



PROCEEDINGS OF THE 1ST ACADEMIC COUNCIL MEETING

HELD ON
WEDNESDAY THE 5TH JANUARY
2022



SAHYADRI
COLLEGE OF ENGINEERING & MANAGEMENT
MANGALURU – 575007



SAHYADRI
COLLEGE OF ENGINEERING & MANAGEMENT
An Autonomous Institution

**PROCEEDINGS OF THE 1ST ACADEMIC COUNCIL OF SAHYADRI COLLEGE OF
ENGINEERING & MANAGEMENT (AUTONOMOUS INSTITUTION) MEETING
HELD ON 5TH JANUARY 2022 IN BLENDED MODE AT BOARD ROOM OF SCEM,
MANGALURU**

MEMBERS PRESENT

Sl. No.	Member Name	Role	Mode of Presence
1.	Dr. Rajesha S	Chairperson	Offline
2.	Dr. Ashok M Raichur	University Nominees	Virtual
3.	Dr. G T Raju		
4.	Dr. Ranganath		Virtual
5.	Prof. T N Nagabhushan	Academic Expert	Virtual
6.	Mr. Bala Thiagarajan	Industry Experts	Virtual
7.	Mr. Nagaraj, Expert		Virtual
8.	Dr. Suresh D S	Special Invitee	Virtual
9.	Dr. Vijaya Kumar B P		Virtual
10.	Mrs. Sweekriti Shetty	Alumnus	Offline
11.	Dr. S. Manjappa	Permanent Invitee	Offline
12.	Dr. Nalini Rebello	Internal Member	Offline
13.	Dr. Shantharajappa		
14.	Mr. Ramesh K G		
15.	Dr. Rashmi Bhandary		
16.	Dr. Joyline DSa		
17.	Dr. Pushpalatha K		
18.	Dr. Anush Bekal		
19.	Dr. Ratishchandra Gatti		
20.	Mr. Hemanth Prabhu		
21.	Dr. Vishal Samartha		
22.	Dr. Prashanth Rao		
23.	Mrs. Shreelatha U A	Faculty Representatives	Offline
24.	Dr. Shreyas Rao		
25.	Mrs. Akhila Thejaswi		
26.	Mr. Vasudeva Rao P V		
27.	Mr. Naveen Kumar	Member Secretary	Offline
28.	Dr. Shamanth Rai		

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Member absent with intimation:

Mr. Nanjappa K G, Additional Director, Factories & Boilers, Bengaluru.

Agenda for the Academic Council Meeting:

Agenda #	Description
1.1	For Information
1.1.1	Welcome and introduction of Academic Council Members
1.1.2	About the Institution
1.1.3	Grant of Autonomous Status
1.1.4	Program Offered for the Academic Year 2021-22
1.1.5	Admission Report for the Academic Year 2021-22
1.2	For Approval
1.2.1	Proposal to Approve Board of Studies (BoS) of Different Disciplines.
1.2.2	a. Proposal to approve the Curriculum Structure, Scheme and Syllabus for the First Year UG Program, effective from the Academic Year 2021-22, as recommended by the respective BoS
	b. Proposal to approve the Curriculum Structure, Scheme and Syllabus for the First Year PG Program, effective from the Academic Year 2021-22, as recommended by the BoS
1.2.3	Proposal to Approve Academic Regulations
1.2.4	Proposal to Approve Question Paper Templates
1.2.5	Proposal to Approve the Academic Calendar
1.2.6	Proposal to Approve the Board of Examiners (BoE)
1.2.7	Proposal to Introduce new certification course in the Aptitude Laboratory
1.2.8	Proposal to Certify the Skill Laboratory course
1.3	Any Other matter with the permission of the Chair

Opening Remarks:

The Chairperson of the Academic Council, Dr. Rajesha S, Principal, Sahyadri College of Engineering & Management, welcomed all the members to the 1st Academic Council Meeting. On behalf of Shri. Manjunath Bhandary, Chairman, Bhandary Foundation, the Chairperson, highlighted the Institute journey from its inception to its Autonomy. He brought out to the notice of the committee that the institution has been practising 56 unique initiatives and attributed it to the institution's success across different dimensions like NAAC, NBA, IEI accreditations, listing in the ARIAA ranking of Top 100 at National Level, Autonomous Status, Best Placements etc. He mentioned that the Academic Statute, effective from the Academic Year 2021-22, is prepared as per the guidelines provided by the UGC and VTU. He informed the Council that, under autonomous structure, a significant emphasis towards introducing Hands-on activities and Integrated Courses is given. He requested all the council members to provide valuable suggestions through their vast experience and knowledge in the field of Technical and Management education sectors, to improve the proposed system and necessary guidance towards the effective



implementation of National Education Policy (NEP) -2020 for the benefit of all the stakeholders.

With these opening remarks, he requested the member secretary of this Council, Dr. Shamanth Rai, IQAC Coordinator, to present the agenda subjects for information, discussions, suggestions and approval.

With the permission of the Chair, Dr. Shamanth Rai presented the item-wise agenda for the 1st Academic Council Meeting of the SCEM.

Agenda 1.1: Information

1.1.1 Welcome and introduction of Academic Council Members

1.1.2 About the Institution

1.1.3 Grant of Autonomous Status

1.1.4 Programs Offered for the Academic Year 2021-22

1.1.5 Admission Report for the Academic Year 2021-22

Dr. Rai welcomed the Chairperson, University Nominees, Academic Experts, Industry Experts Special Invitees, Permanent Invitee, and all the Academic Council members for the college's first Academic Council Meeting. He apprised the members that the Council is formed as per the guidelines of the University Grants Commission (UGC), New Delhi and with the approval of the Visvesvaraya Technological University (VTU), Belagavi.

With the permission of the chair, through videography, the Member Secretary introduced the college, its promoters, the available infrastructure, various initiatives, approvals, awards & recognitions obtained, significant milestones of the college.

For the Academic Year 2021-22, the Member Secretary provided the list of programs offered by the college and the program-wise Admission Report as of 4th January 2022 to the Council.

The Council noted the information provided in (1.1.1 to 1.1.5) and recorded.

Agenda 1.2: For Approval

1.2.1 Proposal to Approve Board of Studies (BoS) of Different Disciplines.

Dr. Rai proposed the list of Board of Studies (BoS) constituted by the Principal as per the guidelines of the UGC and VTU to the Council. The committee comprises the Head of the Department/Senior Faculty member nominated as Chairperson, University Nominee, External Academic and Industrial Experts, Alumni and Special Invitees (as per the course requirement) and Senior Faculty members of the Program. The term of the Office of the



constituted committee is THREE Academic Years.

As per the programs offered by the college, the following FIVE BoS has been constituted:

- BoS in Master of Business Administration (MBA) [Two Years PG Program]
- BoS in Computer Science and Engineering & Allied Programs [Four Years UG Program]
- BoS in Electronics and Communication Engineering [Four Years UG Program]
- BoS in Mechanical Engineering & Allied Programs [Four Years UG Program]
- BoS in Basic Science [includes Science, Humanities & Allied Sciences as required by the above programmes]

A list of all the BoS Members is provided in the enclosure, and the Council is requested for its approval. **(Annexure I)**

The Council appreciated the same and suggested including a few interdisciplinary industry experts based on the technological advancements happening in India and across the Globe. Few external members of the Council volunteered to connect technocrats from different industries to be the members of the BoS, who may contribute towards the curriculum design of the interdisciplinary courses.

Further, Dr. Suresh D S, Dr. Vijay Kumar, Dr. T N Nagabhushan and other members expressed their satisfaction based on the discussions and the responses provided by the college Principal. The Council advised the college team to ensure sufficient incorporation of OBE practices and the NEP-2020 into the Scheme and Syllabus for all the programs in the higher semesters.

The Principal, in his response, expressed that the institute team have designed the curriculum by taking most of the suggestions provided by the Council. He further informed that the Institute had initiated significant activities and initiatives towards creating expertise across programs and accepted the recommendations given by the members.

Finally, the Council approved the constituted BoS.

1.2.2 (A) Proposal to approve the Curriculum Structure, Scheme and Syllabus for the First Year UG Program, effective from the Academic Year 2021-22, as recommended by the respective BoS

Dr. Rai presented the Scheme and Syllabus for UG Programs. He requested the Council for



its suggestions and approval.

After detailed deliberation, the council members suggested emphasizing the Mathematical applications in engineering streams and indicated that the program-specific mathematical application contents be included in the higher semester mathematical courses.

The Council also suggested including the program-specific application topics of Physics and Chemistry in pedagogy.

Dr. Rajesha S accepted the suggestion provided by the Council for giving program-specific concepts and assured the Council that they are being planned for the higher semesters mathematical courses.

The member secretary presented the following list of courses for the First Year Undergraduate Program along with the observations provided by the respective BoS

- ✓ C Programming for Problem Solving
- ✓ C Programming Laboratory
- ✓ Basic Electrical Engineering
- ✓ Basic Electrical Engineering Laboratory
- ✓ Basic Electronics & Communication Engineering
- ✓ Elements of Mechanical Engineering
- ✓ Engineering Visualization
- ✓ Elements of Civil Engineering and Engineering Mechanics
- ✓ Applied Mathematics I
- ✓ Applied Mathematics II
- ✓ Engineering Physics
- ✓ Engineering Physics Laboratory
- ✓ Engineering Chemistry
- ✓ Engineering Chemistry Lab
- ✓ Technical English-I
- ✓ Innovative and Design Thinking (IDT)
- ✓ Technical English -II
- ✓ Scientific Foundations of Health (SFH)



Dr. Shamanth apprised the Council that the BoS provided various suggestions, and the same were incorporated, which were discussed and recommended by the Joint BoS (JBoS). Further, he mentioned that Technical English - I & II are offered as the integrated course, whereas IDT & SFH have been introduced as new courses in line with the VTU syllabus. He requested the Council to provide their suggestions and sought their approval.

The Council advised considering the provision of awarding the credits for the courses having one or lesser credits through Continuous Internal Assessment only. However, the committee also was aware that the University was due to release the Academic Guidelines for awarding degrees effective from the Academic Year 2021-22. Hence, the modification may be incorporated accordingly.

After deliberation, the Council agreed and approved the curriculum structure, scheme, and syllabus for the first year UG program effective from Academic Year 2021-22.

The proposed Scheme and Syllabus for the UG Program effective from the Academic Year 2021-22 is enclosed. (**Annexure II**)

1.2.2 (B) Proposal to approve the Curriculum Structure, Scheme and Syllabus for the First Year PG Program, effective from the Academic Year 2021-22, as recommended by the BoS

Dr. Shamanth presented the Scheme and syllabus for the Master of Business Administration Program (PG Program). He requested the Council for its suggestions and approval.

The Member Secretary presented the list of First semester MBA courses

- ✓ Management & Organizational Behavior
- ✓ Managerial Economics
- ✓ Accounting for Managers
- ✓ Business Statistics
- ✓ Marketing Management
- ✓ Managerial Communication
- ✓ Business Application Software Laboratory
- ✓ Outbound Training

The Member Secretary presented the list of Second Semester MBA courses

- ✓ Human Resource Management



- ✓ Financial Management
- ✓ Research Methodology
- ✓ Operations Research
- ✓ Strategic Management
- ✓ Entrepreneurship & Legal Aspects
- ✓ Data Analysis Laboratory
- ✓ Power BI

The Member Secretary sought the suggestions and approval of the Academic Council

The Council discussed the course contents. Mr. Thiagarajan appreciated the inclusion of the laboratory in PG Program and for the inclusion of Advanced Excel in both semesters.

Dr. Nagabhushan and Mr. Thiagarajan suggested including the concepts of Cyber Laws and Digital Tools used in the Business in the curriculum appropriately or conducting hands-on workshops. The graduates have to be made aware of the cyber laws, their implications, and the business tools used across the industries.

After deliberation, the Council agreed and approved the curriculum structure, scheme, and syllabus for the first year PG program effective from Academic Year 2021-22.

The proposed Scheme and Syllabus for the PG Program effective from the Academic Year 2021-22 is enclosed (**Annexure III**)

1.2.3 Proposal to Approve Academic Regulations

The Member Secretary presented the Academic Regulations formulated for the SCEM. He highlighted the following items for the information of the Council members:

- ✓ Credit-based Semester System
- ✓ Credit Definition
- ✓ Break-up of the regular semesters for UG and PG
- ✓ Supplementary Semester
- ✓ Assessment Process flow for the Curriculum & Teaching
- ✓ CIE Process
- ✓ SEE Process
- ✓ Pedagogical Initiatives



- ✓ Evaluation System
- ✓ Passing Standards in CIE
- ✓ SEE Passing Standards
- ✓ Grading System for UG
- ✓ Grading System for PG
- ✓ Transitional Grades
- ✓ Make-Up Examination
- ✓ Grade Point Average Calculation

The Member Secretary requested the Council for its suggestions and approval

Dr. Ranganath observed the implications in the presented Grading System and advised to address the same. He recommended maintaining the uniform passing standards across the courses. He also suggested bringing out more clarity in the Academic Statute for providing Improvement CIE.

It is also brought to the notice of the Council that the proposed regulations are formulated as per the VTU Autonomous Guidelines 2018, and the university is in the process of formulating the new guidelines, effective from the Academic Year 2021-22. If there is any changes in the new Autonomous Guidelines, the same will be incorporated and circulated to all the members of the Academic Council for their suggestions and approval.

The university nominee Dr. Ranganath expressed that since the draft Academic Regulations formulated for SCEM is not provided for reference. He advised circulating the same after necessary updates.

The draft Academic Rules and Regulations for the Four Year UG and Two Year MBA PG Program updated in line with the new VTU guidelines 2021-22 is enclosed for the suggestion and approval (**Annexure IV**)

1.2.4 Proposal to Approve the Question Paper Templates

The member secretary presented to the Council the question paper template for the following.

- ✓ Continuous Internal Evaluation (CIE) and
- ✓ Semester End Examination (SEE)

The Member Secretary requested the Council for its suggestions and approval.



Dr. Ranganath suggested maintaining the appropriate cognitive level in the question papers so that the students could answer within the stipulated time.

The proposed question paper templates for CIE and SEE is approved (**Annexure V**)

1.2.5 Proposal to Approve the Academic Calendar

Dr. Shamanth Rai presented to the Council the academic calendar (odd semester) for the following.

- ✓ Under Graduate Program
- ✓ Post Graduate Program

The Member Secretary requested the Council for its suggestions and approval.

The proposed Academic Calendar for both UG and PG has been approved by the Council (**Annexure VI**)

1.2.6 Proposal to Approve the Board of Examiners (BoE)

It is proposed to have BoE in each Program/Discipline to conduct and supervise the examination process per the approved Scheme of Evaluation. It is proposed to have BoS Chairman as the Chairman of BoE along with a minimum of THREE to FOUR Internal and External Members considering their seniority and specializations. The term of the BoE Office is THREE Years, and the same may be reconstituted by rotation among the senior faculty members based on the experience and specializations.

The Council, after discussion, authorized the Principal of the College to constitute the BoE in consultation with the Chairman of BoS, and the number of experts may be appropriately nominated according to the specialization required. The BoE is in the following disciplines

- ✓ Computer Science and Engineering & Allied Programs
- ✓ Mechanical Engineering and Allied Programs
- ✓ Electronics and Communication Engineering
- ✓ Basic Science
- ✓ Department of Business Administration

The Council approved the proposed BoE and mentioned that the examination activities is an important confidential assignment. It advised the team to take due care while nominating the member for the BoE.



1.2.7 Proposal to Introduce new certification course in the Aptitude Laboratory

In recent years, the industries have expected various skillsets from engineering graduates. Accordingly, SCEM has taken many initiatives to ensure that its graduates will be more employable. As per the feedback of the industrial HR professionals and inputs from the alumni, the Institute has introduced the Aptitude course in 2017 in a structured manner and is being practised for the benefit of the students.

Under Autonomous status, the college is proposing to certify this course for students to get long-term benefits from the course.

The Council appreciated the initiative. After deliberation, the Council is of the opinion that the proposed course is essential for the current industrial requirement. The above course may also be considered the mandatory credit course for awarding a degree/minor degree/honours degree. The above course may also be considered for integrating with the vocational courses. The Council approved the Proposal to Introduce new certification course in the Aptitude Laboratory.

The Council appreciated the initiatives and suggested the standard evaluation process for awarding the certificate or integrating the course with the vocational course. The Chairperson has accepted the same.

The proposed scheme and training hours of Aptitude lab is enclosed (**Annexure VII**)

1.2.8 Proposal to Certify the Skill Laboratory course

In recent years, the industries have expected various skillsets from engineering graduates. Accordingly, SCEM has taken many initiatives to ensure that its graduates will be more employable. As per the feedback of the industrial HR professionals and inputs from the alumni, the Institute has introduced the Skill Laboratory course in 2018 in a structured manner and is being practised for the benefit of the students.

Under Autonomous status, the college proposes to certify this course for students to get long-term benefits from the course.

The Council appreciated the initiatives and suggested including the grass-root social exploration activities under the Skill lab for the MBA program. The Chairperson has accepted the same.



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COLLEGE OF ENGINEERING & MANAGEMENT
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The Council approved the presented proposal.

The proposed scheme and training hours of Skill lab is enclosed (**Annexure VIII**)

Agenda 1.3: Any Other matter with the permission of the Chair

The council members unanimously congratulated Shri. Manjunath Bhandary, President, Bhandary Foundation, on becoming the Member of Legislative Council (MLC), Govt. of Karnataka. The members requested the Principal to convey their best wishes to him and expressed hope that he will be all successful in his new stint.

Finally, Dr. Shamanth Rai requested Dr. Manjappa S, Director R & D, to provide the concluding remarks.

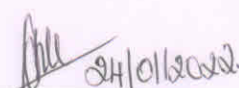
Concluding Remarks:

On behalf of the Institute, Dr. Manjappa S, Director R & D's concluding remarks. He thanked all the members for their valuable time and suggestion. On behalf of the entire team, he assured implementing Autonomous Process in True letter and spirit and satisfying the stakeholders' expectations. He appreciated the external members and university nominees who have helped SCEM directly and indirectly in its holistic development. He requested all the members to continue their support for the Autonomous Process's effective implementation and practice.

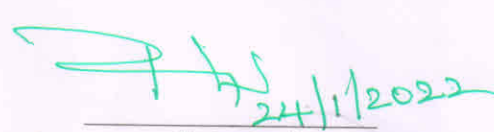
He thanked Shri. Manjunath Bhandary, Chairman, SCEM, for wholehearted involvement in uplifting the quality of the technical education offered by the Institute. On behalf of the Sahyadri family, he proposed to record the support of the Bhandary Foundation; Department of Higher Education, Govt. of Karnataka; Vice-Chancellor and all Officials of VTU; AICTE; UGC; Govt. of India and other Accrediting and Industrial bodies.

He assured that the team Sahyadri would put forward all the effort towards delivering the best Technical and Management education and ensure the overall development of professional education and effective implementation of NEP 2020.

The 1st AC Meeting concluded with thanks to the chair.


Member Secretary




Principal
Sahyadri College of Engineering & Management
Mangalore



SCEM/PRIN/BoS/2021-22/36/3

Date: 08.12.2021

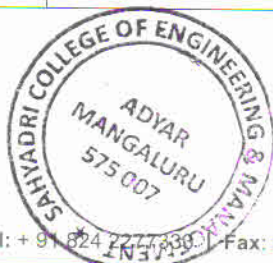
NOTIFICATION

Sub: Constitution of the Board of Studies in Computer Science and Engineering & Allied Branches/ Programs

Ref: VTU/Aca/A12/2021-22/3966; Dated 03.12.2021

The Board of Studies in Computer Science and Engineering & Allied Branches/Programs of Sahyadri College of Engineering & Management, Adyar, Mangaluru is being constituted for the period of three years (2021-24). The constitution is as shown below:

Sl. No.	Role	Name
1.	Chairperson	1. Dr. Pushpalatha K Designation: Associate Professor & Head Ph. No: +918762925818 E-mail id: hod.cs.engg@sahyadri.edu.in 2. Dr. Shamantha Rai B Designation: Associate Professor & Head Ph. No: +91 9986407821 E-mail id: hod.is.engg@sahyadri.edu.in
2.	VTU Nominee	Dr. S D Madhu Kumar Designation: Professor & Dean (SW) Organization: NIT Calicut Ph. No: 9447353393 E-mail id: madhu@nitc.ac.in
3.	Academic Experts	1. Dr. Ashalatha Nayak Designation: Professor and HOD (CSE) Organization: Manipal Institute of Technology Ph. No: 9481753598 E-mail id: asha.nayak@manipal.edu 2. Dr. P.C. Siddhalingaswamy Designation: Associate Professor Organization: Manipal Institute of Technology Ph. No: + 91 9480500025 E-mail id: pcs.swamy@manipal.edu



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		3. Dr. Shashidhar Koolagudi Designation: Associate Professor Organization: NITK Surathkal Ph. No: +91-824-2473413 E-mail id: koolagudi@nitk.edu.in
		4. Dr. Jaidhar CD Designation: Associate Professor & HOD (IT) Organization: NITK Surathkal Ph. No: +91-824-2473553 E-mail id: jaidharc@nitk.edu.in
4	Industry Experts	1. Mr. Lanwin Lobo Designation: Director -Data Science Organization: MResults Pvt. Ltd, Mangaluru Ph. No: +91 9886810841 E-mail id: lanwin.lobo@mresult.com
		2. Mr. Krishnamoorthy Designation: Senior Project Manager Organization: Infosys Limited, Mangaluru Ph. No: +91-72593-09500 E-mail id: moorthyps@gmail.com
5.	Alumni Experts	Mr. Jinto Thomas Designation: Software Developer Organization: Semnox Solution Pvt Ltd Ph. No: +91-9481022759 e-mail id: jinto.thomas@semnox.com
6.	Special Invitees	1. Dr. Pushparaj Shetty Designation: Associate Professor Organization: NITK Surathkal Ph. No: +91 8073268826 E-mail id: prajshetty@ieee.org
		2. Dr. Roshan Fernandes Designation: Associate Professor Organization: NMAMIT, Nitte Ph. No: +91 8217853198 E-mail id: roshan_nmamit@nitte.edu.in
		3. Dr. K G Mohan Designation: Professor Organization: GITAM University, Bengaluru Ph. No: 9845202296 E-mail id: mkabadi@gitam.edu



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7	Senior Faculty nominated by the Principal	1. Dr. Priya R Kamath (Convener) Designation: Associate Professor Ph. No: +91-9008544822 E-mail id: priya.cs@sahyadri.edu.in 2. Mrs. Akhila Thejaswi R Designation: Assistant Professor Ph. No: +91-9448578790 E-mail id: akhila.is@sahyadri.edu.in 3. Mrs. Ankitha K Designation: Assistant Professor Ph. No: +91-9591304742 E-mail id: ankitha.cs@sahyadri.edu.in
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The Chairperson and the Members of the Board of Studies are requested to accept the nominations and carry out the responsibilities of the Board of Studies


Principal





SCEM/PRIN/BoS/2021-22/36/2

Date: 08.12.2021

NOTIFICATION

Sub: Constitution of the Board of Studies in Electronics and Communication Engineering

Ref: Ref: VTU/Aca/A12/2021-22/3966; Dated 03.12.2021

The Board of Studies in Electronics and Communication Engineering of Sahyadri College of Engineering & Management, Adyar, Mangaluru is being constituted for the period of three years (2021-24). The constitution is as shown below:

Sl. No.	Role	Name
1.	Chairperson	Dr. Anush Bekal Associate Professor & Head, Dept. of ECE Sahyadri College of Engineering & Management Ph. No: +91-9844324123 E-mail id: hod.ec.engg@sahyadri.edu.in
2.	VTU Nominee	Dr. Ramesh Kestur Visiting and Adjunct faculty IIIT-Bangalore Ph. No: 9880642856 E-mail id:rkestur@gmail.com
3.	Academic Experts	1. Dr. Aswathakumara M Professor Department of Electronics and Communication Engineering School of Engineering and Technology Kengeri Campus, Christ (Deemed to be University) Ph. No: 9538797640 E-mail id: aswathakumara.m@christuniversity.in



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		2. Dr. M.S Bhat Professor (HAG) Department of Electronics & Communication Engineering, NITK-Surathkal Ph. No: 0824-2473507 E-mail id: msbhat@nitk.edu.in
		3. Dr. Sampath Kumar V Associate Dean Department of ECE Dr. A.P.J. Abdul Kalam Technical University (APJAKTU), Lucknow Ph. No: 9873184185 E-mail id:sampath.kumarjss@gmail.com
4	Industry Experts	1. Mr. Pratap Neelashetty Senior ASIC Digital Design Engineer II Synopsys India Pvt. Ltd, Bangalore E-mail id:pratapn@synopsys.com Ph. No: 7795350324
		2. Mr. Damodhar M S Business Manager Entuple Technologies Pvt. Ltd, Bangalore Ph. No: 9972044353 E-mail id:damodara.ms@entuple.com
		3. Ms. Apurva Verma Senior Regional Manager Academic Engagements, ARM Ltd, Bangalore Ph. No: 9606482184 E-mail id:apurvavarma.r@gmail.com
		4. Mr. Radhey Shyam Gupta Technical Leader STMicroelectronics, Bangalore Ph. No: 8123326539 E-mail id:shyamradhey.gpt@gmail.com

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5.	Alumni Representative	Mr. Vardhana M Design Engineer NXP Semiconductors, Bangalore. Ph. No: 8971359064 E-mail id: vardhana@gmail.com
6.	Special Invitees	Mr. Raghavendra G Shetty Designation: CEO Organization: RDL Technologies PVT LTD Ph. No: 9886271407 E-mail id: raghav@rdltech.in
7.	Senior Faculty nominated by the Principal	1. Dr. Sandeep Bhat (Convener) Designation: Associate Professor Ph. No: +91-9448965401 E-mail id: sandeep.ec@sahyadri.edu.in 2. Dr. Joyline Dsa Designation: Associate Professor Ph. No: +91-9682800028 E-mail id: joyline.ec@sahyadri.edu.in

The Chairperson and the Members of the Board of Studies are requested to accept the nominations and carry out the responsibilities of the Board of Studies.


Principal





SCEM/PRIN/BoS/2021-22/36

Date: 08.12.2021

NOTIFICATION

Sub: Constitution of the Board of Studies in Mechanical Engineering

Ref: VTU/Aca/A12/2021-22/3966; Dated 03.12.2021

The Board of Studies in Mechanical Engineering of Sahyadri College of Engineering & Management, Adyar, Mangaluru is being constituted for the period of three years (2021-24). The constitution is as shown below:

Sl. No.	Role	Name
1.	Chairperson	Dr. Rathishchandra R Gatti Designation: Professor & Head of Mechanical Engineering Ph. No: +91-9481847572 E-mail id: rathishchandra.mech@sahyadri.edu.in
2.	VTU Nominee	Prof. N Yagnesh Sharma Designation: Professor (Retd), Dept. of Mechanical and Manufacturing Engineering, Organization: MIT, Manipal Ph. No: 09480485082 E-mail id: Yagnesh.sharma@gmail.com nysharma@hotmail.com
3.	Academic Experts	1. Dr. H. K. Govindaraju Designation: Professor & Vice Principal Organization: BMSIT Bangalore Ph. No: 9663398689 E-mail id: viceprincipal@bmsit.in
		2. Prof. Srinivas Pai Designation: Professor & DCoE Organization: NMAMIT, Nitte Ph. No: +91-9448296723 E-mail id: srinivasapai@nitte.edu.in
		3. Dr. Srinath M S Designation: Professor Organization: Malnad College of Engineering Hassan Ph. No: +91-8277421917 E-mail id: mss@mcehassan.ac.in



Phs 8/12/2021

4	Industry Experts	1. Mr. Sudhir Sanna Designation: CEO & Director Organization: Robotics & Automation MNC Ph. No: +91-9767430361 E-mail id: sudsan2014@gmail.com
		2. Mr. Sumanth Rao GS Designation: CEO & Managing Director Organization: KOSSA Autotec Pvt. Limited Ph. No: +91-9620336223 E-mail id: Sumanthrao.gs@gmail.com
5	Alumni Experts	Mr. Bhavik Das Designation: Engineer –Mechanical Design & Sales Organization: Rethium Power Tech LLP, Bengaluru Ph. No: +91- 8904059619 E-mail id: bhavik.das@rethium.com
6	Special Invitees	1. Mr. Sundaram Sunder Designation: CEO Organization: Caliper Engineering and Lab Pvt Ltd Ph. No: 8940046168 E-mail id: ceo@caliperlab.in
		2. Mr. Raghavendra Shetty Designation: CEO Organization: RDL Technologies PVT LTD Ph. No: +91- 9886271407 E-mail id: raghav@rdltech.in
		3. Dr. Ravichandra K.R. Designation: Assistant Professor Organization: BMSIT Bangalore Ph. No: +91- 998062373 E-mail id: ravichandra@bmsit.in
7	Senior faculty nominated by the Principal	1. Mr. Lawrence Fernandes (Convener) Designation: Assistant Professor Ph. No: +91- 9449102115 E-mail id: lawrence.mech@sahyadri.edu.in 2. Dr. Harsha Kumar M K Designation: Associate Professor Ph. No: +91- 9980019001 E-mail id: harshakumar.me@sahyadri.edu.in

The Chairperson and the Members of the Board of Studies are requested to accept the nominations and carry out the responsibilities of the Board of Studies.



[Signature]
Principal



SCem/PRIN/2021-22/BoS/36/4

Date: 08.12.2021

NOTIFICATION

Sub: Constitution of the Board of Studies in Basic Science

Ref: VTU/Aca/A12/2021-22/3966; Dated 03.12.2021

The Board of Studies in Basic Science of Sahyadri College of Engineering & Management, Adyar, Mangaluru is being constituted for the period of three years (2021-24). The constitution is as shown below:

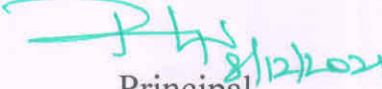
Sl. No.	Role	Name
1.	Chairperson	Dr. Prashantha Rao Designation: Associate Professor & Head Ph. No: 9448983914 e-mail id: hod.basicscience.engineering@sahyadri.edu.in
2.	VTU Nominee	Dr. Arun M Isloor Designation: Professor Organization: Department of Chemistry, NITK, Surathkal Ph. No: 9448523990 E-mail id: isloor@yahoo.com
3.	Academic Experts	1. Dr. V. Upadyaya Designation: Rtd. Professor Organization: Department of Physics, MIT Manipal Ph. No: 9916116217 E-mail id: Email: vyasa.upadhyaya@gmail.com
		2. Dr. Shashirekha B Rai Designation: Professor Organization: Department of Mathematics, NMAMIT Ph. No: 9845064130 E-mail id: sbrai8757@gmail.com
4.	Special Invitees	Prof. Hemanth Prabhu Designation: Associate Professor & Head Organization: Civil Engineering Department, Sahyadri College of Engineering & Management, Mangaluru Ph. No: 9448972015 E-mail id: hemantha.civil@sahyadri.edu.in



PHS
8/12/2021

5.	Senior Faculty nominated by the Principal	1. Dr. Savitha M B(Convener) Designation: Associate Professor Ph. No: +91-7899262515 e-mail id: savitha.chem@sahyadri.edu.in 2. Dr. F. Jyothi Serrao Designation: Associate Professor Ph. No: +91-9448621477 e-mail id: jyothi.phy@sahyadri.edu.in 3. Mrs. Soumyashree Designation: Assistant Professor Ph. No: +91-9108878976 e-mail id: soumyashree.eng@sahyadri.edu.in
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The Chairperson and the Members of the Board of Studies are requested to accept the nominations and carry out the responsibilities of the Board of Studies.


Principal 8/12/2021





SCEM/PRIN/BoS/2021-22/36/1

Date: 08.12.2021

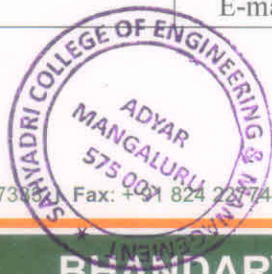
NOTIFICATION

Sub: Constitution of the Board of Studies in Department of Business Administration

Ref: VTU/Aca/A12/2021-22/3966; Dated 03.12.2021

The Board of Studies in the Department of Business Administration of Sahyadri College of Engineering & Management, Adyar, Mangaluru is being constituted for the period of three years (2021-24). The constitution is as shown below:

Sl. No.	Role	Name
1.	Chairperson	Dr. Vishal Samartha Designation: Professor & Director Ph. No: 9886184413 E-mail id: director.mba@sahyadri.edu.in
2.	VTU Nominee	Dr. Raveendranath Nayak Designation: Professor and Director Organization: Manipal Institute of Management, Manipal Academy of Higher Education Manipal, Ph. No: +9164623286 E-mail id: ravi.nayak@manipal.edu
3.	Academic Experts	1. Dr. Mallikarjunappa Designation: Professor Organization: Department of Management Studies, Central University of Kerala, Kasaragod - 671 316 Ph. No: +91 94 805 00025 E-mail id: tmmallik@rediffmail.com 2. Dr. Lakshminarayanan S. Designation: Professor Organization: Manipal Institute of Management – MAHE, Manipal Ph. No: +919880199109 E-mail id: sl.narayanan@manipal.edu
4	Industry Experts	1. Mr. Ananth Ravi, Designation: Former VP Organization: Reliance Industries and management, Consultant, E 704, Juniper Star ETA Gardens apartments, Binny Mill compound, Magadi road, Bangalore Ph. No: 9867500114 E-mail id: ananth.ravi@gmail.com



Ph 8/12/2021

		2. Mr. Mohan Kumar Designation: Practice Head Organization: Wipro Ltd Bangalore Ph. No: +91 99 002 60665 E-mail id: mohan.kumar1@wipro.com
5.	Alumni Experts	Ms. Kavya Gatty Designation: People Advisor Organization: TESCO 2-303, Kattapuni house, Konaje post, Konaje -574199 Ph. No: +91 97 430 82468 E-mail id: kavyagatty1@gmail.com
6.	Special Invitees	1. Mr. Dinesh Prasad, Designation: Chairman, Organization: Noble Business school, Ph. No: +91 9741109550 E-mail id: hvdineshprasad@gmail.com 2. Mr. Dheeraj Shetty Designation: General manager HR, IR & Admin Organization: JBF Petrochemicals Ltd. MSEZ, Mangalore Ph. No: +919886757287 E-mail id: nandheeraj@gmail.com
7.	Senior Faculty nominated by the Principal	1. Mrs. Sushma V(Convener) Designation: Assistant Professor Ph. No: +91-9632053663 E-mail id: sushma.mba@sahyadri.edu.in 2. Ms. Monisha Shetty Designation: Assistant Professor Ph. No: +91- 9742069488 E-mail id: monisha.mba@sahyadri.edu.in 3. Mr. Samarth Shenoy Designation: Assistant Professor Ph. No: +91- 7204128432 E-mail id: samarth.mba@sahyadri.edu.in

The Chairperson and the Members of the Board of Studies are requested to accept the nominations and carry out the responsibilities of the Board of Studies.

[Signature]
Principal



Scheme and Syllabus of Under Graduate Program
Applicable to B.E. Programs of the Autonomous
Scheme
(With Effect from the Academic Year: 2021-22)



SAHYADRI

COLLEGE OF ENGINEERING & MANAGEMENT

Autonomous Institute, Affiliated to Visvesvaraya Technological University, Belagavi,

Approved by AICTE, New Delhi & Government of Karnataka

Accredited by NBA (CSE/ISE/ME/ECE) & NAAC with 'A' Grade

Sahyadri Campus, Adyar, Mangaluru - 575007, Karnataka, India.

E-mail: principal@sahyadri.edu.in Website: sahyadri.edu.in

Ph.: +91 824227722 / 333, Mobile: +91 94498 45959



Scheme of Teaching for the Academic Year 2021-22
Bachelor of Engineering I Semester
Physics Cycle (Common for All the Engineering Disciplines)

Sl. No	Course and Course Code		Course Title	Teaching Department	Paper Setting Board	Teaching Hours / Week			Examination				Credits
						Theory Lecture	Tutorial	Practical / Drawing	Duration in hours	CIE Marks	SEE Marks	Total Marks	
						L	T	P					
1	BSC	21MAT11	Applied Mathematics I	Maths	Maths	2	2	0	03	50	50	100	3
2	BSC	21PHY12	Engineering Physics	Physics	Physics	2	2	0	03	50	50	100	3
3	ESC	21ELE13	Basic Electrical Engineering	EC	EC	2	2	0	03	50	50	100	3
4	ESC	21CIV14	Elements of Civil Engineering & Mechanics	Civil	Civil	3	0	0	03	50	50	100	3
5	ESC	21EVL15	Engineering Visualization	ME	ME	2	0	2	03	50	50	100	3
6	BSC	21PHYL16	Engineering Physics Laboratory	Physics	Physics	0	0	2	03	50	50	100	1
7	ESC	21ELEL17	Basic Electrical Engineering laboratory	EC	EC	0	0	2	03	50	50	100	1
8	HSM C	21EGH18	Technical English 1	Humanities	Humanities	1	0	2	03	50	50	100	2
9		21SFH19	Scientific foundations of Health					2	03	50	50	100	1
Total						12	6	10	27	450	450	900	20



Scheme of Teaching for the Academic Year 2021-22
Bachelor of Engineering I Semester
Chemistry Cycle (Common for All the Engineering Disciplines)

Sl. No:	Course and Course Code		Course Title	Teaching Department	Paper Setting Board	Teaching Hours / Week			Examination				Credits
						Theory Lecture	Tutorial	Practical / Drawing	Duration in hours	CIE Marks	SEE Marks	Total Marks	
						L	T	P					
1	BSC	21MAT11	Applied Mathematics I	Maths	Maths	2	2	0	03	50	50	100	3
2	BS C	21CHE12	Engineering Chemistry	Chemistry	Chemistry	2	2	0	03	50	50	100	3
3	ESC	21CPS13	C Programming for Problem Solving	CS	CS	2	2	0	03	50	50	100	3
4	ESC	21ELN14	Basic Electronics and Communication Engineering	EC	EC	2	2	0	03	50	50	100	3
5	ESC	21ME15	Elements of Mechanical Engineering	ME	ME	2	0	2	03	50	50	100	3
6	BSC	21CHEL16	Engineering Chemistry Laboratory	Chemistry	Chemistry	0	0	2	03	50	50	100	1
7	ESC	21CPL17	C Programming Laboratory	CS	CS	0	0	2	03	50	50	100	1
8	HS MC	21EGH18	Technical English 1	Humanities	Humanities	1	0	2	03	50	50	100	2
9		21IDT19	Innovation and Design Thinking			0	2	0	03	50	50	100	1
Total						11	10	08	27	450	480	900	20



Scheme of Teaching for the Academic Year 2021-22
Bachelor of Engineering II Semester
Physics Cycle (Common for All the Engineering Disciplines)

Sl. No:	Course and Course Code		Course Title	Teaching Department	Paper Setting Board	Teaching Hours / Week			Examination				Credits
						Theory Lecture	Tutorial	Practical / Drawing	Duration in hours	CIE Marks	SEE Marks	Total Marks	
						L	T	P					
1	BSC	21MAT21	Applied Mathematics II	Maths	Maths	2	2	0	03	50	50	100	3
2	BSC	21PHY22	Engineering Physics	Physics	Physics	2	2	0	03	50	50	100	3
3	ESC	21ELE23	Basic Electrical Engineering	EC	EC	2	2	0	03	50	50	100	3
4	ESC	21CIV24	Elements of Civil Engineering & Mechanics	Civil	Civil	3	0	0	03	50	50	100	3
5	ESC	21EV25	Engineering Visualization	ME	ME	2	0	2	03	50	50	100	3
6	BSC	21PHYL26	Engineering Physics Laboratory	Physics	Physics	0	0	2	03	50	50	100	1
7	ESC	21ELEL27	Basic Electrical Engineering laboratory	EC	EC	0	0	2	03	50	50	100	1
8	HSM C	21EGH28	Technical English II	Humanities	Humanities	1	0	2	03	50	50	100	2
9		21SFH29	Scientific foundations of Health					2	03	50	50	100	1
Total						12	6	10	24	450	450	900	20



Scheme of Teaching for the Academic Year 2021-22
Bachelor of Engineering II Semester
Chemistry Cycle (Common for All the Engineering Disciplines)

Sl. No:	Course and Course Code		Course Title	Teaching Department	Paper Setting Board	Teaching Hours / Week			Examination				Credits
						Theory Lecture	Tutorial	Practical / Drawing	Duration in hours	CIE Marks	SEE Marks	Total Marks	
						L	T	P					
1	BSC	21MAT21	Applied Mathematics II	Maths	Maths	2	2	0	03	50	50	100	3
2	BSC	21CHE22	Engineering Chemistry	Chemistry	Chemistry	2	2	0	03	50	50	100	3
3	ESC	21CPS23	C Programming for Problem Solving	CS	CS	2	2	0	03	50	50	100	3
4	ESC	21ELN24	Basic Electronics and Communication Engineering	EC	EC	2	2	0	03	50	50	100	3
5	ESC	21ME25	Elements of Mechanical Engineering	ME	ME	2	0	2	03	50	50	100	3
6	BSC	21CHEL26	Engineering Chemistry Laboratory	Chemistry	Chemistry	0	0	2	03	50	50	100	1
7	ESC	21CPL27	C Programming Laboratory	CS	CS	0	0	2	03	50	50	100	1
8	HSMC	21EGH28	Technical English II	Humanities	Humanities	1	0	2	03	50	50	100	2
9		21IDT29	Innovation and Design Thinking			0	2	0	03	50	50	100	1
Total						11	10	08	24	450	450	900	20

APPLIED MATHEMATICS I					
Course Code		21MAT11		CIE Marks	50
Teaching Hour/Week (L:T:P:S)		2:2:0:1		SEE Marks	50
Total Hours of Teaching-Learning		52		Total Marks	100
Credits		03		Exam Hours	03
COs	Description				CL
CO1	Apply the knowledge of calculus to solve problems related to polar curves and their applications in determining the bentness of a curve				CL3
CO2	Learn the notion of partial differentiation to calculate rates of change of multivariate functions and solve problems related to composite functions and Jacobians				CL3
CO3	Apply the concept of change of order of integration and variables to evaluate multiple integrals and their usage in computing the area and volumes				CL3
CO4	Solve first-order linear/nonlinear differential equation analytically using standard methods				CL2
CO5	Make use of matrix theory for solving system of linear equations and compute eigenvalues and eigenvectors required for matrix diagonalization process				CL3
CO – Assessment Mapping					
Course Outcomes	Continuous Internal Evaluation (CIE)				Semester End Exam
	Test 1	Test 2	Test 3	Assignment/Activities	
	10%	10%	10%	20%	
CO 1	x			x	x
CO 2	x	x		x	x
CO 3		x		x	x
CO 4			x	x	x
CO 5			x	x	x
Course Contents					
Module 1					
Differential Calculus I: Review of elementary differential calculus, nth derivative of elementary functions, Leibnitz Rule, Polar curves - the angle between the radius vector and tangent, Angle between Two curves, Pedal Equation. Curvature and radius of curvature- Cartesian and polar forms; Centre and circle of curvature - applications to evolutes and involutes					
Note: The derivation is not necessary for Radius of Curvature and Centre of Curvature.					
Module 2					
Differential Calculus II: Taylor's and Maclaurin's series expansions for one variable (statements and problems) indeterminate forms - L'Hospital's rule. Partial differentiation; Total derivatives-differentiation of composite functions. Maxima and minima for a function of two variables. Applications of maxima and minima with illustrative examples. Jacobians-simple problems					
Module 3					
Integral Calculus: Review of elementary integral calculus. Multiple integrals: Evaluation of double and triple integrals. Complementation of double integrals- change of order of integration and change into polar coordinates. Applications to find area volume. Beta and Gamma functions: Definitions, Relation between beta and gamma functions and simple problems					
Module 4					

Differential Equations: Nonlinear differential equations Introduction to general and singular solutions; Solvable for p only; Clairaut's and reducible to Clairaut's equations only. Exact and reducible to exact differential equations. Bernoulli's equation. Applications of ODE's-orthogonal trajectories, Newton's law of cooling and L R circuits.

Module 5

Linear Algebra: Rank of a matrix-echelon form. Solution of the system of linear equations consistency. Gauss-elimination method, Gauss- Jordan method and Approximate solution by Gauss-Seidel method. Eigenvalues and eigenvectors Rayleigh's power method. Diagonalization of a square matrix of order two.

CO-PO-PSO Mapping

COs.	Programme Outcomes (POs)												Programme Specific Outcome (PSO)		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3										1			
CO2	3	3				1						1			
CO3	3	3							1			1			
CO4	3	3				1						1			
CO5	3	3			1				1	1		1			

Text Book

1. **Higher Engineering Mathematics**, B.S. Grewal , Khanna Publishers, 43rd Ed., 2015.
2. **Advanced Engineering Mathematics**, E. Kreyszig , John Wiley & Sons, 10th Ed.(Reprint), 2016.

Reference Books

1. **Advanced Engineering Mathematics** C.Ray Wylie, Louis C.Barrett:, 6th Edition,
2. **Higher Engineering Mathematics** B.V.Ramana: 11th Edition, Tata McGraw-Hill.
3. **Engineering Mathematic for Semester I and II**, Gupta C.B, Sing S.R and Mukesh Kumar:, Mc- Graw Hill Education(India) Pvt. Ltd 2015.
4. **Higher Engineering Mathematics** H.K.Dass and Er. Rajnish Verma: S.Chand Publication (2014).
5. **Calculus** James Stewart: Cengage publications, 7th Web links and Video Lectures (e-Resources):

Reference Web Links:

1. <https://www.youtube.com/watch?v=1HDRmEGdb9A>
2. <https://www.youtube.com/watch?v=AQHcZklcltl>
3. <https://www.youtube.com/watch?v=8Kg21jBCm-k>
4. <https://www.youtube.com/watch?v=Znnhpm90Jzc>
5. <https://www.youtube.com/watch?v=Wa6kaCwyYRk>

ENGINEERING PHYSICS					
Course Code		21PHY12/22		CIE Marks	50
Teaching Hour/Week (L:T:P:S)		2:2:0:1		SEE Marks	50
Total Hours of Teaching-Learning		52		Total Marks	100
Credits		03		Exam Hours	03
COs	Description				CL
CO1	Identify and apply the waves and oscillations of various types in real-life applications.				CL3
CO2	Apply the fundamentals of physical properties of materials in beams, cantilevers and pendulums and recognize their engineering applications.				CL3
CO3	Comprehend the background of laser and optical fibres, their construction, working, types and applications.				CL3
CO4	Illustrate the various measurement techniques for material characterization by employing the concepts of revolutionary Quantum Mechanics.				CL3
CO5	Identify and select the materials such as conductors, semiconductors and dielectric materials for the relevant applications.				CL3
CO – Assessment Mapping					
Course Outcomes	Continuous Internal Evaluation (CIE)				Semester End Exam
	Test 1	Test 2	Test 3	Assignment/Activities	
	10%	10%	10%	20%	50%
CO 1	x			x	x
CO 2	x	x		x	x
CO 3		x		x	x
CO 4			x	x	x
CO 5			x	x	x
Course Contents					
Module 1- Oscillations and Waves					
Free Oscillations:					
Review of SHM, derivation of equation for SHM, Mechanical simple harmonic oscillators: mass suspended to spring (vertical oscillations), Equation of motion for free oscillations, Natural frequency of oscillations.					
Damped and forced oscillations:					
Theory of damped oscillations: over damping, critical & under damping. Theory of forced oscillations and resonance, examples for mechanical resonance, quality factor and sharpness of the resonance.					
Shock waves:					
Mach number, classification of speed of objects based on Mach number (subsonic, supersonic, Transonic and hypersonic), definition, description and properties of Shock waves, Construction and working of Reddy shock tube, applications of shock waves.					
Numerical problems					

Module 2- Elastic Properties of Materials
Elasticity: Review of concept of elasticity, plasticity, stress, strain, tensile stress, shear stress, compressive stress, Hooke's law, different elastic moduli: Poisson's ratio, Expression for Young's modulus (Y), Bulk modulus (K) and Rigidity modulus (η) in terms of α and β. Relation between elastic constants. Limits of Poisson's ratio. Bending of beams: Neutral surface and neutral axis, Mention of expression for bending moment and bending moment of a beam with circular and rectangular cross-sections. Single cantilever-derivation of expression for Young's' modulus. Torsion of cylinder: Expression for couple per unit twist of a solid cylinder (Derivation), Torsional Pendulum-Expression for period of oscillation. Numerical problems
Module 3 - Lasers and Optical Fibers
Lasers: Interaction of radiation with matter, Review of spontaneous and stimulated processes, Einstein's coefficients-derivation of expression for energy density. Requisites of a Laser system. Conditions for laser action. Principle, Construction and working of CO₂ and semiconductor Lasers. Application of Lasers in Defence (Laser range finder) and medical applications-Eye surgery and skin treatment. Optical fibres: Basics of optical fiber, Description of propagation mechanism of light through an optical fiber, angle of acceptance, Numerical aperture (NA)-derivation. Modes of propagation and mention types of optical fibers based on refractive index profile. Attenuation: Causes of attenuation and Mention of expression for attenuation coefficient. Application of optical fiber (point-to-point communication), Merits and limitations of optical fiber. Numerical problems
Module 4- Quantum Mechanics and Instrumentation Techniques for Material Characterisation
Quantum mechanics: Introduction to Quantum mechanics, Wave nature of particles, Heisenberg's uncertainty principle, physical significance and application-non-confinement of the electron in the nucleus. Wave function - properties, significance: Probability density, Normalization. Schrodinger time-independent wave equation-derivation, Application of Schrodinger's wave equation – to find the Eigen functions and Energy Eigenvalues of a particle in a potential well. Instrumentation Techniques for Material Characterisation: Nanomaterial's and importance of material characterization. Principle, construction and working of X-ray Diffractometer, crystal size determination by Scherrer equation. Principle, construction, working of Atomic Force Microscope (AFM), and similar instrumentation techniques and applications. Numerical problems.

Module 5- Material Science

Quantum Free electron theory of metals:

Review of classical free electron theory, mention of failures. Assumptions of Quantum Free electron theory (QFET), Mention of expression for density of states. Fermi-Dirac statistics (qualitative), Fermi factor & its temperature dependence, Fermi level, Fermi energy, Mention the expression for the electrical conductivity based on QFET, Success of QFET.

Physics of Semiconductor:

Fundamentals of semiconductors, Fermi level in intrinsic semiconductors, Mentioning of the concept of charge concentration (Electron and Hole) Conductivity of semiconductors (derivation). Hall effect (qualitative).

Dielectric materials:

Fundamentals of dielectrics, dipole moment, Polarization of dielectric materials, types of polarization, polarizability, polar and non-polar dielectrics, internal fields in a solid, Clausius-Mossotti equation (Derivation), mention of solid, liquid and gaseous dielectrics with one example and application each.

Numerical problems

CO-PO-PSO Mapping

COs.	Programme Outcomes (POs)												Programme Specific Outcome (PSO)		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2				1				1		1			
CO2	3	2				1				1		1			
CO3	3	2				1	1			1		1			
CO4	3	2				1				1		1			
CO5	3	2				1				1		1			

Text Book

1. **Textbook of Engineering Physics-** M.N. Avadhanulu and P.G. Kshirsagar, 10th revised Ed, S. Chand & Company Ltd, New Delhi, 2014
2. **Engineering Physics** by S.P Basavaraju, 2018 Edition.
3. **Engineering Physics**-Gaur and Gupta-Dhanpat Rai Publications-2017

Reference Books

1. **Physics for Scientists and Engineers with Modern Physics**, 10th edition-2018 by Raymond Serway and John Jewett
2. **Eisberg and Resnick**, Introduction to Quantum Physics
3. **Solid State Physics**-S O Pillai, 8th Ed- New Age International Publishers-2018
4. **Nanocomposite materials**-Synthesis, properties and applications, CRC Press, 2016.

Reference Web Links:

1. <https://nptel.ac.in/courses/115/106/115106119/> (Waves & Oscillations)
2. <https://nptel.ac.in/courses/113/103/113103072/> (Elasticity)
3. <https://nptel.ac.in/courses/115/102/115102124/> (Laser)
4. <https://nptel.ac.in/courses/115/104/115104096/> (Quantum Mechanics)
5. https://onlinecourses.nptel.ac.in/noc20_mm14/preview (Material Characterization)

BASIC ELECTRICAL ENGINEERING					
Course Code		21ELE13/23		CIE Marks	50
Teaching Hour/Week (L:T:P:S)		2:2:0:1		SEE Marks	50
Total Hours of Teaching-Learning		52		Total Marks	100
Credits		03		Exam Hours	03
COs	Description				CL
CO1	Apply the concepts of KVL/KCL in solving DC circuits and imparting fundamental concepts of AC circuits.				CL3
CO2	Analyze and compare single-phase and three-phase (star and delta Connections) systems.				CL3
CO3	Demonstrate the construction and basic working principles of Transformers and performance characteristics of electrical DC Machines.				CL3
CO4	Explain the three-phase synchronous generators and three-phase induction motor and their performance analysis.				CL2
CO5	Demonstrate the Electrical transmission and distribution, fundamental electrical circuit for home appliances and safety precautions.				CL2
CO – Assessment Mapping					
Course Outcomes	Continuous Internal Evaluation (CIE)				Semester End Exam
	Test 1	Test 2	Test 3	Assignment/Activities	
	10%	10%	10%	20%	
CO 1	x			x	x
CO 2	x	x		x	x
CO 3		x		x	x
CO 4			x	x	x
CO 5			x	x	x
Course Contents					
Module 1					
DC circuits:					
Ohm’s law and Kirchhoff’s laws, analysis of series, parallel and series – parallel circuits excited by independent voltage sources. Power and energy, maximum power transfer theorem applied to the series circuit and its applications.					
Single-phase circuits:					
Generation of sinusoidal voltage, frequency of generated voltage, average value, RMS value, form and peak factors. Voltage and current relationship, with phasor diagram, in R, L and C circuits.					
Module 2					
Single-phase circuits (continued):					
Analysis of R-L, R-C, R-L-C Series and Parallel circuits, Real power, reactive power, apparent power and Power factor. Measurement of power.					
Three-phase circuits:					
Generation of three-phase power, representation of balanced star and delta connected loads, phase and line relations of voltages and currents from phasor diagrams, advantages of three-phase systems. Measurement of three-phase power by two wattmeter method, simple problems.					

Module 3															
DC Machines: (a) Principle of operation, constructional details, induced emf expression, types of generators and relation between induced emf and terminal voltage. (b) Principle of operation, back emf and torque equations, types of motors, characteristics (shunt and series only) and applications. Transformers: Necessity of transformer, the principle of operation, Types and construction of single-phase transformers, emf equation, losses, variation of losses with respect to load, efficiency and condition for maximum efficiency.															
Module 4															
Three-phase induction Motors: Concept of rotating magnetic field, Principle of operation, constructional motor features, types – squirrel cage and wound rotor, slip and problems on the slip, the significance of slip, applications. Three-phase synchronous generators: Principle of operation, constructional details of salient and non-salient pole generators, synchronous speed, frequency of generated voltage, emf equation, with concept of winding factor (excluding the derivation and calculation of winding factors).															
Module 5															
Power transmission and distribution: Concept of HVAC transmission and HVDC transmission. Low voltage distribution system (400 V and 230 V) for domestic, commercial. Concept of the grid and the need for interconnection of grids. Conditions for grid connection. Regulatory bodies in the Electrical power sector and their roles. Power sector scenario in India. Personal safety measures: Electric Shock, Earthing and its types, Safety Precautions to avoid shock and Residual Current Circuit Breaker (RCCB). Equipment Safety measures: Working principle of Fuse and Miniature circuit breaker (MCB), merits and demerits															
CO-PO-PSO Mapping															
COs.	Programme Outcomes (POs)												Programme Specific Outcome (PSO)		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3										1			
CO2	3	3										1			
CO3	3	3										1			
CO4	3	2										1			
CO5	3	2				2	1					1			

Text Book

1. **Basic Electrical Engineering** D. C. Kulshreshtha McGraw-Hill Education Revisedfirst-edition, 2019.
2. **Electrical and Electronic Technology** Edward Hughes Pearson 12th edition, 2016.
3. **Basic Electrical Engineering** D.P. Kothari I.J.Nagrath McGraw-Hill Education 4th Edition,2019.

Reference Books

1. **Fundamentals of Electrical Engineering and Electronics** B.L.Theraja S Chand andCompany Reprint Edition 2013.
2. **Principles Electrical Engineering and Electronics** V.K Mehata, Rohit Mehta S Chand and Company 2nd edition, 2015.

Reference Web Links:

1. <https://nptel.ac.in/courses/108/105/108105053>
2. <https://nptel.ac.in/courses/108/108/108108076/>

ELEMENTS OF CIVIL ENGINEERING AND ENGINEERING MECHANICS					
Course Code		21CIV14/24		CIE Marks	50
Teaching Hour/Week (L:T:P:S)		3:0:0:1		SEE Marks	50
Total Hours of Teaching-Learning		39		Total Marks	100
Credits		03		Exam Hours	03
COs	Description				CL
CO1	Identify the basic qualities of building materials used in construction and different scopes in civil engineering.				CL2
CO2	Apply the fundamentals of Engineering Mechanics and analyse the Coplanar force system.				CL3
CO3	Solve the equilibrium condition of the body and compute the frictional forces on a rigid body.				CL3
CO4	Estimate centroid and moment of inertia of different geometrical figures.				CL3
CO5	Compute the support reactions of determinate beams and find the member forces of trusses under the action of different types of loads and supports.				CL3
CO – Assessment Mapping					
Course Outcomes	Continuous Internal Evaluation (CIE)				Semester End Exam
	Test 1	Test 2	Test 3	Assignment/Activities	
	10%	10%	10%	20%	
CO 1	x			x	x
CO 2	x	x		x	x
CO 3		x		x	x
CO 4			x	x	x
CO 5			x	x	x
Course Contents					
Module 1					
Introduction to Civil Engineering: Introduction to Structural Engineering, Geotechnical Engineering, Construction Technology, Hydraulics, Water Resources and Irrigation Engineering, Transportation Engineering, Environmental and Sanitary Engineering, Earthquake Engineering. Role of Civil Engineer in infrastructural development.					
Introduction to Building Materials: Bricks: properties and tests, bonding in Brick Masonry, Stonemasonry, Cement: properties and tests. Concrete: constituents, grades, properties and tests, RCC, curing of concrete and mortar.					
Module 2					
Analysis of Force system: Force and its characteristics, Force systems, Principle of transmissibility of forces, Resolution and Composition of forces, Resultant,					
Concurrent Force System: Law of the parallelogram of forces and its limitations, method of resolution, Polygon law of forces, problems on Coplanar Concurrent force system.					
Nonconcurrent force system: Moment of a force, Varignon’s theorem, couple and its characteristics, problems on Coplanar non-concurrent force system.					
Module 3					
Equilibrium of Forces: Equilibrium, Equilibrant, Conditions of equilibrium for Coplanar concurrent and non-concurrent force system, Lami’s theorem, Numerical problems on rollers and connected bodies.					

Friction: Friction, Force of friction, Limiting frictional force, Kinetic Frictional forces, Types of friction, Laws of dry Friction, Angle of Friction, Angle of repose and Cone of friction. Problem on Ladder friction, wedge friction, Belt friction and connected bodies

Module 4

Centroid: Centroid and center of gravity, Centroid of geometric figures, problems on location of Centroid of composite symmetrical and unsymmetrical plane figures. **(No derivations)**

Moment of Inertia: Introduction, Parallel axis and perpendicular axis Theorems, Radius of gyration, Moment of inertia of built-up sections. **(No derivations).**

Module 5

Support Reactions: Types of Loads, types of Supports and types of beams. Support Reactions in beams, Numerical problems on support reactions for statically determinate beams considering all types of loads.

Analysis of Trusses: Types of trusses, analysis of statically determinate trusses using the method of joints and method of sections.

CO-PO-PSO Mapping

COs.	Programme Outcomes (POs)												Programme Specific Outcome (PSO)		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2					1	1			1		1			
CO2	2	1										1			
CO3	2	1										1			
CO4	2	1										1			
CO5	2	1										1			

Text Books

1. **Engineering Mechanics:** Principles of Statics and Dynamics, R. C. Hibbler, Pearson Press, 14th edition 2019
2. **Elements of Civil Engineering and Mechanics**, H J Sawant and S P Nitsure, Technical Publications, 1st edition, 2018
3. **Building Materials**, S.K. Duggal, New Age International (P) Limited, 5th edition, 2019
4. **Engineering Mechanics;** Statics and Dynamics, Ferdinand L. Singer, Harper International Edition, 3rd edition

Reference Books

1. **Engineering Mechanics**, S. Timoshenko, D H young, McGraw Hill Education, 5th edition, 2013
2. **Introduction to Statics and Dynamics**, Andy Ruina and Rudra Pratap, Oxford University Press, 2012

Reference Web Links:

1. <https://www.youtube.com/playlist?list=PLyQSN7X0ro203puVhQsmCj9qhlFQ-As8e>
2. https://www.youtube.com/playlist?list=PLxA8_oP9TgCbUrQCISTT8IGviVjpO8vyp
3. <https://nptel.ac.in/courses/122/104/122104014/>
4. <https://nptel.ac.in/courses/105/102/105102088/>
5. <https://nptel.ac.in/courses/105/106/105106206/>

ENGINEERING VISUALIZATION						
Course Code		21EV15/25		CIE Marks		50
Teaching Hour/Week (L:T:P:S)		2:0:2:1		SEE Marks		50
Total Hours of Teaching-Learning		52		Total Marks		100
Credits		03		Exam Hours		03
COs	Description					CL
CO1	Explain the basic concept of engineering drawing. Apply the principles of orthographic projections for lines and planes					CL3
CO2	Apply the principles of orthographic projections for solids.					CL3
CO3	Visualize three-dimensional objects and develop isometric projections.					CL3
CO4	Apply the principles of orthographic projections and prepare the development of lateral surfaces.					CL3
CO5	Apply the principles of engineering drawing in real-world applications					CL3
CO – Assessment Mapping						
Course Outcomes	Continuous Internal Evaluation (CIE)					Semester End Exam
	Test 1	Test 2	Test 3	Lab Report	Assignment /Activities	
	10%	10%	10%	5%	15%	
CO 1	x			x	x	x
CO 2	x	x		x	x	x
CO 3		x		x	x	x
CO 4			x	x	x	x
CO 5			x	x	x	x
Course Contents						
Module 1						
Introduction: for CIE only						
Significance of Engineering drawing, BIS Conventions of Engineering Drawing, Free hand sketching of engineering drawing, Scales. Introduction to Computer-Aided Drafting software, Co-ordinate system and reference planes HP, VP, RPP & LPP of 2D/3D environment. Selection of drawing sheet size and scale. Commands and creation of Lines, coordinate points, axes, polylines, square, rectangle, polygons, splines, circles, ellipse, text, move, copy, off-set, mirror, rotate, trim, extend, break, chamfer, fillet and curves.						
Orthographic Projections of Points, Lines and Planes: Introduction to Orthographic projections, Orthographic projections of points in all the quadrants. Orthographic projections of lines. (Placed in the First quadrant only) Orthographic projections of planes namely triangle, square, rectangle, pentagon, hexagon and circular lamina. (Placed in the First quadrant only).						
Application on projections of Lines & Planes (For CIE only)						
Module 2						
Orthographic Projection of Solids:						
Orthographic projection of right regular solids (Solids Resting on HP only); Prisms & Pyramids (triangle, square, rectangle, pentagon, hexagon), Cylinders, Cones, Cubes, &Tetrahedron. Application problems on the projection of solids.						
Projections of Frustum of cone, pyramid & truncated sphere (For CIE only).						
Module 3						

Isometric Projections:

Isometric scale, Isometric projection of hexahedron (cube), right regular prisms, pyramids, cylinders, cones and spheres. Isometric projection of combination of two simple solids.

Conversion of simple isometric drawings into orthographic views. Problems on applications of Isometric projections of simple objects/engineering components.

Introduction to drawing views using 3D environment (For CIE only).

Module 4**Development of Lateral Surfaces of Solids:**

Development of lateral surfaces of right regular prisms, cylinders, pyramids, and cones resting with a base on HP only. Development of their frustums and truncations. Problems on applications of development of lateral surfaces like funnels and trays.

Introduction to 3D modelling -3D modelling of commonly used products.

Problems on applications of development of lateral surfaces of transition pieces connecting circular duct and rectangular duct (For CIE Only)

Module 5**Multidisciplinary Applications & Practice (For CIE Only):**

Free-hand Sketching; True free-hand, Guided free-hand, Roads, Buildings, Utensils, Hand tools & Furniture's etc., free-handing drawing/ sketching to be given to get hands-on experience in engineering drawing components and scaling aspects.

Drawing Simple Mechanisms; Bicycles, Tricycles, Gear trains, Ratchets, two-wheeler cart & Four wheeler carts to dimensions etc. **Electric Wiring and lighting diagrams;** Like, Automatic fire alarm, Call bell system, UPS system, Basic power distribution system using suitable software

Basic Building Drawing; Like Architectural floor plan, basic foundation drawing, steel structures- Frames, bridges, trusses using Auto CAD or suitable software,

Electronics Engineering Drawings- Like, Simple Electronics Circuit Drawings.

Graphs & Charts: Like Column chart, Pie chart, Line charts, Gantt charts, etc., using Microsoft Excel or any suitable software, Data Visualization using plotting software(such as origin pro).

CO-PO-PSO Mapping

COs.	Programme Outcomes (POs)												Programme Specific Outcome (PSO)		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3			2				1			1			
CO2	3	3			2				1			1			
CO3	3	3			2				1			1			
CO4	3	3			2				1			1			
CO5	3	3			2				2			1			

Text Books

1. **Engineering Drawing: Plane and Solid Geometry**, Bhatt, N.D., 53rd edition, Charotar Publishing House Pvt. Limited, 2019.

2. **Engineering Graphics**, Gopalakrishna K.R., 32nd edition, Subash Stores, Bangalore, 2005.
3. **Fundamentals of Engineering Drawing: with an Introduction to Interactive Computer Graphics for Design and Production**, Luzadder Warren J., Duff John M., Prentice-Hall of India Pvt. Ltd., New Delhi, Eastern Economy Edition, 2005.
4. **A Textbook of Engineering Drawing**, Dhawan R. K., 3/e, S. Chand Publishing, 2019.
5. **Engineering Drawing and Graphics**, Venugopal K., New Age International publishers, 2014.
6. **Engineering Drawing**, Parthasarathy N. S., Vela Murali, Oxford University Press, 2015.

Reference Books

1. **Electrical Engineering Drawing**, Bhattacharya S. K., New Age International publishers, second edition 1998, reprint 2005.
1. **Printed Circuit Board Design using AutoCAD**, Chris Schroder, Newnes, 1997.

Reference Web Links:

1. <https://youtu.be/cQHDAfrptUc>
2. <https://youtu.be/zkWvL1pPkMY>

ENGINEERING PHYSICS LAB				
Course Code		21PHYL16/26	CIE Marks	50
Teaching Hour/Week (L:T:P:S)		0:0:2:1	SEE Marks	50
Total Hours of Teaching-Learning		26	Total Marks	100
Credits		01	Exam Hours	03
COs	Description			CL
CO1	Recognize the resonance concept and analyse the frequency response of LCR circuits.			CL4
CO2	Use the physical properties of the cantilever, spring and torsion pendulum to verify the coherence between theoretical and practical measurements.			CL3
CO3	Analyse the intensity variation of light due to interference, diffraction and total internal reflection.			CL4
CO4	Illustrate the basic laws of Modern physics – Radiation Law and Plank’s Constant.			CL4
CO5	Analyse the concept of electronic energy in conductors, semiconductors and dielectrics in their Engineering applications.			CL3
CO – Assessment Mapping				
Course Outcomes	Continuous Internal Evaluation (CIE)		Semester End Exam	
	Test	Lab		
		20%	30%	50%
CO 1	x	x	x	
CO 2	x	x	x	
CO 3	x	x	x	
CO 4	x	x	x	
CO 5	x	x	x	
Course Contents				
Experiments				
1. To construct the series and parallel LCR resonance circuit and to determine the resonant frequency (fr) inductance value of the given inductor (L), bandwidth (Δf) and quality factor (Q) by drawing the frequency response curve. Hence to analyse the value of current at resonance condition. 2. Determination of the spring constants in Series and Parallel combination of springs and to compare the results with theoretical values 3. Estimation of Young’s modulus of the material of a rectangular beam by single cantilever method 4. Calculation of moment of inertia of the lamina and Rigidity modulus of the material of the suspension wire of a torsion pendulum 5. Apply the diffraction phenomenon to find the wavelength of semiconductor Laser using grating by estimating the grating constant. 6. Estimation of acceptance angle and Numerical aperture of an optical fiber by the graphical method. 7. Estimation of Planck’s Constant by using Planck’s energy equation. (Use four different colours of LEDs). 8. Analysis of Stefan’s law of radiation by graphical method. 9. Estimation of Fermi energy of copper by analysing variation of resistance with temperature graphically. 10. To draw the I-V characteristics of the photodiode and to calculate its responsivity 11. Estimation of the resistivity of the semiconducting material using the Four Probe method. 12. Estimated the capacitance of the given capacitor using RC charging & discharging				

circuit and calculate the dielectric constant of the dielectric material used in the capacitor.

Demonstration Experiment

Identify the type of semiconductor and estimate the charge carrier concentration and mobility of a semiconductor by estimating Hall Coefficient using Hall Effect

CO-PO-PSO Mapping

COs.	Programme Outcomes (POs)												Programme Specific Outcome (PSO)		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	1						1	2	1		1			
CO2	3	1						1	2	1		1			
CO3	3	1						1	2	1		1			
CO4	3	1						1	2	1		1			
CO5	3	1						1	2	1		1			

Reference Books

1. **Engineering Lab Manual** by WBUT-New Age International Publishers.
2. **Applied Physics Lab Manual** by Anoop Sing Yadav.

Reference Web Links:

3. <https://www.youtube.com/watch?v=zDmRkE8-Nf8>
4. <https://youtu.be/uOmBvYUMV2Q>
5. https://www.youtube.com/watch?v=_wWN1n6zP2I
6. <https://www.youtube.com/watch?v=mh8-Dcga-ss>
7. <https://www.youtube.com/watch?v=Fs8TQzDTHNA>
8. <https://vlab.amrita.edu/index.php?sub=1&brch=189&sim=343&cnt=1>
9. <https://vlab.amrita.edu/index.php?sub=1&brch=195&sim=547&cnt=1>
10. <https://bop-iitk.vlabs.ac.in/basics-of-physics/List%20of%20experiments.html>
11. <https://www.youtube.com/watch?v=O6eu9gcevs0>
12. <https://www.youtube.com/watch?v=9IwKPBqnqS0>
13. <https://vlab.amrita.edu/?sub=1&brch=282&sim=1512&cnt=1>
14. <https://www.youtube.com/watch?v=VLRfwFkEPas>
15. <https://vlab.amrita.edu/?sub=1&brch=282&sim=879&cnt=1>.

BASIC ELECTRICAL LAB				
Course Code		21EEL17/27	CIE Marks	50
Teaching Hour/Week (L:T:P:S)		0:0:2:1	SEE Marks	50
Total Hours of Teaching-Learning		26	Total Marks	100
Credits		01	Exam Hours	03
COs	Description			CL
CO1	To Experiment with the basic laws such as Ohm’s law and Kirchhoff’s laws and to understand the short and open circuit behaviour in DC circuits			CL3
CO2	To Compare power factors of different types of lamps			CL3
CO3	Understand the basic behaviour of 3-phase circuit and Examine the power consumed in a 3-phase balanced load			CL3
CO4	Demonstrate earth resistance and understand two way and three-way control of lamps			CL2
CO5	Identify the behaviour of R-L circuit by examining the impedance of an electrical circuit using choke coil			CL3
CO – Assessment Mapping				
Course Outcomes	Continuous Internal Evaluation (CIE)		Semester End Exam	
	Test	Lab		
		20%	30%	50%
CO 1	x	x	x	
CO 2	x	x	x	
CO 3	x	x	x	
CO 4	x	x	x	
CO 5	x	x	x	
Course Contents				
Experiments				
1. Examine the concept of circuit laws such as KCL and KVL for DC circuits. 2. Compare the various types of earthing for electrical systems, and then conduct an experiment to measure Earth resistance of Campus premises. 3. Experiment to measure Current, Power and Power Factor of Incandescent Lamp, Fluorescent Lamp and LED Lamp. 4. Apply the concept of maximum power theorem and examine them to laboratory measurements. 5. Experiment to study the balanced three-phase system for star & delta connected load (Phase and line quantities). 6. To measure three- phase power and power factor in a balanced three-phase circuit using two single-phase wattmeters. 7. To experiment to determine the efficiency of a single-phase transformer by direct load test. 8. To demonstrate Two Way and Three-Way Control of Lamp and Formation of Truth Table. 9. Experiment to measure the Resistance and Inductance of a Choke coil using three voltmeter methods. 10. Examine the concept of the effect of Open and Short circuits for DC circuits.				
Demonstration Experiments				
1. Demonstration of cut-section of electrical machines (DC Machines, Induction				

Machine and Synchronous Machine)

2. Understanding AC & DC Supply. Use of Tester and Test Lamp to ascertain the healthy status of mains.
3. Demonstration of Fuse and MCB separately by creating a fault.
4. Demonstrate a single-phase energy meter and find out energy consumed in 30 minutes.

CO-PO-PSO Mapping

COs.	Programme Outcomes (POs)												Programme Specific Outcome (PSO)		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	2					3	2			1			
CO2	3	2	2					3	2			1			
CO3	3	2	2			1		3	2			1			
CO4	3	2	2			2		3	2			1			
CO5	3	2	2					3	2			1			

Reference Books

1. **Basic Electrical Engineering** D. C. Kulshreshtha McGraw-Hill Education Revised first edition, 2019

Reference Web Links:

1. https://www.youtube.com/watch?v=LO3_qS5wFWI
2. <https://www.youtube.com/watch?v=U85eA3-suiQ>

TECHNICAL ENGLISH I					
Course Code		21EGH18		CIE Marks	50
Teaching Hour/Week (L:T:P:S)		1:0:2:1		SEE Marks	50
Total Hours of Teaching-Learning		39		Total Marks	100
Credits		02		Exam Hours	03
COs	Description				CL
CO1	Understand the skills required to use the English Language effectively in all areas of communication.				CL2
CO2	Develop English vocabulary and language proficiency.				CL2
CO3	Demonstrate Technical communicational skills through reading and listening practices.				CL2
CO4	Infer nature and style of practical writing skills.				CL2
CO5	Acquire Confidence and learn strategies for error-free communication.				CL2
CO – Assessment Mapping					
Course Outcomes	Continuous Internal Evaluation (CIE)				Semester End Exam
	Test 1	Test 2	Test 3	Assignment/Activities	
	10%	10%	10%	20%	50%
CO 1	x			x	x
CO 2	x	x		x	x
CO 3		x		x	x
CO 4			x	x	x
CO 5			x	x	x
Course Contents					
Module 1					
Introduction to Technical Communication					
Introduction to Technical Communication, Grammar: Basic English Grammar, Parts of Speech - Nouns, Pronouns, Adjectives, Verbs, Adverbs, Preposition, Conjunctions, Articles: Use of Articles-Indefinite and Definite Articles, Tenses, SVA					
Lab: Exercises on parts of speech, Articles, Tenses (RBT Levels: L1, L2 & L3)					
Module 2					
Introduction to Listening Skills and Phonetics-I					
Introduction to Phonetics, Sounds Mispronounced, Silent and Non-silent Letters, Homophones and Homonyms, Aspiration, Pronunciation of 'The', words ending 'age', some plural forms.					
Lab: Exercises on Phonetics, Pronunciation (RBT Levels : L1, L2 & L3)					
Module 3					
Developing Listening Skills (Phonetics and Vocabulary Building)					
Speech Sounds: Vowels and Consonants -Exercises on it. Stress Shift, Question Tags, Question Tags for Assertive Sentences (Statements)-Some Exceptions in Question Tags and Exercises, One Word Substitutes and Exercises, Vocabulary-Synonyms and Antonyms, Exercises on it.					
LAB: Exercise on Question tags, Language Enhancers. (RBT Levels: L1, L2 & L3)					
Module 4					

Writing Skills (Basics)

Syllables, Structures, Prefixes and Suffixes (Vocabulary), Contractions and Abbreviations used in text messages, Texting and Literacy.

LAB: Conversations, News Articles and Narratives.

(RBT Levels: L1, L2 & L3)

Module 5**Speaking Skills:**

Extempore/Public Speaking, Difference between Extempore/Public Speaking.

LAB: Mother Tongue Influence(MTI), Listening Comprehension –Exercises, Common Errors in Pronunciation
(RBT Levels: L1, L2 & L3)

CO-PO-PSO Mapping

COs.	Programme Outcomes (POs)												Programme Specific Outcome (PSO)		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1					2				2	3		3			
CO2					2					3		2			
CO3					2			2		3		2			
CO4					2					3		2			
CO5					2			2	1	3		2			

Text Book

1. **High School English Grammar & Composition** by Wren and Martin, S Chandh & Company Ltd-2015
2. **English Language Communication Skills Workbook**, Cengage learning India Pvt Limited [Latest Revised Edition] - 2018.
3. **Lab Manual cum Technica. Communication Principles and Practice.** Third Edition by Meenakshi Raman and Sangeetha Sharma, Oxford University Press 2017.

Reference Books

1. **Effective Technical Communication Second Edition** by M Ashraf Rizvi, McGraw Hill Education (India) Private Limited 2018.
2. **Intermediate Grammar, Usage and Composition** by M.L.Tichoo, AL. Subramanian, P.R.Subramanian, Orient Black Swan 2016.

Reference Web Links:

1. https://www.youtube.com/watch?v=Z7jiJpW_-C0
2. <https://www.youtube.com/watch?v=VE9wAMP3jWo>
3. <https://www.youtube.com/watch?v=6IS6q-uUjmE>
4. <https://www.youtube.com/watch?v=8ZDxn0JZGI8>

SCIENTIFIC FOUNDATION OF HEALTH					
Course Code		21SFH19/29		CIE Marks	50
Teaching Hour/Week (L:T:P:S)		1:0:0:1		SEE Marks	50
Total Hours of Teaching-Learning		13		Total Marks	100
Credits		01		Exam Hours	02
COs	Description				CL
CO1	Understand Health and wellness and its Beliefs				CL2
CO2	Practice good health habits & It’s balanced for positive mind-set				CL2
CO3	Build healthy lifestyles for good health for their better future				CL2
CO4	Create healthy and caring relationships to meet the requirements of MNC and LPG world				CL2
CO5	Aware of the risks and harmful habits				CL2
CO – Assessment Mapping					
Course Outcomes	Continuous Internal Evaluation (CIE)				Semester End Exam
	Test 1	Test 2	Test 3	Assignment/Activities	
	10%	10%	10%	20%	50%
CO 1	x			x	x
CO 2	x	x		x	x
CO 3		x		x	x
CO 4			x	x	x
CO 5			x	x	x
Course Contents					
Module 1					
Good Health and Its balance for positive mindset: What is Health, Why Health is very important Now? – What influences your Health? Health and Behaviour, Health beliefs and advertisements, Advantages of good health (Short term and long-term benefits), Health and Society, Health and family, Health and Personality - Profession. Health and behaviour, Disparities of health in different vulnerable groups. Health and psychology, Methods to improve good psychological health. Psychological disorders (Stress and Health - Stress management), how to maintain good health, Mindfulness for Spiritual and Intellectual health, Changing health habits for good health. Health and personality.					
Module 2					
Building of healthy lifestyles for better future: Developing a healthy diet for good health, Food and health, Nutritional guidelines for good health and well beingness, Obesity and overweight disorders and its management, Eating disorders - proper exercises for its maintenance (Physical activities for health), Fitness components for health, Wellness and physical function,					
Module 3					
Creation of Healthy and caring relationships: Building communication skills (Listening and speaking), Friends and friendship - education, the value of relationships and communication, Relationships for Better or worsening of life, understanding of basic instincts of life (more than biology), Changing health behaviours through social engineering,					

Module 4

Avoiding risks and harmful habits: Characteristics of health-compromising behaviours, Recognizing and avoiding of addictions, how addiction develops and addictive behaviours, Types of addictions, influencing factors for addictions, Differences between addictive people and non-addictive people and their behaviour with society, Effects and health hazards from addictions Such as..., how to recovery from addictions.

Module 5

Preventing and fighting against diseases for good health: Process of infections and reasons for it, how to protect from different types of transmitted infections such as, Current trends of the socio-economic impact of reducing your risk of disease, how to reduce risks for good health, reducing risks and coping with chronic conditions, Management of chronic illness for Quality of life, Health and Wellness of youth: a challenge for the upcoming future Measuring of health and wealth status.

CO-PO-PSO Mapping	
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COs.	Programme Outcomes (POs)												Programme Specific Outcome (PSO)		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1						2		2				2			
CO2						2		1				2			
CO3						1		2		2		2			
CO4						1						2			
CO5						1						2			

Text Books

1. **Health Psychology** (Second edition) by Charles Abraham, Mark Conner, Fiona Jones and Daryl O'Connor – Published by Routledge 711 Third Avenue, New York, NY 10017.
2. **Health Psychology** - A Textbook, FOURTH EDITION by Jane Ogden McGraw Hill Education (India) Private Limited - Open University Press
3. **Scientific Foundations of Health** (Health & Wellness) - General Books published for university and colleges references by popular authors and published by the reputed publisher.

Reference Books

1. **HEALTH PSYCHOLOGY** (Ninth Edition) by SHELLEY E. TAYLOR - University of California, Los Angeles, McGraw Hill Education (India) Private Limited - Open University Press

Reference Web Links:

1. <https://www.youtube.com/watch?v=wzYVBibhyUM>
2. <https://www.youtube.com/watch?v=NtXMOJGkous>

APPLIED MATHEMATICS I					
Course Code		21MAT11		CIE Marks	50
Teaching Hour/Week (L:T:P:S)		2:2:0:1		SEE Marks	50
Total Hours of Teaching-Learning		52		Total Marks	100
Credits		03		Exam Hours	03
COs	Description				CL
CO1	Apply the knowledge of calculus to solve problems related to polar curves and their applications in determining the bentness of a curve				CL3
CO2	Learn the notion of partial differentiation to calculate rates of change of multivariate functions and solve problems related to composite functions and Jacobians				CL3
CO3	Apply the concept of change of order of integration and variables to evaluate multiple integrals and their usage in computing the area and volumes				CL3
CO4	Solve first-order linear/nonlinear differential equation analytically using standard methods				CL2
CO5	Make use of matrix theory for solving system of linear equations and compute eigenvalues and eigenvectors required for matrix diagonalization process				CL3
CO – Assessment Mapping					
Course Outcomes	Continuous Internal Evaluation (CIE)				Semester End Exam
	Test 1	Test 2	Test 3	Assignment/Activities	
	10%	10%	10%	20%	
CO 1	x			x	x
CO 2	x	x		x	x
CO 3		x		x	x
CO 4			x	x	x
CO 5			x	x	x
Course Contents					
Module 1					
Differential Calculus I: Review of elementary differential calculus, nth derivative of elementary functions, Leibnitz Rule, Polar curves - the angle between the radius vector and tangent, Angle between Two curves, Pedal Equation. Curvature and radius of curvature- Cartesian and polar forms; Centre and circle of curvature - applications to evolutes and involutes					
Note: The derivation is not necessary for Radius of Curvature and Centre of Curvature.					
Module 2					
Differential Calculus II: Taylor's and Maclaurin's series expansions for one variable (statements and problems) indeterminate forms - L'Hospital's rule. Partial differentiation; Total derivatives-differentiation of composite functions. Maxima and minima for a function of two variables. Applications of maxima and minima with illustrative examples. Jacobians-simple problems					
Module 3					
Integral Calculus: Review of elementary integral calculus. Multiple integrals: Evaluation of double and triple integrals. Complementation of double integrals- change of order of integration and change into polar coordinates. Applications to find area volume. Beta and Gamma functions: Definitions, Relation between beta and gamma functions and simple problems					
Module 4					

Differential Equations: Nonlinear differential equations Introduction to general and singular solutions; Solvable for p only; Clairaut's and reducible to Clairaut's equations only. Exact and reducible to exact differential equations. Bernoulli's equation. Applications of ODE's-orthogonal trajectories, Newton's law of cooling and L R circuits.

Module 5

Linear Algebra: Rank of a matrix-echelon form. Solution of the system of linear equations consistency. Gauss-elimination method, Gauss- Jordan method and Approximate solution by Gauss-Seidel method. Eigenvalues and eigenvectors Rayleigh's power method. Diagonalization of a square matrix of order two.

CO-PO-PSO Mapping

COs.	Programme Outcomes (POs)												Programme Specific Outcome (PSO)		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3										1			
CO2	3	3				1						1			
CO3	3	3							1			1			
CO4	3	3				1						1			
CO5	3	3			1				1	1		1			

Text Book

1. **Higher Engineering Mathematics**, B.S. Grewal , Khanna Publishers, 43rd Ed., 2015.
2. **Advanced Engineering Mathematics**, E. Kreyszig , John Wiley & Sons, 10th Ed.(Reprint), 2016.

Reference Books

1. **Advanced Engineering Mathematics** C.Ray Wylie, Louis C.Barrett:, 6th Edition,
2. **Higher Engineering Mathematics** B.V.Ramana: 11th Edition, Tata McGraw-Hill.
3. **Engineering Mathematic for Semester I and II**, Gupta C.B, Sing S.R and Mukesh Kumar:, Mc- Graw Hill Education(India) Pvt. Ltd 2015.
4. **Higher Engineering Mathematics** H.K.Dass and Er. Rajnish Verma: S.Chand Publication (2014).
5. **Calculus** James Stewart: Cengage publications, 7th Web links and Video Lectures (e-Resources):

Reference Web Links:

1. <https://www.youtube.com/watch?v=1HDRmEGdb9A>
2. <https://www.youtube.com/watch?v=AQHcZklcltI>
3. <https://www.youtube.com/watch?v=8Kg21jBCm-k>
4. <https://www.youtube.com/watch?v=Znnhpm90Jzc>
5. <https://www.youtube.com/watch?v=Wa6kaCwyYRk>

ENGINEERING CHEMISTRY					
Course Code		21CHE12/22		CIE Marks	50
Teaching Hour/Week (L:T:P:S)		2:2:0:1		SEE Marks	50
Total Hours of Teaching-Learning		52		Total Marks	100
Credits		03		Exam Hours	03
COs	Description				CL
CO1	Relate and apply the concepts of electrochemistry in Corrosion control and metal finishing.				CL3
CO2	Apply the techniques used to enhance chemical fuel performance in IC engines and understand the importance of alternate green energy resources.				CL3
CO3	Identify and interpret the usage of various fundamental materials in Engineering applications.				CL3
CO4	Explain the basic concepts of thermal Chemistry.				CL2
CO5	Apply volumetric & instrumental analysis methods for water treatment and waste management principles.				CL3
CO – Assessment Mapping					
Course Outcomes	Continuous Internal Evaluation (CIE)				Semester End Exam
	Test 1	Test 2	Test 3	Assignment/Activities	
	10%	10%	10%	20%	
CO 1	x			x	x
CO 2	x	x		x	x
CO 3		x		x	x
CO 4			x	x	x
CO 5			x	x	x
Course Contents					
Module 1- Electrochemistry, Corrosion Science and Metal Finishing					
Basic Concept of Electrochemistry : Electrode potential, galvanic cell, cell representation, Gibbs free energy, electromotive force and cell potential. Derivation of Nernst equation for single electrode potential. Numerical problems on cell potential and electrode potential determination.					
Reference Electrodes: Introduction to secondary reference electrode construction, working and application of calomel electrode. Ion-Selective Electrodes: Glass electrode - definition, construction and working of the glass electrode. Determination of pH of a solution using a glass electrode.					
Corrosion: Introduction, electrochemical theory of corrosion. Types of corrosion - differential metal corrosion, differential aeration and stress corrosion. Corrosion Control: Protective coating: Metallic coating- Anodic and cathodic metal coatings with examples. Inorganic coatings - anodizing and phosphating, Cathodic protection - sacrificial anode method and impressed current method. Numerical problems on Corrosion Penetration Rate (CPR) and Weight loss method.					
Metal Finishing: Introduction, technological importance. Electroplating: Introduction, principles governing electroplating - polarization, decomposition potential and overvoltage. Electroplating process. Electroplating of chromium (hard and decorative). Electroless plating: Introduction, electroless plating of Copper on PCB					

Module 2- Green fuels and Alternated Energy Systems
Chemical Fuels Introduction, the definition of calorific value, Determination of calorific value of solid fuel by Bomb calorimeter, numerical problems. Synthetic petrol by Fischer-Tropsch process. Power alcohol, bio-diesel: synthesis and advantages. Battery: Basic concepts battery characteristics (voltage, energy efficiency, capacity, shelf life and cycle life). Classification of batteries. Lithium Batteries - lithium-ion batteries. Fuel Cells: Introduction, the difference between battery and fuel cells, construction and working of methanol- oxygen fuel cell using H₂SO₄ as electrolyte and solid oxide fuel cell – SOFC. Photovoltaic Cell: Production of solar grade silicon by Union Carbide process, purification by zone refining. Crystal growth by czochralski process, doping process. Construction and working of PV cells.
Module 3 - Material Chemistry
Polymers: Introduction, Glass transition temperature (T_g), factors influencing T_g. Molecular weight of polymer (Number average and mass average of polymer)-Numerical problems. Biodegradable Polymers-Synthesis, properties and applications of polyglycolic acid and polylactic acid. Conducting Polymers: Introduction, conduction mechanism taking polyacetylene and polyaniline as examples and their applications. Polymer Composites: Introduction, Synthesis and application of carbon fibre, and Kevlar. Classification (particle reinforced, fibre reinforced, structural), and their composites(Carbon Fiber Reinforced Polymer (CFRP), Aramid Fiber-Reinforced Polymer and Glass Fiber-Reinforced Polymer (GFRP) Inorganic Engineering material: Introduction, Types, properties and applications of abrasives, cement and ceramics (refractories, glass and clay products) Nanomaterials: Introduction, size-dependent properties (surface area, electrical, optical, thermal) synthesis of nanomaterials- sol-gel process, precipitation and chemical vapour deposition. Nanoscale materials: Graphenes, carbon nanotubes, dendrimers and fullerenes
Module 4- Thermal Chemistry
Introduction, terminologies in thermodynamics- system(Isolated, closed, open, heterogeneous and homogenous), surroundings, state variables (dependent and independent), internal energy and heat capacity of a system. Zeroth law of (concept of heat, work,) and Statement of the first law of thermodynamics. The second law of thermodynamics: Need for second law, statement of Second law of thermodynamics (concepts of the reservoir). Available energy, unavailable energy and increase in entropy. Maximum useful work for a system and control volume, irreversibility. Third law of thermodynamics-Statement.
Module 5- Water Chemistry, Solid waste management and instrumental analysis
Water Chemistry: Introduction. Hardness – definition and itsdetermination by EDTA method. Disadvantages of hardness in boilers (scale and sludge formation and boiler corrosion) and its prevention. Removal of hardness by the ion exchange process. Numerical problems on hardness determination. Definition of Biological Oxygen Demand (BOD), dissolved oxygen (DO), Alkalinity and Chemical Oxygen Demand (COD) – numerical problems on COD determination. Sewage: Introduction and sources. Sewage treatment -Municipal sewage treatment (Primary, secondary and tertiary). Saline water: Introduction and disadvantage.

Desalination of water by reverse osmosis and electrodialysis.

Waste Management:

Solid waste, e-waste and biomedical waste. Sources characteristic and disposal methods.

Instrumental Methods of Analysis:

Theory, Instrumentation and applications Colorimetry, Flame Photometry, Atomic Absorption Spectroscopy and UV Visible Spectroscopy.

CO-PO-PSO Mapping

COs.	Programme Outcomes (POs)												Programme Specific Outcome (PSO)		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3					1	1	1	1		1			
CO2	3	2					1	1	1			1			
CO3	3	1					1		1			1			
CO4	3	1													
CO5	3	2				1	1	1	1	1		1			

Text Book

1. **Physical Chemistry**, by P. W. Atkins, Oxford Publications
2. **A Text Book on Water Chemistry** by A G S Reddy
3. **The Chemistry of Nanomaterials**, WILEY-VCH, edited by C N R Rao., A Muller & AK Cheetham
4. **Text Book of Polymer Science**, F.W. Billmeyer, John Wiley & Sons publications, 4th Edition, 1999.
5. **Corrosion Engineering**, M.G. Fontana, N.D. Greene, McGraw Hill Publications, New York, 3rd Edition, 1996.
6. **Principles of Physical Chemistry**, B.R. Puri, L.R. Sharma & M.S. Pathania, S. Nagin Chand & Co., 41 Edition, 2004
7. **Engineering chemistry** by Jain and Jain ,15th edition Dhanpath Rai publication
8. **‘Nanotechnology A Chemical Approach to Nanomaterials’** by G.A Ozin & A.C. Arsenault

Reference Books

1. **‘Engineering Chemistry’**, by R. V. Gadag & A. Nityananda Shetty., I. K. International Publishing House Private Ltd, New Delhi, 2018.
2. **‘Engineering Chemistry’**, by Dr. Savitha M. B., Lamberts Academic Publishing, Mauritius, 2018.
3. **‘Wiley Engineering Chemistry’**, Wiley India Pvt. Ltd, New Delhi, Second Edition.
4. **“Text Book of Engineering Chemistry”**, by Y. R. Sharma, Pravanthi Mitra Edition, Kalyani Publishers.

Reference Web Links:

1. <https://www.youtube.com/watch?v=faESCxAWR9k>
2. <https://www.youtube.com/watch?v=TBqXMWaxZYM&list=PLyhmwFtznRhu z8L1bb3X-9IbHrDMjHWWH>
3. <https://www.youtube.com/watch?v=j5Hml6KN4TI>
4. <https://www.youtube.com/watch?v=X9GHBdyYcyo>
5. <https://www.youtube.com/watch?v=1xWBPZnEjk8>

C PROGRAMMING FOR PROBLEM SOLVING					
Course Code		21CPS13/23		CIE Marks	50
Teaching Hour/Week (L:T:P:S)		2:2:0:1		SEE Marks	50
Total Hours of Teaching-Learning		52		Total Marks	100
Credits		03		Exam Hours	03
COs	Description				CL
CO1	Inculcate computational thinking for problem-solving using C.				CL3
CO2	Apply the concepts of branching and looping in problem-solving.				CL3
CO3	Demonstrate the arrays, strings, searching and sorting algorithms.				CL3
CO4	Illustrate the functions and recursions to solve problems using modular programming constructs.				CL3
CO5	Demonstrate the concept of structures, pointers, files and dynamic memory allocation.				CL3
CO – Assessment Mapping					
Course Outcomes	Continuous Internal Evaluation (CIE)				Semester End Exam
	Test 1	Test 2	Test 3	Assignment/Activities	
	10%	10%	10%	20%	
CO 1	x			x	x
CO 2	x	x		x	x
CO 3		x		x	x
CO 4			x	x	x
CO 5			x	x	x
Course Contents					
Module 1					
Computational Thinking: Algorithms, Flowcharts Overview of C programming, Applications of C programming, Basic structure of a C program, executing a C program, constant, variable and data types, Operators – Arithmetic operator, Assignment operator, Relational operator, logical operators, Bitwise operators, Miscellaneous operator and expressions.					
Module 2					
Managing Input and output operations. Conditional Branching (if, if-else, else-if ladder, nested if, switch) and Loops (for, while, do-while).					
Example programs: Simple calculator, finding roots of a quadratic equation, plotting of Pascal’s triangle. C – Typecasting.					
Module 3					
Arrays: Arrays (1-D, 2-D), Multi-dimensional arrays and matrices, Character arrays and Strings, Basic Algorithms: Searching and Sorting. Dynamic arrays.					
Example programs: (Linear search, Binary search, Bubble sort, and Selection sort).					
Module 4					
User-Defined Functions and Recursion. Example programs: Finding Factorial of a positive integer, GCD of two numbers, Fibonacci sequence, Tower of Hanoi and sum of natural numbers.					

Module 5

Structures, Unions and Pointers, Pre-processor Directives and Example Programs.

Introduction to files and dynamic memory allocation with example.

CO-PO-PSO Mapping	
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COs.	Programme Outcomes (POs)												Programme Specific Outcome (PSO)		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3							2	2	1		3			
CO2	3	2	2					2	2	1		3			
CO3	3	2	2					2	2	1		3			
CO4	3	2	2					2	2	1		3			
CO5	3	2	2					2	2	1		3			

Text Book

1. **Programming in ANSI C** by E. Balagurusamy Tata McGraw-Hill, 7th Edition, 2017
2. **The ‘C’ Programming Language** Brian W. Kernighan and Dennis M. Ritchie Prentice Hall of India, 2nd Edition 1988.

Reference Books

1. **Computer fundamentals and programming in C** Reema Thereja Oxford University press, 2nd Edition 2015.
2. **C Programming for Scientists and Engineers with Applications** Raman reddy Jones & Bartlett Learning, 1st Edition 2009.

Reference Web Links:

1. <https://nptel.ac.in/courses/106/105/106105171/>
2. <http://elearning.vtu.ac.in/econtent/courses/video/BS/06CCP13.html>
3. <https://india.oup.com/productPage/5591038/7421214/9780199456147>
4. <https://kremlin.cc/k&r.pdf>

BASIC ELECTRONICS & COMMUNICATION ENGINEERING					
Course Code		21ELN14/24		CIE Marks	50
Teaching Hour/Week (L:T:P:S)		2:2:0:1		SEE Marks	50
Total Hours of Teaching-Learning		52		Total Marks	100
Credits		03		Exam Hours	03
COs	Description				CL
CO1	Illustrate electronics circuit concepts such as power supply, amplifiers and Oscillators.				CL3
CO2	Apply the fundamentals of digital logic engineering in data representation, Circuits and microcontroller systems.				CL3
CO3	Interpret the properties of Embedded system and their technical advancements.				CL2
CO4	Illustrate the concepts of principles of communication engineering ranging From frequency spectrum to various circuits involved in antennas.				CL3
CO5	Interpret the various modes of communication, from wired to wireless and the computing involved.				CL2
CO – Assessment Mapping					
Course Outcomes	Continuous Internal Evaluation (CIE)				Semester End Exam
	Test 1	Test 2	Test 3	Assignment/Activities	
	10%	10%	10%	20%	50%
CO 1	x			x	x
CO 2	x	x		x	x
CO 3		x		x	x
CO 4			x	x	x
CO 5			x	x	x
Course Contents					
Module 1					
Electronic Circuits:					
Power Supplies –Block diagram, Rectifiers, Reservoir and smoothing circuits, Full-wave rectifiers, Biphase rectifier circuits, Bridge rectifier circuits, Voltage regulators, Output resistance and voltage regulation, Voltage multipliers.					
Amplifiers – Types of amplifiers, Class of operation, Input and output resistance, Frequency response, Bandwidth, Phase shift, Negative feedback, Multi-stage amplifiers.					
Operational amplifiers - Operational amplifier parameters, Operational amplifier characteristics, Operational amplifier configurations, Operational amplifier circuits, Multi-stage amplifiers.					
Oscillators – Positive feedback, Conditions for oscillation, Ladder network oscillator, Wein bridge oscillator, Multivibrators, Single-stage astable oscillator, Crystal controlled oscillators.					
Module 2					
Logic Circuits –Logic gates, Bistables, R-S Bistables, D-type Bistables, J-K Bistables. Data representation, Data types, Data storage, A microcontroller system.					
Realization using basic gates and truth table the Half Adder and Full Adder, Multiplexer and decoder Shift registers and its types–operation and truth table, Counters and asynchronous.					

Module 3

Embedded Systems—Definition, Embedded systems vs. general computing systems, Classification of Embedded Systems, Major application areas of Embedded Systems, Elements of an Embedded System, Core of the Embedded System, Microprocessor vs. Microcontroller, RISC vs. CISC, Harvard vs. Von Neumann, Big-Endian vs. Little-Endian.

Introduction to IoT System: Component of IoT System.

Communication Interface, UART, Parallel Interface, USB, Bluetooth, Wi-Fi, GPRS.

Module 4									
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Sensors and Interfacing—Instrumentation and control systems, Transducers, Sensors. Actuators, LED, 7-Segment LED Display, Optocoupler, Stepper Motor, Relay, Piezo Buzzer, Push Button Switch, Keyboard.
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Analog and Digital Communication—Modern communication system scheme, Information source and input transducer, Transmitter, Channel Hardware and Software, Noise, Receiver, Multiplexing, Types of communications systems.

Types of modulation – Introduction to Analog Modulation (AM, FM and PM) and Digital Modulation Techniques.

Antenna, Types of antennas.

Module 5	
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Evolution of mobile radio communication fundamentals-Introduction, Cellular telephone system, Cellular Concepts: frequency reuse.

Wireless Network Topologies - First Generation (1G) Technology, Second Generation (2G) Technology, GSM Communications, GSM System architecture, Third Generation(3G) Technology, CDMA Technology, High level architecture of LTE, Fourth Generation (4G)Technology, Wireless LAN.

Satellite Communication–Elements of Satellite Communication, Types of satellites, satellite subsystems.

Optical Fiber Communication - A fiber optic Communication system.

CO-PO-PSO Mapping		
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COs.	Programme Outcomes (POs)												Programme Specific Outcome (PSO)		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2							1	1	1	1			
CO2	3	2			1				1	1		1			
CO3	3	1										1			
CO4	3	2			1				1	1		1			
CO5	3	1										1			

Text Book

1. Mike Tooley, '**Electronic Circuits, Fundamentals & Applications**', 4 th Edition, Elsevier, 2015. DOI <https://doi.org/10.4324/9781315737980>. eBook ISBN9781315737980
2. K V Shibu, '**Introduction to Embedded Systems**', 2nd Edition, McGraw Hill

Education (India), Private Limited, 2016.

3. S L Kakani and Priyanka Punglia, '**Communication Systems**', New Age International Publisher, 2017. <https://elib4u.ipublishcentral.com/pdfreader/communication-systems>.
4. D P Kothari, I J Nagrath, '**Basic Electronics**', 2nd edition, McGraw Hill Education (India), Private Limited, 2018.
5. Raj Kamal, '**Internet of Things-Architecture and design principles**', McGraw Hill Education.

Reference Books

1. E-book versions are available at '<https://www.knimbus.com/>' of VTU consortium.
Remote login available through respective college IDs.

Reference Web Links:

1. <https://nptel.ac.in/courses/122/106/122106025/>
2. <https://www.coursera.org/learn/electronics>.

ELEMENTS OF MECHANICAL ENGINEERING					
Course Code		21EME15/25		CIE Marks	50
Teaching Hour/Week (L:T:P:S)		2:0:2:1		SEE Marks	50
Total Hours of Teaching-Learning		40		Total Marks	100
Credits		03		Exam Hours	03
COs	Description				CL
CO1	Describe the environmental and sustainable issues associated with conventional energy sources. Explain various renewable energy sources and their conversion methods.				CL2
CO2	Review the materials for various engineering applications and describe the working principles of metal joining methods				CL2
CO3	Explain the working principle of IC engine, future mobility technology, Refrigeration & AC and their applications.				CL2
CO4	Discuss the different types of mechanical power transmission systems and basic understanding of robotics.				CL2
CO5	Summarize the conventional and modern manufacturing methods used for mechanical manufacturing with advantages and limitations.				CL2
CO – Assessment Mapping					
Course Outcomes	Continuous Internal Evaluation (CIE)				Semester End Exam
	Test 1	Test 2	Test 3	Assignment/Activities	
	10%	10%	10%	20%	
CO 1	x			x	x
CO 2	x	x		x	x
CO 3		x		x	x
CO 4			x	x	x
CO 5			x	x	x
Course Contents					
Module 1					
Introduction to Mechanical Engineering (Overview only): Role of Mechanical Engineering in Industries and Society- Emerging Trends and Technologies in different sectors such as Energy, Manufacturing, Automotive, Aerospace, and Marine sectors.					
Steam Generation and Application: Formation of steam and thermodynamic properties of steam (Simple Problems using Steam Tables), Applications of steam in industries.					
Energy Sources and Power Plants: Review of energy sources; Construction and working of Hydel power plant, Thermal power plant, Nuclear power plant, Solar power plant, Tidal power plant, Wind power plant.					
Introduction to basics of Hydraulic turbines and pumps:					
Principle and Operation of Hydraulic turbines, namely, Pelton Wheel, Francis Turbine and Kaplan Turbine. Introduction to working of Centrifugal Pump.					
Laboratory Components:					
1. Visit any one conventional or renewable energy power plant and prepare a comprehensive report					

2. Demonstration of various turbines – Pelton, Francis, Kaplan 3. Demonstration of various pumps – Centrifugal and Reciprocating pump
Module 2
Engineering Materials – properties, composition and industrial applications: Metals-Ferrous: Tool steels and stainless steels. Non-ferrous /metals: aluminium alloys. Advanced materials: Introduction to smart materials- piezoelectric materials, shape memory alloys, semiconductors, and super-insulators. Metal Joining Processes: Soldering, Brazing and Welding: Definitions. Classification and methods of soldering, brazing, and welding. Brief description of arc welding, Oxy-acetylene welding, Introduction to TIG welding, MIG welding, and bi-metallic welding. Laboratory Components: 1. Demonstration of Material Types and their Physical Properties (5 cm³ Blocks of all possible Materials to be provided for touch and feel, and also to compare the density, mass and surface texture) 2. One exercise each involving Welding and Soldering Demonstration of anyone Heat transfer application device and prepare a comprehensive report.
Module 3
Fundamentals of IC Engines: Review of Internal Combustion Engines, fundamentals of a 2-Stroke engine, 4-Stroke engine, Components and working principles, Application of IC Engines Insight into future mobility technology; Electric and Hybrid Vehicles, Components of Electric and Hybrid Vehicles. Advantages and disadvantages of EVs and Hybrid vehicles, introduction to thermal cooling of batteries and battery packaging Refrigeration and Air-Conditioning: Introduction to the heat pump, refrigeration principle, Refrigeration effect, Ton of Refrigeration, COP, Refrigerants and their desirable properties. Principles and Operation of Vapor Compression and Vapor absorption refrigeration. Working Principles of Air Conditioning and types, Applications of refrigeration and Air conditioning. Laboratory Components: 1. Study of engine components through cut sections 2. Demonstration on Refrigerator and AC components and prepare a comprehensive report. Field visit to refrigeration plant/service centre or workshop
Module 4
Mechanical Power Transmission: Gear Drives: Types - spur, helical, bevel, worm and rack and pinion, velocity ratio, Gear Trains and their application: simple and compound Gear Trains, Simple numerical problems on Gear trains involving velocity ratios Belt Drives: Components of belt drive and concept of velocity ratio; Types of belt drives and Application of Belt Drives. Simple numerical problems on Belt drives involving velocity ratios, Introduction to Robotics: Drives and actuators for robots, common Robot configurations.

Applications of Robotics in Material Handling, Processing, Assembly, and Inspection.

Laboratory Components:

1. Identification of different types of gears and belts with their application and prepare a comprehensive report
2. Demonstration of any one model of robot; Demonstration of Mechanical linkages

Module 5

Fundamentals of Machine Tools and Operations: Fundamentals of Machining and machine tools, Construction and Working Principle of Lathe, Various Lathe Operations: Turning, Facing, Taper Turning and Knurling. Construction and Working of Milling Machines and applications. Construction and working of simple Drilling Machines and applications.

Introduction to Modern Manufacturing Tools and Techniques: CNC: Introduction, components of CNC, advantages and applications of CNC, Introduction to ECM and EDM, Introduction to Computer-Aided Manufacturing, Concepts of Smart Manufacturing and Industrial IoT

Introduction to Mechatronics: Introduction to components of mechatronic systems –sensors and actuators, Concept of open-loop and closed-loop systems, Examples of Mechatronic systems in Automatic washing machine and their working principle.

Laboratory Components:

1. Demonstration of developing one model involving Lathe, Milling and Drilling
2. Study/visit an industry using CNC/Modern techniques and submit a report

Carry out a case study on anyone Mechatronics device and prepare a comprehensive report

CO-PO-PSO Mapping

COs.	Programme Outcomes (POs)												Programme Specific Outcome (PSO)		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2						1	2	1		1			
CO2	3	2						1	2	1		1			
CO3	3	2					1	1	2			1			
CO4	3	2						1	2	1		1			
CO5	3	2						1	2			1			

Text Books

1. Standard Handbook of Machine Design, Joseph E Shigley; Charles R Mischke, Thomas H Brown, Jr., McGraw-Hill, New York, 2004.
2. Basic and Applied Thermodynamics, P.K.Nag, Tata McGraw Hill 2nd Ed., 2002
3. Non-Conventional Energy Sources, G.D Rai, Khanna Publishers, 2003
4. Turbo Machines, M. S. Govindgowda and A. M. Nagaraj, M. M. Publications 7Th Ed, 2012
5. Elements of Mechanical Engineering, K R Gopalakrishna, Subhash Publications, 2008
6. Manufacturing Technology- Foundry, Forming and Welding, P.N.Rao Tata McGraw Hill 3rd Ed., 2003.

Reference Books

1. Thermal Management in Electronic Equipment, HCL Technologies, 2010
2. Thermal Management of Microelectronic Equipment, L. T. Yeh and R. C. Chu, ASME Press, New York, 2002

Reference Web Links:

1. <https://nptel.ac.in/courses/112/104/112104195/> (Introduction to conventional Machining processes)
2. <https://nptel.ac.in/courses/112/107/112107219/> (Fundamentals of Manufacturing processes)
3. <https://www.youtube.com/watch?v=WzoUcCPs1K8> (Principle of Refrigeration)
4. <https://www.youtube.com/watch?v=R0eJXe6R8vY> (Robotic configuration)

ENGINEERING CHEMISTRY LAB				
Course Code		21CHEL16/26	CIE Marks	50
Teaching Hour/Week (L:T:P:S)		0:0:2:1	SEE Marks	50
Total Hours of Teaching-Learning		26	Total Marks	100
Credits		01	Exam Hours	03
COs	Description			CL
CO1	Analyze the water sample so to adopt a suitable treatment method			CL4
CO2	Quantitatively analyze the ions and principles constituent from the sample using the titrimetric method.			CL4
CO3	Detect and estimate the metal ions in the sample using colourimetry..			CL4
CO4	Estimate the mass of the chemical species and the dissociation constant by applying the Nernst equation, ohms law and Henderson's equation.			CL4
CO5	Determine the viscosity of a liquid by comparing its flow rate with a standard liquid.			CL3
CO – Assessment Mapping				
Course Outcomes	Continuous Internal Evaluation (CIE)		Semester End Exam	
	Test	Lab		
		20%	30%	50%
CO 1	x	x	x	
CO 2	x	x	x	
CO 3	x	x	x	
CO 4	x	x	x	
CO 5	x	x	x	
Course Contents				
Experiments				
Demonstration on solution preparation and titration				
1. Estimation of Total hardness of water by EDTA complexometric method..				
2. Estimation of CaO in cement by rapid EDTA method..				
3. Determination of percentage of Copper in brass using standard sodium thiosulphate solution.				
4. Estimation of percentage of iron in the given rust solution using standard Potassium Dichromate solution (External indicator method)				
5. Determination of COD of wastewater				
Instrumental Experiments				
1. Determination of pKa of the given weak acid using pH meter.				
2. Potentiometric estimation of FAS using standard K ₂ Cr ₂ O ₇ solution.				
3. Colorimetric estimation of Copper				
4. Conductometric estimation of the acid mixture.				
5. Determination of Viscosity co-efficient of the given liquid using Ostwald's viscometer.				
Demonstration Experiments				
1. Determination of Dissolved oxygen and total the alkalinity of water.				
2. Synthesis of Nano-materials by Precipitation method				

CO-PO-PSO Mapping

COs.	Programme Outcomes (POs)												Programme Specific Outcome (PSO)		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	2	1		1		1	2	2		1			
CO2	3	2	2	1		1		1	2	2					
CO3	3	3	1					1	2	2					
CO4	3	1	1					1	2	2					
CO5	3	1				1		1	2	2					

Text Books

1. **A text book of quantitative analysis**, Vogel's A.I. 35th edition, 2012.
2. **A textbook of Instrumental analysis** Willard, Merit, Dean and Settle, 6th edition 2012.

Reference Books

1. **A textbook of quantitative analysis**, G.H Jeffery, J Bassett, J Mendham and R.C. Denney Vogel's A.I. Dorling Kindersley (India) Pvt., Ltd. 35th edition, 2012.
2. **Analytical Chemistry**, Gary D Christian, Wiley India, 6th edition, 2015.
3. **A Text book of Nanoscience and Nanotechnology**, T. Pradeep McGraw Hill Education (India) Pvt., Ltd., 1st edition, 2015

C PROGRAMMING LABORATORY				
Course Code		21CPL17/27	CIE Marks	50
Teaching Hour/Week (L:T:P:S)		0:0:2:1	SEE Marks	50
Total Hours of Teaching-Learning		26	Total Marks	100
Credits		01	Exam Hours	03
COs	Description			CL
CO1	Apply the concept of looping and branching to solve the problem.			CL3
CO2	Implement the programs on arrays and strings			CL3
CO3	Apply searching and sorting techniques that solve real-world problems			CL3
CO4	Construct programs on functions and recursions to solve problems using modular programming constructs			CL3
CO5	Implement the programs on structures and pointers			CL3
CO – Assessment Mapping				
Course Outcomes	Continuous Internal Evaluation (CIE)		Semester End Exam	
	Test	Lab		
		20%	30%	50%
CO 1	x	x	x	
CO 2	x	x	x	
CO 3	x	x	x	
CO 4	x	x	x	
CO 5	x	x	x	
Course Contents				
Experiments				
1. Familiarization of open-source Operating System, and their associated commands necessary for C programming.				
2. Design and implementation of if -else if- ladder to arrive at a solution. Sample programs: Student grading system, Income Tax estimation, Electricity Bill generation, determining if a year is a leap year				
3. Design and implementation of computational problems using switch. Sample programs: Simple calculator, No. of days in a month, count Vowels/Consonants				
4. Design and Implementation of looping constructs. Sample Programs: Reverse a number, Decimal to Binary, Euclid’s algorithm, Taylor series expansion				
5. Design and implementation of Matrix operations. Sample programs: creation of identity matrix, transpose of a matrix, Matrix Multiplication				
6. Design and development of string manipulation function Sample program: Reverse a string/ String concatenation/ Length of string/ Change Case				
7. Develop a program to display the specified pattern. Sample program: Pascal triangle, construct basic shape (eg triangle, square) using the specified character				
8. Design and development of searching algorithms: binary search, linear search. Sample program: Search for sales records, Contact numbers				
9. Design and development of sorting algorithms: Bubble sort, Selection sort Sample programs: sort by weight of items/price list				
10. Application of structure/pointer Sample programs: Read and retrieve employee details/ obtain statistical information				

(sum, mean, std dev) to record the changes in weather/real estate market analysis 11. Design and implementation of recursive functions. Sample Programs: Generation of Fibonacci series, the factorial of a number, Tower of Hanoi

11. Design and implementation of recursive functions. Sample Programs: Generation of Fibonacci series, the factorial of a number, Tower of Hanoi

Sample Programs: Generation of Fibonacci series, the factorial of a number, Tower of Hanoi

CO-PO-PSO Mapping

COs.	Programme Outcomes (POs)												Programme Specific Outcome (PSO)		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	1	1		2			3	1	2		3			
CO2	3	1	1		2			3	1	2		3			
CO3	3	1	1		2			3	1	2		3			
CO4	3	1	1		2			3	1	2		3			
CO5	3	1	1		2			3	1	2		3			

Reference Books

1. **Let Us C, Authentic Guide to C Programming Language** Yashavant Kanetkar, bpb publisher, 17th Edition, 2020.
2. **C: The complete reference**, Herbert Schildt, McGraw Hill, 4th Edition, 2017
3. **Programming in C**, ReemaTharaja, Oxford University Press, 2nd Edition

Reference Web Links:

1. <http://elearning.vtu.ac.in/econtent/courses/video/BS/14CPL16.html>
2. <https://nptel.ac.in/courses/106/105/106105171/>

TECHNICAL ENGLISH I					
Course Code		21EGH18		CIE Marks	50
Teaching Hour/Week (L:T:P:S)		1:0:2:1		SEE Marks	50
Total Hours of Teaching-Learning		39		Total Marks	100
Credits		02		Exam Hours	03
COs	Description				CL
CO1	Understand the skills required to use the English Language effectively in all areas of communication.				CL2
CO2	Develop English vocabulary and language proficiency.				CL2
CO3	Demonstrate Technical communicational skills through reading and listening practices.				CL2
CO4	Infer nature and style of practical writing skills.				CL2
CO5	Acquire Confidence and learn strategies for error-free communication.				CL2
CO – Assessment Mapping					
Course Outcomes	Continuous Internal Evaluation (CIE)				Semester End Exam
	Test 1	Test 2	Test 3	Assignment/Activities	
	10%	10%	10%	20%	50%
CO 1	x			x	x
CO 2	x	x		x	x
CO 3		x		x	x
CO 4			x	x	x
CO 5			x	x	x
Course Contents					
Module 1					
Introduction to Technical Communication					
Introduction to Technical Communication, Grammar: Basic English Grammar, Parts of Speech - Nouns, Pronouns, Adjectives, Verbs, Adverbs, Preposition, Conjunctions, Articles: Use of Articles-Indefinite and Definite Articles, Tenses, SVA					
Lab: Exercises on parts of speech, Articles, Tenses (RBT Levels: L1, L2 & L3)					
Module 2					
Introduction to Listening Skills and Phonetics-I					
Introduction to Phonetics, Sounds Mispronounced, Silent and Non-silent Letters, Homophones and Homonyms, Aspiration, Pronunciation of 'The', words ending 'age', some plural forms.					
Lab: Exercises on Phonetics, Pronunciation (RBT Levels : L1, L2 & L3)					
Module 3					
Developing Listening Skills (Phonetics and Vocabulary Building)					
Speech Sounds: Vowels and Consonants -Exercises on it. Stress Shift, Question Tags, Question Tags for Assertive Sentences (Statements)-Some Exceptions in Question Tags and Exercises, One Word Substitutes and Exercises, Vocabulary-Synonyms and Antonyms, Exercises on it.					
LAB: Exercise on Question tags, Language Enhancers. (RBT Levels: L1, L2 & L3)					
Module 4					

Writing Skills (Basics)

Syllables, Structures, Prefixes and Suffixes (Vocabulary), Contractions and Abbreviations used in text messages, Texting and Literacy.

LAB: Conversations, News Articles and Narratives.

(RBT Levels: L1, L2 & L3)

Module 5**Speaking Skills:**

Extempore/Public Speaking, Difference between Extempore/Public Speaking.

LAB: Mother Tongue Influence(MTI), Listening Comprehension –Exercises, Common Errors in Pronunciation
(RBT Levels: L1, L2 & L3)

CO-PO-PSO Mapping

COs.	Programme Outcomes (POs)												Programme Specific Outcome (PSO)		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1					2				2	3		3			
CO2					2					3		2			
CO3					2			2		3		2			
CO4					2					3		2			
CO5					2			2	1	3		2			

Text Book

1. **High School English Grammar & Composition** by Wren and Martin, S Chandh & Company Ltd-2015
2. **English Language Communication Skills Workbook**, Cengage learning India Pvt Limited [Latest Revised Edition] - 2018.
3. **Lab Manual cum Technica. Communication Principles and Practice.** Third Edition by Meenakshi Raman and Sangeetha Sharma, Oxford University Press 2017.

Reference Books

1. **Effective Technical Communication Second Edition** by M Ashraf Rizvi, McGraw Hill Education (India) Private Limited 2018.
2. **Intermediate Grammar, Usage and Composition** by M.L.Tichoo, AL. Subramanian, P.R.Subramanian, Orient Black Swan 2016.

Reference Web Links:

1. https://www.youtube.com/watch?v=Z7jiJpW_-C0
2. <https://www.youtube.com/watch?v=VE9wAMP3jWo>
3. <https://www.youtube.com/watch?v=6IS6q-uUjmE>
4. <https://www.youtube.com/watch?v=8ZDxn0JZGl8>

INNOVATION AND DESIGN THINKING				
Course Code		21IDT19/29	CIE Marks	50
Teaching Hour/Week (L:T:P:S)		1:0:0:1	SEE Marks	50
Total Hours of Teaching-Learning		13	Total Marks	100
Credits		01	Exam Hours	03
COs	Description			CL
CO1	Understand the concepts of design thinking approaches			CL3
CO2	Create design thinking teams and conduct design thinking sessions			CL3
CO3	Apply both critical thinking and design thinking in parallel to solve problems			CL3
CO4	Apply some design thinking concepts to their daily work			CL3
CO – Assessment Mapping				
Course Outcomes	Continuous Internal Evaluation (CIE)		Semester End Exam	
	Final Presentation (Test)	Assignment/Activities		
		30%	20%	50%
CO 1	x	x	x	
CO 2	x	x	x	
CO 3	x	x	x	
CO 4	x	x	x	
CO 5	x	x	x	
Course Contents				
Module 1				
Introduction to Design Thinking				
Need of design thinking, Traditional problem solving versus design thinking, Impact of design thinking, Divergent thinking, Human-centered design, Wicked problem.				
Module 2				
Empathy: Methods of empathizing in design thinking, Empathy maps, Customer journey mapping, transitioning from empathy stage to define stage				
Module 3				
Define stage: Purpose and importance, Problem statement, Point of view - develop a problem statement and practical application				
Ideate stage: Purpose and methods, Brainstorming – Osborn brainstorming and SCAMPER, Mind map, the transition from ideate stage to prototype stage				
Module 4				
Prototype stage: Purpose and importance, Business model prototyping, Rapid prototyping				
Module 5				
Test stage: Purpose and importance, Best practices for testing prototypes, Applications				

CO-PO-PSO Mapping

COs.	Programme Outcomes (POs)												Programme Specific Outcome (PSO)		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2	2						2	2	1	1			
CO2	3	2	2						2	2	1	1			
CO3	3	2	2						2	2	1	1			
CO4	3	2	2						2	2	1	1			
CO5	3	2	2						2	2	1	1			

Text Books

1. **"Engineering Design"**, John.R.Karsnitz, Stephen O'Brien and John P. Hutchinson, Cengage learning (International edition) Second Edition, 2013.
2. **"The Design of Business: Why Design Thinking is the Next Competitive Advantage"**, Roger Martin, Harvard Business Press, 2009.
3. **"Design Thinking: Understand – Improve – Apply"**, Hasso Plattner, Christoph Meinel and Larry Leifer (eds), Springer, 2011
4. **"Design Thinking for Strategic Innovation: What They Can't Teach You at Business or Design School"**, Idris Mootee, John Wiley & Sons 2013.

Reference Books

1. **"Engineering Design Process"**, Yousef Haik and Tamer M.Shahin, Cengage Learning, Second Edition, 2011.
2. **Solving Problems with Design Thinking - Ten Stories of What Works** (Columbia Business School Publishing) Hardcover – 20 Sep 2013 by Jeanne Liedtka (Author), Andrew King (Author), Kevin Bennett (Author).

Reference Web Links:

1. www.tutor2u.net/business/presentations/. /productlifecycle/default.html
2. https://docs.oracle.com/cd/E11108_02/otn/pdf/. /E11087_01.pdf
3. www.bizfilings.com › Home › Marketing › Product Development
4. <https://www.mindtools.com/brainstm.html>
5. <https://www.quicksprout.com/. /how-to-reverse-engineer-your-competit>
6. www.vertabelo.com/blog/documentation/reverse-engineering
<https://support.microsoft.com/en-us/kb/273814>
7. <https://support.google.com/docs/answer/179740?hl=en>
8. <https://www.youtube.com/watch?v=2mjSDIBaUIM>
9. <https://dschool.stanford.edu/.../designresources/.../ModeGuideBOOTCAMP2010L.pdf>

APPLIED MATHEMATICS II					
Course Code		21MAT21		CIE Marks	50
Teaching Hour/Week (L:T:P:S)		2:2:0:1		SEE Marks	50
Total Hours of Teaching-Learning		52		Total Marks	100
Credits		03		Exam Hours	03
COs	Description				CL
CO1	Illustrate the applications of multivariate calculus to understand the solenoidal and irrotational vectors and exhibit the interdependence of line, surface and volume integrals.				CL3
CO2	Understand various physical models through higher-order differential equations and solve such linear ordinary differential equations				CL3
CO3	Model a variety of partial differential equations and solve by various methods				CL2
CO4	Understand the concepts of Laplace Transform and Inverse Laplace Transform and apply them to obtain the general solution of initial value problems				CL3
CO5	Understand the concepts of numerical methods to solve various engineering problems				CL2
CO – Assessment Mapping					
Course Outcomes	Continuous Internal Evaluation (CIE)				Semester End Exam
	Test 1	Test 2	Test 3	Assignment/Activities	
	10%	10%	10%	20%	
CO 1	x			x	x
CO 2	x	x		x	x
CO 3		x		x	x
CO 4			x	x	x
CO 5			x	x	x
Course Contents					
Module 1					
Vector Differentiation: Scalar and vector fields. Gradient, directional derivative; curl and divergence-physical interpretation; solenoidal and irrotational vector fields-Illustrative problems.					
Vector Integration: Line integrals, Theorems of Green, Gauss and Stokes (without Proof). Applications to work done by a force and flux.					
Module 2					
Differential Equations of higher-order: - Second order linear ODE's with constant coefficients-Inverse differential operators (for e^{ax} , $\sin ax$ or $\cos ax$, x^m), method of variation of parameters; Cauchy's and Legendre homogeneous equations. Applications to oscillations of a spring.					
Module 3					
Partial Differential Equations (PDE's):- Formation of PDE's by elimination of arbitrary constants and functions. Solution of non-homogeneous PDE by direct integration. Homogeneous PDEs involve derivatives with respect to one independent variable only. Solution of Lagrange's linear PDE. Derivation of one-dimensional heat and wave equations and solutions by the method of separation of variables.					
Module 4					

Laplace Transform: Definition and Laplace transforms elementary functions (statements only). Laplace transforms of Periodic functions and unit-step function – problems. Properties of Laplace transform.

Inverse Laplace Transform:

Definition and problems, Convolution theorem to find the inverse Laplace transforms (without Proof) and problems. Solution of linear differential equations using Laplace transforms.

Module 5

Numerical Methods: Finite differences. Solution of polynomial and transcendental equations-Newton-Raphson and Regula-Falsi methods (only formulae)-illustrative examples. Interpolation/extrapolation using Newton's forward and backward difference formulae, Newton's divided difference and Lagrange's formula (All formulae without Proof).

Numerical integration: Simpson's $(1/3)^{th}$ and $(3/8)^{th}$ rules, Weddle's rule (without Proof)-Problems

CO-PO-PSO Mapping

COs.	Programme Outcomes (POs)												Programme Specific Outcome (PSO)		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3										1			
CO2	3	3				1						1			
CO3	3	3							1			1			
CO4	3	3				1						1			
CO5	3	3			1				1	1		1			

Text Book

1. **Higher Engineering Mathematics**, B.S. Grewal , Khanna Publishers, 43rd Ed., 2015.
2. **Advanced Engineering Mathematics**, E. Kreyszig , John Wiley & Sons, 10th Ed.(Reprint), 2016.

Reference Books

1. **Advanced Engineering Mathematics** C.Ray Wylie, Louis C.Barrett:, 6th Edition,
2. **Higher Engineering Mathematics** B.V.Ramana: 11th Edition, Tata McGraw-Hill.
3. **Engineering Mathematic for Semester I and II**, Gupta C.B, Sing S.R and Mukesh Kumar:, Mc-Graw Hill Education(India) Pvt. Ltd 2015.
4. **Higher Engineering Mathematics** H.K.Dass and Er. Rajnish Verma: S.Chand Publication (2014).
5. **Calculus** James Stewart: Cengage publications, 7th Web links and Video Lectures (e-Resources)

Reference Web Links:

1. <https://www.youtube.com/watch?v=hj2vbM34qQ0>
2. <https://www.youtube.com/watch?v=NBcGLLU90fM>
3. <https://www.youtube.com/watch?v=NBcGLLU90fM>

ENGINEERING PHYSICS					
Course Code		21PHY12/22		CIE Marks	50
Teaching Hour/Week (L:T:P:S)		2:2:0:1		SEE Marks	50
Total Hours of Teaching-Learning		52		Total Marks	100
Credits		03		Exam Hours	03
COs	Description				CL
CO1	Identify and apply the waves and oscillations of various types in real-life applications.				CL3
CO2	Apply the fundamentals of physical properties of materials in beams, cantilevers and pendulums and recognize their engineering applications.				CL3
CO3	Comprehend the background of laser and optical fibres, their construction, working, types and applications.				CL3
CO4	Illustrate the various measurement techniques for material characterization by employing the concepts of revolutionary Quantum Mechanics.				CL3
CO5	Identify and select the materials such as conductors, semiconductors and dielectric materials for the relevant applications.				CL3
CO – Assessment Mapping					
Course Outcomes	Continuous Internal Evaluation (CIE)				Semester End Exam
	Test 1	Test 2	Test 3	Assignment/Activities	
	10%	10%	10%	20%	50%
CO 1	x			x	x
CO 2	x	x		x	x
CO 3		x		x	x
CO 4			x	x	x
CO 5			x	x	x
Course Contents					
Module 1- Oscillations and Waves					
Free Oscillations:					
Review of SHM, derivation of equation for SHM, Mechanical simple harmonic oscillators: mass suspended to spring (vertical oscillations), Equation of motion for free oscillations, Natural frequency of oscillations.					
Damped and forced oscillations:					
Theory of damped oscillations: over damping, critical & under damping. Theory of forced oscillations and resonance, examples for mechanical resonance, quality factor and sharpness of the resonance.					
Shock waves:					
Mach number, classification of speed of objects based on Mach number (subsonic, supersonic, Transonic and hypersonic), definition, description and properties of Shock waves, Construction and working of Reddy shock tube, applications of shock waves.					
Numerical problems					

Module 2- Elastic Properties of Materials
Elasticity: Review of concept of elasticity, plasticity, stress, strain, tensile stress, shear stress, compressive stress, Hooke's law, different elastic moduli: Poisson's ratio, Expression for Young's modulus (Y), Bulk modulus (K) and Rigidity modulus (η) in terms of α and β. Relation between elastic constants. Limits of Poisson's ratio. Bending of beams: Neutral surface and neutral axis, Mention of expression for bending moment and bending moment of a beam with circular and rectangular cross-sections. Single cantilever-derivation of expression for Young's modulus. Torsion of cylinder: Expression for couple per unit twist of a solid cylinder (Derivation), Torsional Pendulum-Expression for period of oscillation. Numerical problems
Module 3 - Lasers and Optical Fibers
Lasers: Interaction of radiation with matter, Review of spontaneous and stimulated processes, Einstein's coefficients-derivation of expression for energy density. Requisites of a Laser system. Conditions for laser action. Principle, Construction and working of CO₂ and semiconductor Lasers. Application of Lasers in Defence (Laser range finder) and medical applications-Eye surgery and skin treatment. Optical fibres: Basics of optical fiber, Description of propagation mechanism of light through an optical fiber, angle of acceptance, Numerical aperture (NA)-derivation. Modes of propagation and mention types of optical fibers based on refractive index profile. Attenuation: Causes of attenuation and Mention of expression for attenuation coefficient. Application of optical fiber (point-to-point communication), Merits and limitations of optical fiber. Numerical problems
Module 4- Quantum Mechanics and Instrumentation Techniques for Material Characterisation
Quantum mechanics: Introduction to Quantum mechanics, Wave nature of particles, Heisenberg's uncertainty principle, physical significance and application-non-confinement of the electron in the nucleus. Wave function - properties, significance: Probability density, Normalization. Schrodinger time-independent wave equation-derivation, Application of Schrodinger's wave equation – to find the Eigen functions and Energy Eigenvalues of a particle in a potential well. Instrumentation Techniques for Material Characterisation: Nanomaterial's and importance of material characterization. Principle, construction and working of X-ray Diffractometer, crystal size determination by Scherrer equation. Principle, construction, working of Atomic Force Microscope (AFM), and similar instrumentation techniques and applications. Numerical problems.

Module 5- Material Science

Quantum Free electron theory of metals:

Review of classical free electron theory, mention of failures. Assumptions of Quantum Free electron theory (QFET), Mention of expression for density of states. Fermi-Dirac statistics (qualitative), Fermi factor & its temperature dependence, Fermi level, Fermi energy, Mention the expression for the electrical conductivity based on QFET, Success of QFET.

Physics of Semiconductor:

Fundamentals of semiconductors, Fermi level in intrinsic semiconductors, Mentioning of the concept of charge concentration (Electron and Hole) Conductivity of semiconductors (derivation). Hall effect (qualitative).

Dielectric materials:

Fundamentals of dielectrics, dipole moment, Polarization of dielectric materials, types of polarization, polarizability, polar and non-polar dielectrics, internal fields in a solid, Clausius-Mossotti equation (Derivation), mention of solid, liquid and gaseous dielectrics with one example and application each.

Numerical problems

CO-PO-PSO Mapping

COs.	Programme Outcomes (POs)												Programme Specific Outcome (PSO)		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2				1				1		1			
CO2	3	2				1				1		1			
CO3	3	2				1	1			1		1			
CO4	3	2				1				1		1			
CO5	3	2				1				1		1			

Text Book

1. **Textbook of Engineering Physics-** M.N. Avadhanulu and P.G. Kshirsagar, 10th revised Ed, S. Chand & Company Ltd, New Delhi, 2014
2. **Engineering Physics** by S.P Basavaraju, 2018 Edition.
3. **Engineering Physics**-Gaur and Gupta-Dhanpat Rai Publications-2017

Reference Books

1. **Physics for Scientists and Engineers with Modern Physics**, 10th edition-2018 by Raymond Serway and John Jewett
2. **Eisberg and Resnick**, Introduction to Quantum Physics
3. **Solid State Physics**-S O Pillai, 8th Ed- New Age International Publishers-2018
4. **Nanocomposite materials**-Synthesis, properties and applications, CRC Press, 2016.

Reference Web Links:

1. <https://nptel.ac.in/courses/115/106/115106119/> (Waves & Oscillations)
2. <https://nptel.ac.in/courses/113/103/113103072/> (Elasticity)
3. <https://nptel.ac.in/courses/115/102/115102124/> (Laser)
4. <https://nptel.ac.in/courses/115/104/115104096/> (Quantum Mechanics)
5. https://onlinecourses.nptel.ac.in/noc20_mm14/preview (Material Characterization)

BASIC ELECTRICAL ENGINEERING					
Course Code		21ELE13/23		CIE Marks	50
Teaching Hour/Week (L:T:P:S)		2:2:0:1		SEE Marks	50
Total Hours of Teaching-Learning		52		Total Marks	100
Credits		03		Exam Hours	03
COs	Description				CL
CO1	Apply the concepts of KVL/KCL in solving DC circuits and imparting fundamental concepts of AC circuits.				CL3
CO2	Analyze and compare single-phase and three-phase (star and delta Connections) systems.				CL3
CO3	Demonstrate the construction and basic working principles of Transformers and performance characteristics of electrical DC Machines.				CL3
CO4	Explain the three-phase synchronous generators and three-phase induction motor and their performance analysis.				CL2
CO5	Demonstrate the Electrical transmission and distribution, fundamental electrical circuit for home appliances and safety precautions.				CL2
CO – Assessment Mapping					
Course Outcomes	Continuous Internal Evaluation (CIE)				Semester End Exam
	Test 1	Test 2	Test 3	Assignment/Activities	
	10%	10%	10%	20%	
CO 1	x			x	x
CO 2	x	x		x	x
CO 3		x		x	x
CO 4			x	x	x
CO 5			x	x	x
Course Contents					
Module 1					
DC circuits:					
Ohm’s law and Kirchhoff’s laws, analysis of series, parallel and series – parallel circuits excited by independent voltage sources. Power and energy, maximum power transfer theorem applied to the series circuit and its applications.					
Single-phase circuits:					
Generation of sinusoidal voltage, frequency of generated voltage, average value, RMS value, form and peak factors. Voltage and current relationship, with phasor diagram, in R, L and C circuits.					
Module 2					
Single-phase circuits (continued):					
Analysis of R-L, R-C, R-L-C Series and Parallel circuits, Real power, reactive power, apparent power and Power factor. Measurement of power.					
Three-phase circuits:					
Generation of three-phase power, representation of balanced star and delta connected loads, phase and line relations of voltages and currents from phasor diagrams, advantages of three-phase systems. Measurement of three-phase power by two wattmeter method, simple problems.					

Module 3															
DC Machines: (a) Principle of operation, constructional details, induced emf expression, types of generators and relation between induced emf and terminal voltage. (b) Principle of operation, back emf and torque equations, types of motors, characteristics (shunt and series only) and applications. Transformers: Necessity of transformer, the principle of operation, Types and construction of single-phase transformers, emf equation, losses, variation of losses with respect to load, efficiency and condition for maximum efficiency.															
Module 4															
Three-phase induction Motors: Concept of rotating magnetic field, Principle of operation, constructional motor features, types – squirrel cage and wound rotor, slip and problems on the slip, the significance of slip, applications. Three-phase synchronous generators: Principle of operation, constructional details of salient and non-salient pole generators, synchronous speed, frequency of generated voltage, emf equation, with concept of winding factor (excluding the derivation and calculation of winding factors).															
Module 5															
Power transmission and distribution: Concept of HVAC transmission and HVDC transmission. Low voltage distribution system (400 V and 230 V) for domestic, commercial. Concept of the grid and the need for interconnection of grids. Conditions for grid connection. Regulatory bodies in the Electrical power sector and their roles. Power sector scenario in India. Personal safety measures: Electric Shock, Earthing and its types, Safety Precautions to avoid shock and Residual Current Circuit Breaker (RCCB). Equipment Safety measures: Working principle of Fuse and Miniature circuit breaker (MCB), merits and demerits															
CO-PO-PSO Mapping															
COs.	Programme Outcomes (POs)												Programme Specific Outcome (PSO)		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3										1			
CO2	3	3										1			
CO3	3	3										1			
CO4	3	2										1			
CO5	3	2				2	1					1			

Text Book

1. **Basic Electrical Engineering** D. C. Kulshreshtha McGraw-Hill Education Revisedfirst-edition, 2019.
2. **Electrical and Electronic Technology** Edward Hughes Pearson 12th edition, 2016.
3. **Basic Electrical Engineering** D.P. Kothari I.J.Nagrath McGraw-Hill Education 4th Edition,2019.

Reference Books

1. **Fundamentals of Electrical Engineering and Electronics** B.L.Theraja S Chand andCompany Reprint Edition 2013.
2. **Principles Electrical Engineering and Electronics** V.K Mehata, Rohit Mehta S Chand and Company 2nd edition, 2015.

Reference Web Links:

1. <https://nptel.ac.in/courses/108/105/108105053>
2. <https://nptel.ac.in/courses/108/108/108108076/>

ELEMENTS OF CIVIL ENGINEERING AND ENGINEERING MECHANICS					
Course Code		21CIV14/24		CIE Marks	50
Teaching Hour/Week (L:T:P:S)		3:0:0:1		SEE Marks	50
Total Hours of Teaching-Learning		39		Total Marks	100
Credits		03		Exam Hours	03
COs	Description				CL
CO1	Identify the basic qualities of building materials used in construction and different scopes in civil engineering.				CL2
CO2	Apply the fundamentals of Engineering Mechanics and analyse the Coplanar force system.				CL3
CO3	Solve the equilibrium condition of the body and compute the frictional forces on a rigid body.				CL3
CO4	Estimate centroid and moment of inertia of different geometrical figures.				CL3
CO5	Compute the support reactions of determinate beams and find the member forces of trusses under the action of different types of loads and supports.				CL3
CO – Assessment Mapping					
Course Outcomes	Continuous Internal Evaluation (CIE)				Semester End Exam
	Test 1	Test 2	Test 3	Assignment/Activities	
	10%	10%	10%	20%	
CO 1	x			x	x
CO 2	x	x		x	x
CO 3		x		x	x
CO 4			x	x	x
CO 5			x	x	x
Course Contents					
Module 1					
Introduction to Civil Engineering: Introduction to Structural Engineering, Geotechnical Engineering, Construction Technology, Hydraulics, Water Resources and Irrigation Engineering, Transportation Engineering, Environmental and Sanitary Engineering, Earthquake Engineering. Role of Civil Engineer in infrastructural development.					
Introduction to Building Materials: Bricks: properties and tests, bonding in Brick Masonry, Stonemasonry, Cement: properties and tests. Concrete: constituents, grades, properties and tests, RCC, curing of concrete and mortar.					
Module 2					
Analysis of Force system: Force and its characteristics, Force systems, Principle of transmissibility of forces, Resolution and Composition of forces, Resultant,					
Concurrent Force System: Law of the parallelogram of forces and its limitations, method of resolution, Polygon law of forces, problems on Coplanar Concurrent force system.					
Nonconcurrent force system: Moment of a force, Varignon’s theorem, couple and its characteristics, problems on Coplanar non-concurrent force system.					
Module 3					
Equilibrium of Forces: Equilibrium, Equilibrant, Conditions of equilibrium for Coplanar concurrent and non-concurrent force system, Lami’s theorem, Numerical problems on rollers and connected bodies.					

Friction: Friction, Force of friction, Limiting frictional force, Kinetic Frictional forces, Types of friction, Laws of dry Friction, Angle of Friction, Angle of repose and Cone of friction. Problem on Ladder friction, wedge friction, Belt friction and connected bodies

Module 4

Centroid: Centroid and center of gravity, Centroid of geometric figures, problems on location of Centroid of composite symmetrical and unsymmetrical plane figures. **(No derivations)**

Moment of Inertia: Introduction, Parallel axis and perpendicular axis Theorems, Radius of gyration, Moment of inertia of built-up sections. **(No derivations).**

Module 5

Support Reactions: Types of Loads, types of Supports and types of beams. Support Reactions in beams, Numerical problems on support reactions for statically determinate beams considering all types of loads.

Analysis of Trusses: Types of trusses, analysis of statically determinate trusses using the method of joints and method of sections.

CO-PO-PSO Mapping

COs.	Programme Outcomes (POs)												Programme Specific Outcome (PSO)		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2					1	1			1		1			
CO2	2	1										1			
CO3	2	1										1			
CO4	2	1										1			
CO5	2	1										1			

Text Books

1. **Engineering Mechanics:** Principles of Statics and Dynamics, R. C. Hibbler, Pearson Press, 14th edition 2019
2. **Elements of Civil Engineering and Mechanics**, H J Sawant and S P Nitsure, Technical Publications, 1st edition, 2018
3. **Building Materials**, S.K. Duggal, New Age International (P) Limited, 5th edition, 2019
4. **Engineering Mechanics;** Statics and Dynamics, Ferdinand L. Singer, Harper International Edition, 3rd edition

Reference Books

1. **Engineering Mechanics**, S. Timoshenko, D H young, McGraw Hill Education, 5th edition, 2013
2. **Introduction to Statics and Dynamics**, Andy Ruina and Rudra Pratap, Oxford University Press, 2012

Reference Web Links:

1. <https://www.youtube.com/playlist?list=PLyQSN7X0ro203puVhQsmCj9qhlFQ-As8e>
2. https://www.youtube.com/playlist?list=PLxA8_oP9TgCbUrQCISTT8IGviVjpO8vyp
3. <https://nptel.ac.in/courses/122/104/122104014/>
4. <https://nptel.ac.in/courses/105/102/105102088/>
5. <https://nptel.ac.in/courses/105/106/105106206/>

ENGINEERING VISUALIZATION						
Course Code		21EV15/25		CIE Marks		50
Teaching Hour/Week (L:T:P:S)		2:0:2:1		SEE Marks		50
Total Hours of Teaching-Learning		52		Total Marks		100
Credits		03		Exam Hours		03
COs	Description					CL
CO1	Explain the basic concept of engineering drawing. Apply the principles of orthographic projections for lines and planes					CL3
CO2	Apply the principles of orthographic projections for solids.					CL3
CO3	Visualize three-dimensional objects and develop isometric projections.					CL3
CO4	Apply the principles of orthographic projections and prepare the development of lateral surfaces.					CL3
CO5	Apply the principles of engineering drawing in real-world applications					CL3
CO – Assessment Mapping						
Course Outcomes	Continuous Internal Evaluation (CIE)					Semester End Exam
	Test 1	Test 2	Test 3	Lab Report	Assignment /Activities	
	10%	10%	10%	5%	15%	
CO 1	x			x	x	x
CO 2	x	x		x	x	x
CO 3		x		x	x	x
CO 4			x	x	x	x
CO 5			x	x	x	x
Course Contents						
Module 1						
Introduction: for CIE only						
Significance of Engineering drawing, BIS Conventions of Engineering Drawing, Free hand sketching of engineering drawing, Scales. Introduction to Computer-Aided Drafting software, Co-ordinate system and reference planes HP, VP, RPP & LPP of 2D/3D environment. Selection of drawing sheet size and scale. Commands and creation of Lines, coordinate points, axes, polylines, square, rectangle, polygons, splines, circles, ellipse, text, move, copy, off-set, mirror, rotate, trim, extend, break, chamfer, fillet and curves.						
Orthographic Projections of Points, Lines and Planes: Introduction to Orthographic projections, Orthographic projections of points in all the quadrants. Orthographic projections of lines. (Placed in the First quadrant only) Orthographic projections of planes namely triangle, square, rectangle, pentagon, hexagon and circular lamina. (Placed in the First quadrant only).						
Application on projections of Lines & Planes (For CIE only)						
Module 2						
Orthographic Projection of Solids:						
Orthographic projection of right regular solids (Solids Resting on HP only); Prisms & Pyramids (triangle, square, rectangle, pentagon, hexagon), Cylinders, Cones, Cubes, & Tetrahedron. Application problems on the projection of solids.						
Projections of Frustum of cone, pyramid & truncated sphere (For CIE only).						
Module 3						

Isometric Projections:

Isometric scale, Isometric projection of hexahedron (cube), right regular prisms, pyramids, cylinders, cones and spheres. Isometric projection of combination of two simple solids.

Conversion of simple isometric drawings into orthographic views. Problems on applications of Isometric projections of simple objects/engineering components.

Introduction to drawing views using 3D environment (For CIE only).

Module 4**Development of Lateral Surfaces of Solids:**

Development of lateral surfaces of right regular prisms, cylinders, pyramids, and cones resting with a base on HP only. Development of their frustums and truncations. Problems on applications of development of lateral surfaces like funnels and trays.

Introduction to 3D modelling -3D modelling of commonly used products.

Problems on applications of development of lateral surfaces of transition pieces connecting circular duct and rectangular duct (For CIE Only)

Module 5**Multidisciplinary Applications & Practice (For CIE Only):**

Free-hand Sketching; True free-hand, Guided free-hand, Roads, Buildings, Utensils, Hand tools & Furniture's etc., free-handing drawing/ sketching to be given to get hands-on experience in engineering drawing components and scaling aspects.

Drawing Simple Mechanisms; Bicycles, Tricycles, Gear trains, Ratchets, two-wheeler cart & Four wheeler carts to dimensions etc. **Electric Wiring and lighting diagrams;** Like, Automatic fire alarm, Call bell system, UPS system, Basic power distribution system using suitable software

Basic Building Drawing; Like Architectural floor plan, basic foundation drawing, steel structures- Frames, bridges, trusses using Auto CAD or suitable software,

Electronics Engineering Drawings- Like, Simple Electronics Circuit Drawings.

Graphs & Charts: Like Column chart, Pie chart, Line charts, Gantt charts, etc., using Microsoft Excel or any suitable software, Data Visualization using plotting software(such as origin pro).

CO-PO-PSO Mapping

COs.	Programme Outcomes (POs)												Programme Specific Outcome (PSO)		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3			2				1			1			
CO2	3	3			2				1			1			
CO3	3	3			2				1			1			
CO4	3	3			2				1			1			
CO5	3	3			2				2			1			

Text Books

1. **Engineering Drawing: Plane and Solid Geometry**, Bhatt, N.D., 53rd edition, Charotar Publishing House Pvt. Limited, 2019.

2. **Engineering Graphics**, Gopalakrishna K.R., 32nd edition, Subash Stores, Bangalore, 2005.
3. **Fundamentals of Engineering Drawing: with an Introduction to Interactive Computer Graphics for Design and Production**, Luzadder Warren J., Duff John M., Prentice-Hall of India Pvt. Ltd., New Delhi, Eastern Economy Edition, 2005.
4. **A Textbook of Engineering Drawing**, Dhawan R. K., 3/e, S. Chand Publishing, 2019.
5. **Engineering Drawing and Graphics**, Venugopal K., New Age International publishers, 2014.
6. **Engineering Drawing**, Parthasarathy N. S., Vela Murali, Oxford University Press, 2015.

Reference Books

1. **Electrical Engineering Drawing**, Bhattacharya S. K., New Age International publishers, second edition 1998, reprint 2005.
1. **Printed Circuit Board Design using AutoCAD**, Chris Schroder, Newnes, 1997.

Reference Web Links:

1. <https://youtu.be/cQHDAfrptUc>
2. <https://youtu.be/zkWvL1pPkMY>

ENGINEERING PHYSICS LAB				
Course Code		21PHYL16/26	CIE Marks	50
Teaching Hour/Week (L:T:P:S)		0:0:2:1	SEE Marks	50
Total Hours of Teaching-Learning		26	Total Marks	100
Credits		01	Exam Hours	03
COs	Description			CL
CO1	Recognize the resonance concept and analyse the frequency response of LCR circuits.			CL4
CO2	Use the physical properties of the cantilever, spring and torsion pendulum to verify the coherence between theoretical and practical measurements.			CL3
CO3	Analyse the intensity variation of light due to interference, diffraction and total internal reflection.			CL4
CO4	Illustrate the basic laws of Modern physics – Radiation Law and Plank’s Constant.			CL4
CO5	Analyse the concept of electronic energy in conductors, semiconductors and dielectrics in their Engineering applications.			CL3
CO – Assessment Mapping				
Course Outcomes	Continuous Internal Evaluation (CIE)		Semester End Exam	
	Test	Lab		
		20%	30%	50%
CO 1	x	x	x	
CO 2	x	x	x	
CO 3	x	x	x	
CO 4	x	x	x	
CO 5	x	x	x	
Course Contents				
Experiments				
1. To construct the series and parallel LCR resonance circuit and to determine the resonant frequency (fr) inductance value of the given inductor (L), bandwidth (Δf) and quality factor (Q) by drawing the frequency response curve. Hence to analyse the value of current at resonance condition. 2. Determination of the spring constants in Series and Parallel combination of springs and to compare the results with theoretical values 3. Estimation of Young’s modulus of the material of a rectangular beam by single cantilever method 4. Calculation of moment of inertia of the lamina and Rigidity modulus of the material of the suspension wire of a torsion pendulum 5. Apply the diffraction phenomenon to find the wavelength of semiconductor Laser using grating by estimating the grating constant. 6. Estimation of acceptance angle and Numerical aperture of an optical fiber by the graphical method. 7. Estimation of Planck’s Constant by using Planck’s energy equation. (Use four different colours of LEDs). 8. Analysis of Stefan’s law of radiation by graphical method. 9. Estimation of Fermi energy of copper by analysing variation of resistance with temperature graphically. 10. To draw the I-V characteristics of the photodiode and to calculate its responsivity 11. Estimation of the resistivity of the semiconducting material using the Four Probe method. 12. Estimated the capacitance of the given capacitor using RC charging & discharging				

circuit and calculate the dielectric constant of the dielectric material used in the capacitor.

Demonstration Experiment

Identify the type of semiconductor and estimate the charge carrier concentration and mobility of a semiconductor by estimating Hall Coefficient using Hall Effect

CO-PO-PSO Mapping

COs.	Programme Outcomes (POs)												Programme Specific Outcome (PSO)		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	1						1	2	1		1			
CO2	3	1						1	2	1		1			
CO3	3	1						1	2	1		1			
CO4	3	1						1	2	1		1			
CO5	3	1						1	2	1		1			

Reference Books

1. **Engineering Lab Manual** by WBUT-New Age International Publishers.
2. **Applied Physics Lab Manual** by Anoop Sing Yadav.

Reference Web Links:

3. <https://www.youtube.com/watch?v=zDmRkE8-Nf8>
4. <https://youtu.be/uOmBvYUMV2Q>
5. https://www.youtube.com/watch?v=_wWN1n6zP2I
6. <https://www.youtube.com/watch?v=mh8-Dcga-ss>
7. <https://www.youtube.com/watch?v=Fs8TQzDTHNA>
8. <https://vlab.amrita.edu/index.php?sub=1&brch=189&sim=343&cnt=1>
9. <https://vlab.amrita.edu/index.php?sub=1&brch=195&sim=547&cnt=1>
10. <https://bop-iitk.vlabs.ac.in/basics-of-physics/List%20of%20experiments.html>
11. <https://www.youtube.com/watch?v=O6eu9gcevs0>
12. <https://www.youtube.com/watch?v=9IwKPBqngS0>
13. <https://vlab.amrita.edu/?sub=1&brch=282&sim=1512&cnt=1>
14. <https://www.youtube.com/watch?v=VLRfwFkEPas>
15. <https://vlab.amrita.edu/?sub=1&brch=282&sim=879&cnt=1>.

BASIC ELECTRICAL LAB				
Course Code		21EEL17/27	CIE Marks	50
Teaching Hour/Week (L:T:P:S)		0:0:2:1	SEE Marks	50
Total Hours of Teaching-Learning		26	Total Marks	100
Credits		01	Exam Hours	03
COs	Description			CL
CO1	To Experiment with the basic laws such as Ohm’s law and Kirchhoff’s laws and to understand the short and open circuit behaviour in DC circuits			CL3
CO2	To Compare power factors of different types of lamps			CL3
CO3	Understand the basic behaviour of 3-phase circuit and Examine the power consumed in a 3-phase balanced load			CL3
CO4	Demonstrate earth resistance and understand two way and three-way control of lamps			CL2
CO5	Identify the behaviour of R-L circuit by examining the impedance of an electrical circuit using choke coil			CL3
CO – Assessment Mapping				
Course Outcomes	Continuous Internal Evaluation (CIE)		Semester End Exam	
	Test	Lab		
		20%	30%	50%
CO 1	x	x	x	
CO 2	x	x	x	
CO 3	x	x	x	
CO 4	x	x	x	
CO 5	x	x	x	
Course Contents				
Experiments				
1. Examine the concept of circuit laws such as KCL and KVL for DC circuits. 2. Compare the various types of earthing for electrical systems, and then conduct an experiment to measure Earth resistance of Campus premises. 3. Experiment to measure Current, Power and Power Factor of Incandescent Lamp, Fluorescent Lamp and LED Lamp. 4. Apply the concept of maximum power theorem and examine them to laboratory measurements. 5. Experiment to study the balanced three-phase system for star & delta connected load (Phase and line quantities). 6. To measure three- phase power and power factor in a balanced three-phase circuit using two single-phase wattmeters. 7. To experiment to determine the efficiency of a single-phase transformer by direct load test. 8. To demonstrate Two Way and Three-Way Control of Lamp and Formation of Truth Table. 9. Experiment to measure the Resistance and Inductance of a Choke coil using three voltmeter methods. 10. Examine the concept of the effect of Open and Short circuits for DC circuits.				
Demonstration Experiments				
1. Demonstration of cut-section of electrical machines (DC Machines, Induction				

Machine and Synchronous Machine)

2. Understanding AC & DC Supply. Use of Tester and Test Lamp to ascertain the healthy status of mains.
3. Demonstration of Fuse and MCB separately by creating a fault.
4. Demonstrate a single-phase energy meter and find out energy consumed in 30 minutes.

CO-PO-PSO Mapping

COs.	Programme Outcomes (POs)												Programme Specific Outcome (PSO)		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	2					3	2			1			
CO2	3	2	2					3	2			1			
CO3	3	2	2			1		3	2			1			
CO4	3	2	2			2		3	2			1			
CO5	3	2	2					3	2			1			

Reference Books

1. **Basic Electrical Engineering** D. C. Kulshreshtha McGraw-Hill Education Revised first edition, 2019

Reference Web Links:

1. https://www.youtube.com/watch?v=LO3_qS5wFWI
2. <https://www.youtube.com/watch?v=U85eA3-suiQ>

TECHNICAL ENGLISH II						
Course Code			21EGH28		CIE Marks	50
Teaching Hour/Week (L:T:P:S)			1:0:2:1		SEE Marks	50
Total Hours of Teaching-Learning			39		Total Marks	100
Credits			02		Exam Hours	03
COs	Description					CL
CO1	Identify common errors in written communication.					CL2
CO2	Understand how to write technical content for a specific audience.					CL2
CO3	Improve technical communication skills through reading and writing practices.					CL2
CO4	Synthesize complex concepts and present them in speech and writing.					CL2
CO5	To create healthy and caring relationships to meet the MNC and LPG world requirements. MNC- Multinational Company, LPG – Liberalization, Privatization, and Globalization					CL2
CO – Assessment Mapping						
Course Outcomes	Continuous Internal Evaluation (CIE)				Semester End Exam	
	Test 1	Test 2	Test 3	Assignment/Activities		
	10%	10%	10%	20%	50%	
CO 1	x			x	x	
CO 2	x	x		x	x	
CO 3		x		x	x	
CO 4			x	x	x	
CO 5			x	x	x	
Course Contents						
Module 1						
Nature and style of writing: Importance of proper punctuations, Usage of Idioms and Phrases, Error correction in sentences, Active and Passive voices Lab: Exercises on punctuations error corrections (RBT Levels: L1, L2 & L3)						
Module 2						
Introduction to Writing Skills The Art of condensation, Writing business, letters Emails, Blog writing, minutes and memos, Technical Report and Proposal Writing, Understanding types of charts, reading graphs and writing about them. Lab: Lab: Book Review, Article writing and Paragraph writing (RBT Levels: L1, L2 & L3)						
Module 3						
Technical Reading Practice Reading comprehension passages, Spotting Error Exercise, Indianisms, Word Analogies, Cloze test and Theme Detection Test. LAB: Reading Comprehensions (RBT Levels : L1, L2 & L3)						
Module 4						

Communication for Employment

Letter of Application (Cover Letter) and Resume, Interpersonal Communicational Skill: Formal and Informal, Dialogues in Various Situations.

LAB: Exercises on Formal & Informal letter-writing and narrative writing.
(RBT Levels : L1, L2 & L3)

Module 5**Speaking Skills**

Non – verbal Communication Skills, Group Discussions, Employment Interviews, Presentational Skills, Barriers to Effective Communication, Different styles in Technical Communication. Interpersonal Communication Skills, How to improve Interpersonal Communication Skills, Developing Interpersonal Skills.

LAB: Group Discussions

(RBT Levels : L1, L2 & L3)

CO-PO-PSO Mapping

COs.	Programme Outcomes (POs)												Programme Specific Outcome (PSO)		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1					2					1		2			
CO2					2					1		2			
CO3					2				3		2				
CO4					2					1		2			
CO5					2			2	1	3		1			

Text Book

1. **High School English Grammar & Composition** by Wren and Martin, S Chandh & Company Ltd-2015
2. **English Language Communication Skills Workbook**, Cengage learning India Pvt Limited [Latest Revised Edition] - 2018.
3. **Lab Manual cum Technica. Communication Principles and Practice.** Third Edition by Meenakshi Raman and Sangeetha Sharma, Oxford University Press 2017.

Reference Books

1. **Effective Technical Communication Second Edition** by M Ashraf Rizvi, McGraw Hill Education (India) Private Limited 2018.
2. **Intermediate Grammar, Usage and Composition** by M.L.Tichoo, AL. Subramanian, P.R.Subramanian, Orient Black Swan 2016

Reference Web Links:

1. https://www.youtube.com/watch?v=Z7jiJpW_-C0
2. <https://www.youtube.com/watch?v=VE9wAMP3jWo>
3. <https://www.youtube.com/watch?v=6IS6q-uUjmE>
4. <https://www.youtube.com/watch?v=8ZDxn0JZGl8>

SCIENTIFIC FOUNDATION OF HEALTH					
Course Code		21SFH19/29		CIE Marks	50
Teaching Hour/Week (L:T:P:S)		1:0:0:1		SEE Marks	50
Total Hours of Teaching-Learning		13		Total Marks	100
Credits		01		Exam Hours	02
COs	Description				CL
CO1	Understand Health and wellness and its Beliefs				CL2
CO2	Practice good health habits & It’s balanced for positive mind-set				CL2
CO3	Build healthy lifestyles for good health for their better future				CL2
CO4	Create healthy and caring relationships to meet the requirements of MNC and LPG world				CL2
CO5	Aware of the risks and harmful habits				CL2
CO – Assessment Mapping					
Course Outcomes	Continuous Internal Evaluation (CIE)				Semester End Exam
	Test 1	Test 2	Test 3	Assignment/Activities	
	10%	10%	10%	20%	50%
CO 1	x			x	x
CO 2	x	x		x	x
CO 3		x		x	x
CO 4			x	x	x
CO 5			x	x	x
Course Contents					
Module 1					
Good Health and Its balance for positive mindset: What is Health, Why Health is very important Now? – What influences your Health? Health and Behaviour, Health beliefs and advertisements, Advantages of good health (Short term and long-term benefits), Health and Society, Health and family, Health and Personality - Profession. Health and behaviour, Disparities of health in different vulnerable groups. Health and psychology, Methods to improve good psychological health. Psychological disorders (Stress and Health - Stress management), how to maintain good health, Mindfulness for Spiritual and Intellectual health, Changing health habits for good health. Health and personality.					
Module 2					
Building of healthy lifestyles for better future: Developing a healthy diet for good health, Food and health, Nutritional guidelines for good health and well beingness, Obesity and overweight disorders and its management, Eating disorders - proper exercises for its maintenance (Physical activities for health), Fitness components for health, Wellness and physical function,					
Module 3					
Creation of Healthy and caring relationships: Building communication skills (Listening and speaking), Friends and friendship - education, the value of relationships and communication, Relationships for Better or worsening of life, understanding of basic instincts of life (more than biology), Changing health behaviours through social engineering,					

Module 4

Avoiding risks and harmful habits: Characteristics of health-compromising behaviours, Recognizing and avoiding of addictions, how addiction develops and addictive behaviours, Types of addictions, influencing factors for addictions, Differences between addictive people and non-addictive people and their behaviour with society, Effects and health hazards from addictions Such as..., how to recovery from addictions.

Module 5

Preventing and fighting against diseases for good health: Process of infections and reasons for it, how to protect from different types of transmitted infections such as, Current trends of the socio-economic impact of reducing your risk of disease, how to reduce risks for good health, reducing risks and coping with chronic conditions, Management of chronic illness for Quality of life, Health and Wellness of youth: a challenge for the upcoming future Measuring of health and wealth status.

CO-PO-PSO Mapping	
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COs.	Programme Outcomes (POs)												Programme Specific Outcome (PSO)		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1						2		2				2			
CO2						2		1				2			
CO3						1		2		2		2			
CO4						1						2			
CO5						1						2			

Text Books

1. **Health Psychology** (Second edition) by Charles Abraham, Mark Conner, Fiona Jones and Daryl O'Connor – Published by Routledge 711 Third Avenue, New York, NY 10017.
2. **Health Psychology** - A Textbook, FOURTH EDITION by Jane Ogden McGraw Hill Education (India) Private Limited - Open University Press
3. **Scientific Foundations of Health** (Health & Wellness) - General Books published for university and colleges references by popular authors and published by the reputed publisher.

Reference Books

1. **HEALTH PSYCHOLOGY** (Ninth Edition) by SHELLEY E. TAYLOR - University of California, Los Angeles, McGraw Hill Education (India) Private Limited - Open University Press

Reference Web Links:

1. <https://www.youtube.com/watch?v=wzYVBibhyUM>
2. <https://www.youtube.com/watch?v=NtXMOJGkous>

APPLIED MATHEMATICS II					
Course Code		21MAT21		CIE Marks	50
Teaching Hour/Week (L:T:P:S)		2:2:0:1		SEE Marks	50
Total Hours of Teaching-Learning		52		Total Marks	100
Credits		03		Exam Hours	03
COs	Description				CL
CO1	Illustrate the applications of multivariate calculus to understand the solenoidal and irrotational vectors and exhibit the interdependence of line, surface and volume integrals.				CL3
CO2	Understand various physical models through higher-order differential equations and solve such linear ordinary differential equations				CL3
CO3	Model a variety of partial differential equations and solve by various methods				CL2
CO4	Understand the concepts of Laplace Transform and Inverse Laplace Transform and apply them to obtain the general solution of initial value problems				CL3
CO5	Understand the concepts of numerical methods to solve various engineering problems				CL2
CO – Assessment Mapping					
Course Outcomes	Continuous Internal Evaluation (CIE)				Semester End Exam
	Test 1	Test 2	Test 3	Assignment/Activities	
	10%	10%	10%	20%	
CO 1	x			x	x
CO 2	x	x		x	x
CO 3		x		x	x
CO 4			x	x	x
CO 5			x	x	x
Course Contents					
Module 1					
Vector Differentiation: Scalar and vector fields. Gradient, directional derivative; curl and divergence-physical interpretation; solenoidal and irrotational vector fields-Illustrative problems.					
Vector Integration: Line integrals, Theorems of Green, Gauss and Stokes (without Proof). Applications to work done by a force and flux.					
Module 2					
Differential Equations of higher-order: - Second order linear ODE's with constant coefficients-Inverse differential operators (for e^{ax} , $\sin ax$ or $\cos ax$, x^m), method of variation of parameters; Cauchy's and Legendre homogeneous equations. Applications to oscillations of a spring.					
Module 3					
Partial Differential Equations (PDE's):- Formation of PDE's by elimination of arbitrary constants and functions. Solution of non-homogeneous PDE by direct integration. Homogeneous PDEs involve derivatives with respect to one independent variable only. Solution of Lagrange's linear PDE. Derivation of one-dimensional heat and wave equations and solutions by the method of separation of variables.					
Module 4					

Laplace Transform: Definition and Laplace transforms elementary functions (statements only). Laplace transforms of Periodic functions and unit-step function – problems. Properties of Laplace transform.

Inverse Laplace Transform:

Definition and problems, Convolution theorem to find the inverse Laplace transforms (without Proof) and problems. Solution of linear differential equations using Laplace transforms.

Module 5

Numerical Methods: Finite differences. Solution of polynomial and transcendental equations-Newton-Raphson and Regula-Falsi methods (only formulae)-illustrative examples. Interpolation/extrapolation using Newton's forward and backward difference formulae, Newton's divided difference and Lagrange's formula (All formulae without Proof).

Numerical integration: Simpson's $(1/3)^{th}$ and $(3/8)^{th}$ rules, Weddle's rule (without Proof)-Problems

CO-PO-PSO Mapping

COs.	Programme Outcomes (POs)												Programme Specific Outcome (PSO)		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3										1			
CO2	3	3				1						1			
CO3	3	3							1			1			
CO4	3	3				1						1			
CO5	3	3			1				1	1		1			

Text Book

1. **Higher Engineering Mathematics**, B.S. Grewal , Khanna Publishers, 43rd Ed., 2015.
2. **Advanced Engineering Mathematics**, E. Kreyszig , John Wiley & Sons, 10th Ed.(Reprint), 2016.

Reference Books

1. **Advanced Engineering Mathematics** C.Ray Wylie, Louis C.Barrett:, 6th Edition,
2. **Higher Engineering Mathematics** B.V.Ramana: 11th Edition, Tata McGraw-Hill.
3. **Engineering Mathematic for Semester I and II**, Gupta C.B, Sing S.R and Mukesh Kumar:, Mc-Graw Hill Education(India) Pvt. Ltd 2015.
4. **Higher Engineering Mathematics** H.K.Dass and Er. Rajnish Verma: S.Chand Publication (2014).
5. **Calculus** James Stewart: Cengage publications, 7th Web links and Video Lectures (e-Resources)

Reference Web Links:

1. <https://www.youtube.com/watch?v=hj2vbM34qQ0>
2. <https://www.youtube.com/watch?v=NBcGLLU90fM>
3. <https://www.youtube.com/watch?v=NBcGLLU90fM>

ENGINEERING CHEMISTRY					
Course Code		21CHE12/22		CIE Marks	50
Teaching Hour/Week (L:T:P:S)		2:2:0:1		SEE Marks	50
Total Hours of Teaching-Learning		52		Total Marks	100
Credits		03		Exam Hours	03
COs	Description				CL
CO1	Relate and apply the concepts of electrochemistry in Corrosion control and metal finishing.				CL3
CO2	Apply the techniques used to enhance chemical fuel performance in IC engines and understand the importance of alternate green energy resources.				CL3
CO3	Identify and interpret the usage of various fundamental materials in Engineering applications.				CL3
CO4	Explain the basic concepts of thermal Chemistry.				CL2
CO5	Apply volumetric & instrumental analysis methods for water treatment and waste management principles.				CL3
CO – Assessment Mapping					
Course Outcomes	Continuous Internal Evaluation (CIE)				Semester End Exam
	Test 1	Test 2	Test 3	Assignment/Activities	
	10%	10%	10%	20%	
CO 1	x			x	x
CO 2	x	x		x	x
CO 3		x		x	x
CO 4			x	x	x
CO 5			x	x	x
Course Contents					
Module 1- Electrochemistry, Corrosion Science and Metal Finishing					
Basic Concept of Electrochemistry : Electrode potential, galvanic cell, cell representation, Gibbs free energy, electromotive force and cell potential. Derivation of Nernst equation for single electrode potential. Numerical problems on cell potential and electrode potential determination.					
Reference Electrodes: Introduction to secondary reference electrode construction, working and application of calomel electrode. Ion-Selective Electrodes: Glass electrode - definition, construction and working of the glass electrode. Determination of pH of a solution using a glass electrode.					
Corrosion: Introduction, electrochemical theory of corrosion. Types of corrosion - differential metal corrosion, differential aeration and stress corrosion. Corrosion Control: Protective coating: Metallic coating- Anodic and cathodic metal coatings with examples. Inorganic coatings - anodizing and phosphating, Cathodic protection - sacrificial anode method and impressed current method. Numerical problems on Corrosion Penetration Rate (CPR) and Weight loss method.					
Metal Finishing: Introduction, technological importance. Electroplating: Introduction, principles governing electroplating - polarization, decomposition potential and overvoltage. Electroplating process. Electroplating of chromium (hard and decorative). Electroless plating: Introduction, electroless plating of Copper on PCB					

Module 2- Green fuels and Alternated Energy Systems
Chemical Fuels Introduction, the definition of calorific value, Determination of calorific value of solid fuel by Bomb calorimeter, numerical problems. Synthetic petrol by Fischer-Tropsch process. Power alcohol, bio-diesel: synthesis and advantages. Battery: Basic concepts battery characteristics (voltage, energy efficiency, capacity, shelf life and cycle life). Classification of batteries. Lithium Batteries - lithium-ion batteries. Fuel Cells: Introduction, the difference between battery and fuel cells, construction and working of methanol- oxygen fuel cell using H₂SO₄ as electrolyte and solid oxide fuel cell – SOFC. Photovoltaic Cell: Production of solar grade silicon by Union Carbide process, purification by zone refining. Crystal growth by czochralski process, doping process. Construction and working of PV cells.
Module 3 - Material Chemistry
Polymers: Introduction, Glass transition temperature (T_g), factors influencing T_g. Molecular weight of polymer (Number average and mass average of polymer)-Numerical problems. Biodegradable Polymers-Synthesis, properties and applications of polyglycolic acid and polylactic acid. Conducting Polymers: Introduction, conduction mechanism taking polyacetylene and polyaniline as examples and their applications. Polymer Composites: Introduction, Synthesis and application of carbon fibre, and Kevlar. Classification (particle reinforced, fibre reinforced, structural), and their composites(Carbon Fiber Reinforced Polymer (CFRP), Aramid Fiber-Reinforced Polymer and Glass Fiber-Reinforced Polymer (GFRP) Inorganic Engineering material: Introduction, Types, properties and applications of abrasives, cement and ceramics (refractories, glass and clay products) Nanomaterials: Introduction, size-dependent properties (surface area, electrical, optical, thermal) synthesis of nanomaterials- sol-gel process, precipitation and chemical vapour deposition. Nanoscale materials: Graphenes, carbon nanotubes, dendrimers and fullerenes
Module 4- Thermal Chemistry
Introduction, terminologies in thermodynamics- system(Isolated, closed, open, heterogeneous and homogenous), surroundings, state variables (dependent and independent), internal energy and heat capacity of a system. Zeroth law of (concept of heat, work,) and Statement of the first law of thermodynamics. The second law of thermodynamics: Need for second law, statement of Second law of thermodynamics (concepts of the reservoir). Available energy, unavailable energy and increase in entropy. Maximum useful work for a system and control volume, irreversibility. Third law of thermodynamics-Statement.
Module 5- Water Chemistry, Solid waste management and instrumental analysis
Water Chemistry: Introduction. Hardness – definition and itsdetermination by EDTA method. Disadvantages of hardness in boilers (scale and sludge formation and boiler corrosion) and its prevention. Removal of hardness by the ion exchange process. Numerical problems on hardness determination. Definition of Biological Oxygen Demand (BOD), dissolved oxygen (DO), Alkalinity and Chemical Oxygen Demand (COD) – numerical problems on COD determination. Sewage: Introduction and sources. Sewage treatment -Municipal sewage treatment (Primary, secondary and tertiary). Saline water: Introduction and disadvantage.

Desalination of water by reverse osmosis and electrodialysis.

Waste Management:

Solid waste, e-waste and biomedical waste. Sources characteristic and disposal methods.

Instrumental Methods of Analysis:

Theory, Instrumentation and applications Colorimetry, Flame Photometry, Atomic Absorption Spectroscopy and UV Visible Spectroscopy.

CO-PO-PSO Mapping

COs.	Programme Outcomes (POs)												Programme Specific Outcome (PSO)		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3					1	1	1	1		1			
CO2	3	2					1	1	1			1			
CO3	3	1					1		1			1			
CO4	3	1													
CO5	3	2				1	1	1	1	1		1			

Text Book

1. **Physical Chemistry**, by P. W. Atkins, Oxford Publications
2. **A Text Book on Water Chemistry** by A G S Reddy
3. **The Chemistry of Nanomaterials**, WILEY-VCH, edited by C N R Rao., A Muller & AK Cheetham
4. **Text Book of Polymer Science**, F.W. Billmeyer, John Wiley & Sons publications, 4th Edition, 1999.
5. **Corrosion Engineering**, M.G. Fontana, N.D. Greene, McGraw Hill Publications, New York, 3rd Edition, 1996.
6. **Principles of Physical Chemistry**, B.R. Puri, L.R. Sharma & M.S. Pathania, S. Nagin Chand & Co., 41 Edition, 2004
7. **Engineering chemistry** by Jain and Jain ,15th edition Dhanpath Rai publication
8. **‘Nanotechnology A Chemical Approach to Nanomaterials’** by G.A Ozin & A.C. Arsenault

Reference Books

1. **‘Engineering Chemistry’**, by R. V. Gadag & A. Nityananda Shetty., I. K. International Publishing House Private Ltd, New Delhi, 2018.
2. **‘Engineering Chemistry’**, by Dr. Savitha M. B., Lamberts Academic Publishing, Mauritius, 2018.
3. **‘Wiley Engineering Chemistry’**, Wiley India Pvt. Ltd, New Delhi, Second Edition.
4. **“Text Book of Engineering Chemistry”**, by Y. R. Sharma, Pravanthi Mitra Edition, Kalyani Publishers.

Reference Web Links:

1. <https://www.youtube.com/watch?v=faESCxAWR9k>
2. <https://www.youtube.com/watch?v=TBqXMWaxZYM&list=PLyhmwFtznRhu z8L1bb3X-9IbHrDMjHWWH>
3. <https://www.youtube.com/watch?v=j5Hml6KN4TI>
4. <https://www.youtube.com/watch?v=X9GHBdyYcyo>
5. <https://www.youtube.com/watch?v=1xWBPZnEjk8>

C PROGRAMMING FOR PROBLEM SOLVING					
Course Code		21CPS13/23		CIE Marks	50
Teaching Hour/Week (L:T:P:S)		2:2:0:1		SEE Marks	50
Total Hours of Teaching-Learning		52		Total Marks	100
Credits		03		Exam Hours	03
COs	Description				CL
CO1	Inculcate computational thinking for problem-solving using C.				CL3
CO2	Apply the concepts of branching and looping in problem-solving.				CL3
CO3	Demonstrate the arrays, strings, searching and sorting algorithms.				CL3
CO4	Illustrate the functions and recursions to solve problems using modular programming constructs.				CL3
CO5	Demonstrate the concept of structures, pointers, files and dynamic memory allocation.				CL3
CO – Assessment Mapping					
Course Outcomes	Continuous Internal Evaluation (CIE)				Semester End Exam
	Test 1	Test 2	Test 3	Assignment/Activities	
	10%	10%	10%	20%	
CO 1	x			x	x
CO 2	x	x		x	x
CO 3		x		x	x
CO 4			x	x	x
CO 5			x	x	x
Course Contents					
Module 1					
Computational Thinking: Algorithms, Flowcharts Overview of C programming, Applications of C programming, Basic structure of a C program, executing a C program, constant, variable and data types, Operators – Arithmetic operator, Assignment operator, Relational operator, logical operators, Bitwise operators, Miscellaneous operator and expressions.					
Module 2					
Managing Input and output operations. Conditional Branching (if, if-else, else-if ladder, nested if, switch) and Loops (for, while, do-while).					
Example programs: Simple calculator, finding roots of a quadratic equation, plotting of Pascal’s triangle. C – Typecasting.					
Module 3					
Arrays: Arrays (1-D, 2-D), Multi-dimensional arrays and matrices, Character arrays and Strings, Basic Algorithms: Searching and Sorting. Dynamic arrays.					
Example programs: (Linear search, Binary search, Bubble sort, and Selection sort).					
Module 4					
User-Defined Functions and Recursion. Example programs: Finding Factorial of a positive integer, GCD of two numbers, Fibonacci sequence, Tower of Hanoi and sum of natural numbers.					

Module 5

Structures, Unions and Pointers, Pre-processor Directives and Example Programs.

Introduction to files and dynamic memory allocation with example.

CO-PO-PSO Mapping	
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COs.	Programme Outcomes (POs)												Programme Specific Outcome (PSO)		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3							2	2	1		3			
CO2	3	2	2					2	2	1		3			
CO3	3	2	2					2	2	1		3			
CO4	3	2	2					2	2	1		3			
CO5	3	2	2					2	2	1		3			

Text Book

1. **Programming in ANSI C** by E. Balagurusamy Tata McGraw-Hill, 7th Edition, 2017
2. **The ‘C’ Programming Language** Brian W. Kernighan and Dennis M. Ritchie Prentice Hall of India, 2nd Edition 1988.

Reference Books

1. **Computer fundamentals and programming in C** Reema Thereja Oxford University press, 2nd Edition 2015.
2. **C Programming for Scientists and Engineers with Applications** Raman reddy Jones & Bartlett Learning, 1st Edition 2009.

Reference Web Links:

1. <https://nptel.ac.in/courses/106/105/106105171/>
2. <http://elearning.vtu.ac.in/econtent/courses/video/BS/06CCP13.html>
3. <https://india.oup.com/productPage/5591038/7421214/9780199456147>
4. <https://kremlin.cc/k&r.pdf>

BASIC ELECTRONICS & COMMUNICATION ENGINEERING					
Course Code		21ELN14/24		CIE Marks	50
Teaching Hour/Week (L:T:P:S)		2:2:0:1		SEE Marks	50
Total Hours of Teaching-Learning		52		Total Marks	100
Credits		03		Exam Hours	03
COs	Description				CL
CO1	Illustrate electronics circuit concepts such as power supply, amplifiers and Oscillators.				CL3
CO2	Apply the fundamentals of digital logic engineering in data representation, Circuits and microcontroller systems.				CL3
CO3	Interpret the properties of Embedded system and their technical advancements.				CL2
CO4	Illustrate the concepts of principles of communication engineering ranging From frequency spectrum to various circuits involved in antennas.				CL3
CO5	Interpret the various modes of communication, from wired to wireless and the computing involved.				CL2
CO – Assessment Mapping					
Course Outcomes	Continuous Internal Evaluation (CIE)				Semester End Exam
	Test 1	Test 2	Test 3	Assignment/Activities	
	10%	10%	10%	20%	50%
CO 1	x			x	x
CO 2	x	x		x	x
CO 3		x		x	x
CO 4			x	x	x
CO 5			x	x	x
Course Contents					
Module 1					
Electronic Circuits:					
Power Supplies –Block diagram, Rectifiers, Reservoir and smoothing circuits, Full-wave rectifiers, Biphase rectifier circuits, Bridge rectifier circuits, Voltage regulators, Output resistance and voltage regulation, Voltage multipliers.					
Amplifiers – Types of amplifiers, Class of operation, Input and output resistance, Frequency response, Bandwidth, Phase shift, Negative feedback, Multi-stage amplifiers.					
Operational amplifiers - Operational amplifier parameters, Operational amplifier characteristics, Operational amplifier configurations, Operational amplifier circuits, Multi-stage amplifiers.					
Oscillators – Positive feedback, Conditions for oscillation, Ladder network oscillator, Wein bridge oscillator, Multivibrators, Single-stage astable oscillator, Crystal controlled oscillators.					
Module 2					
Logic Circuits –Logic gates, Bistables, R-S Bistables, D-type Bistables, J-K Bistables. Data representation, Data types, Data storage, A microcontroller system.					
Realization using basic gates and truth table the Half Adder and Full Adder, Multiplexer and decoder Shift registers and its types–operation and truth table, Counters and asynchronous.					

Module 3

Embedded Systems—Definition, Embedded systems vs. general computing systems, Classification of Embedded Systems, Major application areas of Embedded Systems, Elements of an Embedded System, Core of the Embedded System, Microprocessor vs. Microcontroller, RISC vs. CISC, Harvard vs. Von Neumann, Big-Endian vs. Little-Endian.

Introduction to IoT System: Component of IoT System.
Communication Interface, UART, Parallel Interface, USB, Bluetooth, Wi-Fi, GPRS.

Module 4

Sensors and Interfacing—Instrumentation and control systems. Transducers. Sensors.

Analog and Digital Communication—Modern communication system scheme, Information source and input transducer, Transmitter, Channel Hardware and Software, Noise, Receiver, Multiplexing, Types of communications systems.

Types of modulation – Introduction to Analog Modulation (AM, FM and PM) and Digital Modulation Techniques.

Antenna, Types of antennas.

Module 5

Evolution of mobile radio communication fundamentals-Introduction, Cellular telephone

Wireless Network Topologies - First Generation (1G) Technology, Second Generation (2G) Technology, GSM Communications, GSM System architecture, Third Generation(3G) Technology, CDMA Technology, High level architecture of LTE, Fourth Generation (4G)Technology, Wireless LAN.

Satellite Communication—Elements of Satellite Communication, Types of satellites, satellite subsystems.

Optical Fiber Communication - A fiber optic Communication system.

CO-PO-PSO Mapping	
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COs.	Programme Outcomes (POs)												Programme Specific Outcome (PSO)		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2							1	1	1	1			
CO2	3	2			1				1	1		1			
CO3	3	1										1			
CO4	3	2			1				1	1		1			
CO5	3	1										1			

Text Book

1. Mike Tooley, '**Electronic Circuits, Fundamentals & Applications**', 4 th Edition, Elsevier, 2015. DOI <https://doi.org/10.4324/9781315737980>. eBook ISBN9781315737980
2. K V Shibu, '**Introduction to Embedded Systems**', 2nd Edition, McGraw Hill

Education (India), Private Limited, 2016.

3. S L Kakani and Priyanka Punglia, '**Communication Systems**', New Age International Publisher, 2017. <https://elib4u.ipublishcentral.com/pdfreader/communication-systems>.
4. D P Kothari, I J Nagrath, '**Basic Electronics**', 2nd edition, McGraw Hill Education (India), Private Limited, 2018.
5. Raj Kamal, '**Internet of Things-Architecture and design principles**', McGraw Hill Education.

Reference Books

1. E-book versions are available at '<https://www.knimbus.com/>' of VTU consortium.
Remote login available through respective college IDs.

Reference Web Links:

1. <https://nptel.ac.in/courses/122/106/122106025/>
2. <https://www.coursera.org/learn/electronics>.

ELEMENTS OF MECHANICAL ENGINEERING						
Course Code			21EME15/25		CIE Marks	50
Teaching Hour/Week (L:T:P:S)			2:0:2:1		SEE Marks	50
Total Hours of Teaching-Learning			40		Total Marks	100
Credits			03		Exam Hours	03
COs		Description				CL
CO1		Describe the environmental and sustainable issues associated with conventional energy sources. Explain various renewable energy sources and their conversion methods.				CL2
CO2		Review the materials for various engineering applications and describe the working principles of metal joining methods				CL2
CO3		Explain the working principle of IC engine, future mobility technology, Refrigeration & AC and their applications.				CL2
CO4		Discuss the different types of mechanical power transmission systems and basic understanding of robotics.				CL2
CO5		Summarize the conventional and modern manufacturing methods used for mechanical manufacturing with advantages and limitations.				CL2
CO – Assessment Mapping						
Course Outcomes		Continuous Internal Evaluation (CIE)				Semester End Exam
		Test 1	Test 2	Test 3	Assignment/Activities	
		10%	10%	10%	20%	
CO 1		x			x	x
CO 2		x	x		x	x
CO 3			x		x	x
CO 4				x	x	x
CO 5				x	x	x
Course Contents						
Module 1						
Introduction to Mechanical Engineering (Overview only): Role of Mechanical Engineering in Industries and Society- Emerging Trends and Technologies in different sectors such as Energy, Manufacturing, Automotive, Aerospace, and Marine sectors.						
Steam Generation and Application: Formation of steam and thermodynamic properties of steam (Simple Problems using Steam Tables), Applications of steam in industries.						
Energy Sources and Power Plants: Review of energy sources; Construction and working of Hydel power plant, Thermal power plant, Nuclear power plant, Solar power plant, Tidal power plant, Wind power plant.						
Introduction to basics of Hydraulic turbines and pumps:						
Principle and Operation of Hydraulic turbines, namely, Pelton Wheel, Francis Turbine and Kaplan Turbine. Introduction to working of Centrifugal Pump.						
Laboratory Components:						
1. Visit any one conventional or renewable energy power plant and prepare a comprehensive report						

2. Demonstration of various turbines – Pelton, Francis, Kaplan 3. Demonstration of various pumps – Centrifugal and Reciprocating pump
Module 2
Engineering Materials – properties, composition and industrial applications: Metals-Ferrous: Tool steels and stainless steels. Non-ferrous /metals: aluminium alloys. Advanced materials: Introduction to smart materials- piezoelectric materials, shape memory alloys, semiconductors, and super-insulators. Metal Joining Processes: Soldering, Brazing and Welding: Definitions. Classification and methods of soldering, brazing, and welding. Brief description of arc welding, Oxy-acetylene welding, Introduction to TIG welding, MIG welding, and bi-metallic welding. Laboratory Components: 1. Demonstration of Material Types and their Physical Properties (5 cm³ Blocks of all possible Materials to be provided for touch and feel, and also to compare the density, mass and surface texture) 2. One exercise each involving Welding and Soldering Demonstration of anyone Heat transfer application device and prepare a comprehensive report.
Module 3
Fundamentals of IC Engines: Review of Internal Combustion Engines, fundamentals of a 2-Stroke engine, 4-Stroke engine, Components and working principles, Application of IC Engines Insight into future mobility technology; Electric and Hybrid Vehicles, Components of Electric and Hybrid Vehicles. Advantages and disadvantages of EVs and Hybrid vehicles, introduction to thermal cooling of batteries and battery packaging Refrigeration and Air-Conditioning: Introduction to the heat pump, refrigeration principle, Refrigeration effect, Ton of Refrigeration, COP, Refrigerants and their desirable properties. Principles and Operation of Vapor Compression and Vapor absorption refrigeration. Working Principles of Air Conditioning and types, Applications of refrigeration and Air conditioning. Laboratory Components: 1. Study of engine components through cut sections 2. Demonstration on Refrigerator and AC components and prepare a comprehensive report. Field visit to refrigeration plant/service centre or workshop
Module 4
Mechanical Power Transmission: Gear Drives: Types - spur, helical, bevel, worm and rack and pinion, velocity ratio, Gear Trains and their application: simple and compound Gear Trains, Simple numerical problems on Gear trains involving velocity ratios Belt Drives: Components of belt drive and concept of velocity ratio; Types of belt drives and Application of Belt Drives. Simple numerical problems on Belt drives involving velocity ratios, Introduction to Robotics: Drives and actuators for robots, common Robot configurations.

Applications of Robotics in Material Handling, Processing, Assembly, and Inspection.

Laboratory Components:

1. Identification of different types of gears and belts with their application and prepare a comprehensive report
2. Demonstration of any one model of robot; Demonstration of Mechanical linkages

Module 5

Fundamentals of Machine Tools and Operations: Fundamentals of Machining and machine tools, Construction and Working Principle of Lathe, Various Lathe Operations: Turning, Facing, Taper Turning and Knurling. Construction and Working of Milling Machines and applications. Construction and working of simple Drilling Machines and applications.

Introduction to Modern Manufacturing Tools and Techniques: CNC: Introduction, components of CNC, advantages and applications of CNC, Introduction to ECM and EDM, Introduction to Computer-Aided Manufacturing, Concepts of Smart Manufacturing and Industrial IoT

Introduction to Mechatronics: Introduction to components of mechatronic systems –sensors and actuators, Concept of open-loop and closed-loop systems, Examples of Mechatronic systems in Automatic washing machine and their working principle.

Laboratory Components:

1. Demonstration of developing one model involving Lathe, Milling and Drilling
2. Study/visit an industry using CNC/Modern techniques and submit a report

Carry out a case study on anyone Mechatronics device and prepare a comprehensive report

CO-PO-PSO Mapping

COs.	Programme Outcomes (POs)												Programme Specific Outcome (PSO)		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2						1	2	1		1			
CO2	3	2						1	2	1		1			
CO3	3	2					1	1	2			1			
CO4	3	2						1	2	1		1			
CO5	3	2						1	2			1			

Text Books

1. Standard Handbook of Machine Design, Joseph E Shigley; Charles R Mischke, Thomas H Brown, Jr., McGraw-Hill, New York, 2004.
2. Basic and Applied Thermodynamics, P.K.Nag, Tata McGraw Hill 2nd Ed., 2002
3. Non-Conventional Energy Sources, G.D Rai, Khanna Publishers, 2003
4. Turbo Machines, M. S. Govindgowda and A. M. Nagaraj, M. M. Publications 7Th Ed, 2012
5. Elements of Mechanical Engineering, K R Gopalakrishna, Subhash Publications, 2008
6. Manufacturing Technology- Foundry, Forming and Welding, P.N.Rao Tata McGraw Hill 3rd Ed., 2003.

Reference Books

1. Thermal Management in Electronic Equipment, HCL Technologies, 2010
2. Thermal Management of Microelectronic Equipment, L. T. Yeh and R. C. Chu, ASME Press, New York, 2002

Reference Web Links:

1. <https://nptel.ac.in/courses/112/104/112104195/> (Introduction to conventional Machining processes)
2. <https://nptel.ac.in/courses/112/107/112107219/> (Fundamentals of Manufacturing processes)
3. <https://www.youtube.com/watch?v=WzoUcCPs1K8> (Principle of Refrigeration)
4. <https://www.youtube.com/watch?v=R0eJXe6R8vY> (Robotic configuration)

ENGINEERING CHEMISTRY LAB				
Course Code		21CHEL16/26	CIE Marks	50
Teaching Hour/Week (L:T:P:S)		0:0:2:1	SEE Marks	50
Total Hours of Teaching-Learning		26	Total Marks	100
Credits		01	Exam Hours	03
COs	Description			CL
CO1	Analyze the water sample so to adopt a suitable treatment method			CL4
CO2	Quantitatively analyze the ions and principles constituent from the sample using the titrimetric method.			CL4
CO3	Detect and estimate the metal ions in the sample using colourimetry..			CL4
CO4	Estimate the mass of the chemical species and the dissociation constant by applying the Nernst equation, ohms law and Henderson’s equation.			CL4
CO5	Determine the viscosity of a liquid by comparing its flow rate with a standard liquid.			CL3
CO – Assessment Mapping				
Course Outcomes	Continuous Internal Evaluation (CIE)		Semester End Exam	
	Test	Lab		
		20%	30%	50%
CO 1	x	x	x	
CO 2	x	x	x	
CO 3	x	x	x	
CO 4	x	x	x	
CO 5	x	x	x	
Course Contents				
Experiments				
Demonstration on solution preparation and titration				
1. Estimation of Total hardness of water by EDTA complexometric method..				
2. Estimation of CaO in cement by rapid EDTA method..				
3. Determination of percentage of Copper in brass using standard sodium thiosulphate solution.				
4. Estimation of percentage of iron in the given rust solution using standard Potassium Dichromate solution (External indicator method)				
5. Determination of COD of wastewater				
Instrumental Experiments				
1. Determination of pKa of the given weak acid using pH meter.				
2. Potentiometric estimation of FAS using standard K ₂ Cr ₂ O ₇ solution.				
3. Colorimetric estimation of Copper				
4. Conductometric estimation of the acid mixture.				
5. Determination of Viscosity co-efficient of the given liquid using Ostwald’s viscometer.				
Demonstration Experiments				
1. Determination of Dissolved oxygen and total the alkalinity of water.				
2. Synthesis of Nano-materials by Precipitation method				

CO-PO-PSO Mapping

COs.	Programme Outcomes (POs)												Programme Specific Outcome (PSO)		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	2	1		1		1	2	2		1			
CO2	3	2	2	1		1		1	2	2					
CO3	3	3	1					1	2	2					
CO4	3	1	1					1	2	2					
CO5	3	1				1		1	2	2					

Text Books

1. **A text book of quantitative analysis**, Vogel's A.I. 35th edition, 2012.
2. **A textbook of Instrumental analysis** Willard, Merit, Dean and Settle, 6th edition 2012.

Reference Books

1. **A textbook of quantitative analysis**, G.H Jeffery, J Bassett, J Mendham and R.C. Denney Vogel's A.I. Dorling Kindersley (India) Pvt., Ltd. 35th edition, 2012.
2. **Analytical Chemistry**, Gary D Christian, Wiley India, 6th edition, 2015.
3. **A Text book of Nanoscience and Nanotechnology**, T. Pradeep McGraw Hill Education (India) Pvt., Ltd., 1st edition, 2015

C PROGRAMMING LABORATORY				
Course Code		21CPL17/27	CIE Marks	50
Teaching Hour/Week (L:T:P:S)		0:0:2:1	SEE Marks	50
Total Hours of Teaching-Learning		26	Total Marks	100
Credits		01	Exam Hours	03
COs	Description			CL
CO1	Apply the concept of looping and branching to solve the problem.			CL3
CO2	Implement the programs on arrays and strings			CL3
CO3	Apply searching and sorting techniques that solve real-world problems			CL3
CO4	Construct programs on functions and recursions to solve problems using modular programming constructs			CL3
CO5	Implement the programs on structures and pointers			CL3
CO – Assessment Mapping				
Course Outcomes	Continuous Internal Evaluation (CIE)		Semester End Exam	
	Test	Lab		
		20%	30%	50%
CO 1	x	x	x	
CO 2	x	x	x	
CO 3	x	x	x	
CO 4	x	x	x	
CO 5	x	x	x	
Course Contents				
Experiments				
1. Familiarization of open-source Operating System, and their associated commands necessary for C programming.				
2. Design and implementation of if -else if- ladder to arrive at a solution. Sample programs: Student grading system, Income Tax estimation, Electricity Bill generation, determining if a year is a leap year				
3. Design and implementation of computational problems using switch. Sample programs: Simple calculator, No. of days in a month, count Vowels/Consonants				
4. Design and Implementation of looping constructs. Sample Programs: Reverse a number, Decimal to Binary, Euclid’s algorithm, Taylor series expansion				
5. Design and implementation of Matrix operations. Sample programs: creation of identity matrix, transpose of a matrix, Matrix Multiplication				
6. Design and development of string manipulation function Sample program: Reverse a string/ String concatenation/ Length of string/ Change Case				
7. Develop a program to display the specified pattern. Sample program: Pascal triangle, construct basic shape (eg triangle, square) using the specified character				
8. Design and development of searching algorithms: binary search, linear search. Sample program: Search for sales records, Contact numbers				
9. Design and development of sorting algorithms: Bubble sort, Selection sort Sample programs: sort by weight of items/price list				
10. Application of structure/pointer Sample programs: Read and retrieve employee details/ obtain statistical information				

(sum, mean, std dev) to record the changes in weather/real estate market analysis 11. Design and implementation of recursive functions. Sample Programs: Generation of Fibonacci series, the factorial of a number, Tower of Hanoi

11. Design and implementation of recursive functions. Sample Programs: Generation of Fibonacci series, the factorial of a number, Tower of Hanoi

Sample Programs: Generation of Fibonacci series, the factorial of a number, Tower of Hanoi

CO-PO-PSO Mapping	
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COs.	Programme Outcomes (POs)												Programme Specific Outcome (PSO)		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	1	1		2			3	1	2		3			
CO2	3	1	1		2			3	1	2		3			
CO3	3	1	1		2			3	1	2		3			
CO4	3	1	1		2			3	1	2		3			
CO5	3	1	1		2			3	1	2		3			

Reference Books

1. **Let Us C, Authentic Guide to C Programming Language** Yashavant Kanetkar, bpb publisher, 17th Edition, 2020.
2. **C: The complete reference**, Herbert Schildt, McGraw Hill, 4th Edition, 2017
3. **Programming in C**, ReemaTharaja, Oxford University Press, 2nd Edition

Reference Web Links:

1. <http://elearning.vtu.ac.in/econtent/courses/video/BS/14CPL16.html>
2. <https://nptel.ac.in/courses/106/105/106105171/>

TECHNICAL ENGLISH II						
Course Code			21EGH28		CIE Marks	50
Teaching Hour/Week (L:T:P:S)			1:0:2:1		SEE Marks	50
Total Hours of Teaching-Learning			39		Total Marks	100
Credits			02		Exam Hours	03
COs	Description					CL
CO1	Identify common errors in written communication.					CL2
CO2	Understand how to write technical content for a specific audience.					CL2
CO3	Improve technical communication skills through reading and writing practices.					CL2
CO4	Synthesize complex concepts and present them in speech and writing.					CL2
CO5	To create healthy and caring relationships to meet the MNC and LPG world requirements. MNC- Multinational Company, LPG – Liberalization, Privatization, and Globalization					CL2
CO – Assessment Mapping						
Course Outcomes	Continuous Internal Evaluation (CIE)				Semester End Exam	
	Test 1	Test 2	Test 3	Assignment/Activities		
	10%	10%	10%	20%	50%	
CO 1	x			x	x	
CO 2	x	x		x	x	
CO 3		x		x	x	
CO 4			x	x	x	
CO 5			x	x	x	
Course Contents						
Module 1						
Nature and style of writing: Importance of proper punctuations, Usage of Idioms and Phrases, Error correction in sentences, Active and Passive voices Lab: Exercises on punctuations error corrections (RBT Levels: L1, L2 & L3)						
Module 2						
Introduction to Writing Skills The Art of condensation, Writing business, letters Emails, Blog writing, minutes and memos, Technical Report and Proposal Writing, Understanding types of charts, reading graphs and writing about them. Lab: Lab: Book Review, Article writing and Paragraph writing (RBT Levels: L1, L2 & L3)						
Module 3						
Technical Reading Practice Reading comprehension passages, Spotting Error Exercise, Indianisms, Word Analogies, Cloze test and Theme Detection Test. LAB: Reading Comprehensions (RBT Levels : L1, L2 & L3)						
Module 4						

Communication for Employment

Letter of Application (Cover Letter) and Resume, Interpersonal Communicational Skill: Formal and Informal, Dialogues in Various Situations.

LAB: Exercises on Formal & Informal letter-writing and narrative writing.
(RBT Levels : L1, L2 & L3)

Module 5**Speaking Skills**

Non – verbal Communication Skills, Group Discussions, Employment Interviews, Presentational Skills, Barriers to Effective Communication, Different styles in Technical Communication. Interpersonal Communication Skills, How to improve Interpersonal Communication Skills, Developing Interpersonal Skills.

LAB: Group Discussions

(RBT Levels : L1, L2 & L3)

CO-PO-PSO Mapping

COs.	Programme Outcomes (POs)												Programme Specific Outcome (PSO)		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1					2					1		2			
CO2					2					1		2			
CO3					2				3		2				
CO4					2					1		2			
CO5					2			2	1	3		1			

Text Book

1. **High School English Grammar & Composition** by Wren and Martin, S Chandh & Company Ltd-2015
2. **English Language Communication Skills Workbook**, Cengage learning India Pvt Limited [Latest Revised Edition] - 2018.
3. **Lab Manual cum Technica. Communication Principles and Practice.** Third Edition by Meenakshi Raman and Sangeetha Sharma, Oxford University Press 2017.

Reference Books

1. **Effective Technical Communication Second Edition** by M Ashraf Rizvi, McGraw Hill Education (India) Private Limited 2018.
2. **Intermediate Grammar, Usage and Composition** by M.L.Tichoo, AL. Subramanian, P.R.Subramanian, Orient Black Swan 2016

Reference Web Links:

1. https://www.youtube.com/watch?v=Z7jiJpW_-C0
2. <https://www.youtube.com/watch?v=VE9wAMP3jWo>
3. <https://www.youtube.com/watch?v=6IS6q-uUjmE>
4. <https://www.youtube.com/watch?v=8ZDxn0JZGl8>

INNOVATION AND DESIGN THINKING				
Course Code		21IDT19/29	CIE Marks	50
Teaching Hour/Week (L:T:P:S)		1:0:0:1	SEE Marks	50
Total Hours of Teaching-Learning		13	Total Marks	100
Credits		01	Exam Hours	03
COs	Description			CL
CO1	Understand the concepts of design thinking approaches			CL3
CO2	Create design thinking teams and conduct design thinking sessions			CL3
CO3	Apply both critical thinking and design thinking in parallel to solve problems			CL3
CO4	Apply some design thinking concepts to their daily work			CL3
CO – Assessment Mapping				
Course Outcomes	Continuous Internal Evaluation (CIE)		Semester End Exam	
	Final Presentation (Test)	Assignment/Activities		
		30%	20%	50%
CO 1	x	x	x	
CO 2	x	x	x	
CO 3	x	x	x	
CO 4	x	x	x	
CO 5	x	x	x	
Course Contents				
Module 1				
Introduction to Design Thinking				
Need of design thinking, Traditional problem solving versus design thinking, Impact of design thinking, Divergent thinking, Human-centered design, Wicked problem.				
Module 2				
Empathy: Methods of empathizing in design thinking, Empathy maps, Customer journey mapping, transitioning from empathy stage to define stage				
Module 3				
Define stage: Purpose and importance, Problem statement, Point of view - develop a problem statement and practical application				
Ideate stage: Purpose and methods, Brainstorming – Osborn brainstorming and SCAMPER, Mind map, the transition from ideate stage to prototype stage				
Module 4				
Prototype stage: Purpose and importance, Business model prototyping, Rapid prototyping				
Module 5				
Test stage: Purpose and importance, Best practices for testing prototypes, Applications				

CO-PO-PSO Mapping

COs.	Programme Outcomes (POs)												Programme Specific Outcome (PSO)		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2	2						2	2	1	1			
CO2	3	2	2						2	2	1	1			
CO3	3	2	2						2	2	1	1			
CO4	3	2	2						2	2	1	1			
CO5	3	2	2						2	2	1	1			

Text Books

1. **"Engineering Design"**, John.R.Karsnitz, Stephen O'Brien and John P. Hutchinson, Cengage learning (International edition) Second Edition, 2013.
2. **"The Design of Business: Why Design Thinking is the Next Competitive Advantage"**, Roger Martin, Harvard Business Press, 2009.
3. **"Design Thinking: Understand – Improve – Apply"**, Hasso Plattner, Christoph Meinel and Larry Leifer (eds), Springer, 2011
4. **"Design Thinking for Strategic Innovation: What They Can't Teach You at Business or Design School"**, Idris Mootee, John Wiley & Sons 2013.

Reference Books

1. **"Engineering Design Process"**, Yousef Haik and Tamer M.Shahin, Cengage Learning, Second Edition, 2011.
2. **Solving Problems with Design Thinking - Ten Stories of What Works** (Columbia Business School Publishing) Hardcover – 20 Sep 2013 by Jeanne Liedtka (Author), Andrew King (Author), Kevin Bennett (Author).

Reference Web Links:

1. www.tutor2u.net/business/presentations/. /productlifecycle/default.html
2. https://docs.oracle.com/cd/E11108_02/otn/pdf/. /E11087_01.pdf
3. www.bizfilings.com › Home › Marketing › Product Development
4. <https://www.mindtools.com/brainstm.html>
5. <https://www.quicksprout.com/. /how-to-reverse-engineer-your-competit>
6. www.vertabelo.com/blog/documentation/reverse-engineering
<https://support.microsoft.com/en-us/kb/273814>
7. <https://support.google.com/docs/answer/179740?hl=en>
8. <https://www.youtube.com/watch?v=2mjSDIBaUIM>
9. <https://dschool.stanford.edu/.../designresources/.../ModeGuideBOOTCAMP2010L.pdf>

Scheme and Syllabus of Post Graduate Program
Applicable to MBA Programs of the Autonomous
Scheme
(With Effect from the Academic Year: 2021-22)
SAHYADRI



COLLEGE OF ENGINEERING & MANAGEMENT

Autonomous Institute, Affiliated to Visvesvaraya Technological University, Belagavi,

Approved by AICTE, New Delhi & Government of Karnataka

Accredited by NBA (CSE/ISE/ME/ECE) & NAAC with 'A' Grade

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Scheme of Teaching for the Academic Year 2021-22
MASTER OF BUSINESS ADMINISTRATION (MBA)
Semester - I

Sl. No:	Course	Course Code	Course Title	Teaching Department	Teaching Hours / Week			Examination				Credits
					Lecture	Tutorial	Practical	Duration of Exam hours	CIE Marks	SEE Marks	Total Marks	
					L	T	P					
1	PCC	21MBA11	Management & Organizational Behaviour	Business Administration	03	0	02	03	50	50	100	4
2	PCC	21MBA12	Managerial Economics	Business Administration	03	0	02	03	50	50	100	4
3	PCC	21MBA13	Accounting for Managers	Business Administration	03	0	02	03	50	50	100	4
4	PCC	21MBA14	Business Statistics	Business Administration	03	0	02	03	50	50	100	4
5	PCC	21MBA15	Marketing Management	Business Administration	03	0	02	03	50	50	100	4
6	PCC	21MBA16	Managerial Communication	Business Administration	02	0	02	03	50	50	100	3
7	PCC	21MBA17	Business Application Laboratory-1	Business Administration	--	--	02	02	50	50	100	1
8	NCC	21MBA18	Outbound Training	Business Administration	--	--	--	-	Pass Grade	-	Pass Grade	0
TOTAL					17	0	14	20	350	350	700	24

Note:

PCC: Professional Core Course NCC: Non-Credit Course

Practical /Field Work / Assignment are part of contact hours for the faculty and must be considered in the workload.

Four-credit courses are designed for 56 hours Teaching-Learning process.

SEE would be conducted out of 100marks for PCC and converted to 50marks.



Scheme of Teaching for the Academic Year 2021-22
MASTER OF BUSINESS ADMINISTRATION (MBA)
Semester - II

Sl. No:	Course	Course Code	Course Title	Teaching Department	Teaching Hours / Week			Examination				Credits
					Lecture	Tutorial	Practical	Duration of Exam hours	CIE Marks	SEE Marks	Total Marks	
1	PCC	21MBA21	Human Resource Management	Business Administration	03	0	02	03	50	50	100	4
2	PCC	21MBA22	Financial Management	Business Administration	03	0	02	03	50	50	100	4
3	PCC	21MBA23	Research Methodology	Business Administration	02	0	02	03	50	50	100	3
4	PCC	21MBA24	Operations Research	Business Administration	03	0	02	03	50	50	100	4
5	PCC	21MBA25	Strategic Management	Business Administration	03	0	02	03	50	50	100	4
6	PCC	21MBA26	Entrepreneurship & Legal Aspects	Business Administration	03	0	02	03	50	50	100	4
7	PCC	21MBA27	Business Application Laboratory-2	Business Administration	--	--	02	02	50	50	100	1
8	NCC	21MBA28	Power BI	Business Administration	--	--	--	--	Pass Grade	--	Pass Grade	--
TOTAL					17	0	14	20	350	350	700	24

Note:

PCC: Professional Core Course NCC: Non-Credit Course

Practical /Field Work / Assignment are part of contact hours for the faculty and must be considered in the workload.

Four-credit courses are designed for 56 hours Teaching-Learning process.

SEE would be conducted out of 100marks for PCC and converted to 50marks.

MANAGEMENT AND ORGANIZATIONAL BEHAVIOUR					
Course Code		21MBA11		CIE Marks	50
Teaching Hours/Week		3:0:2		SEE Marks	50
Teaching Hours of Teaching Learning		65		Total Marks	100
Credits		4		Exam Hours	3
COs	Description				CL
CO1	Interpret the conceptual knowledge of various functions of Management				CL2
CO2	Utilize the practical experiences studied in the field of management and Organization Behavior in different situations				CL3
CO3	Compare individual and group behaviour and the implications of organizational behaviour on the process of management.				CL4
CO4	Summarize the different types of power and culture in modern organizations				CL2
CO5	Illustrate the need for change in organizations and the stress caused in the present-day world				CL2
CO – Assessment Mapping					
Course Outcomes	Continuous Internal Evaluation (CIE)			Semester End Exam	
	Test 1	Test 2	Assignment/Activities		
	15%	15%	20%	50%	
CO 1	x		x	x	
CO 2	x		x	x	
CO 3	x	x	x	x	
CO 4		x	x	x	
CO 5		x	x	x	
Course Contents					
Module -1 : Introduction to Management and Functions of Management					
Management -Introduction, Managerial Skills, Roles Functions of Management, Fayol’s fourteen principles of Management, Recent Trends in Management, Challenges faced by modern organizations					
Planning - Definition, Features, Nature, Importance, Types, Steps in Planning, Planning Tools and Techniques, Essentials of a Good Plan.					
Organization -Definitions, Importance, Principles, Span of Control, Centralization and Decentralization of Authority, Modern organization structures- Divisional, Project, matrix, Network, Virtual					
Directing -Definitions, Importance, Elements of Directing, Principles of Directing, Characteristics of Directing.					
Controlling -Definitions, Need of Controlling, Characteristics of Control, Steps in the Controlling Process, Resistance to Control, Design of Effective Control System, Types of Control, Control Techniques.					
Decision-making - Concepts, Types, Models, Difficulties in Decision-making, Decision-making for Organizational Effectiveness, Decision-making Styles.					
Module -2 : Organizational Behaviour					
Organizational Behavior: Introduction, Definitions, fundamental concepts of OB, Nature, Goals, Importance, Approaches to Organizational Behavior, Models.					
Attitude - Meaning, Definition, Types, Components, Attitudes and Behavior, Changing Attitudes in the Workplace;					
Perception -Meaning, Perceptual Process, Factors Influencing Perception, Errors in perception, Perception and Decision-making;					
Personality -Definitions, Factors Influencing Personality, Big Five Personality Traits, Basic theories of personality- Trait, Type, Intrapsychic, self,					

Measurement of personality- **MBTI, TAT**
Motivation-Definitions, Process of Motivation (Cycle of Motivation), Nature, Importance, Types, **Basic Theories-Maslow, Herzberg's, McGregor's, equity theory.**

Module -3 : Managing Human at Work

Group Dynamics- Meaning of Group, Group Characteristics, Classification of Groups, formation of Group Development, Meaning of Group Dynamics, Group Behaviour, Impact of Group on Individual's Behaviour, Impact of External Factors on Group Behaviour.
Teamwork- Nature of Teams, Team Characteristics, Teams Versus Groups, Teamwork, Processes of Teamwork, Types of Teams, Reasons for Team Failure, Creating Effective Teams.

Module-4 : Organizational Power, Politics and Culture

Power and Politics- Nature of Power and Politics, Sources of Power for Individuals, Managing Organizational Politics.
Culture- Definitions of Organizational Culture, Strong Versus Weak Culture, Characteristics, Types, Levels, Dimensions, Creating Organizational Culture, Changing Organizational Culture.

Module-5 : Change and Stress Management

Change- Nature, Characteristics, Process, Forces Responsible for Change in Organizations, Resistance to Change, Managing Resistance to Change.
Stress Management- Definitions, Understanding Stress, Relation between Stress and Performance, Level, Signs and Symptoms of Stress, Types of Stress, Causes of Stress, Managing Stress.

CO-PO-PSO Mapping

COs.	Programme Outcomes (POs)												Programme Specific Outcome (PSO)		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2		2		1		1								
CO2	2		1	1	2		1								
CO3	1		2		2		1								
CO4	1	1	1	2	1		1								
CO5	1		1	1			1								

1 – Slight, 2 – Moderate, 3 – Substantial, BT – Blooms Taxonomy

Text Books

1. **Essentials of Management**, Harold Koontz, Heinz Weihrich, Mark V. Cannice, Graw Hill8e, 11/e, 2020.
2. **Principles and Practices of Management and Organisational Behaviour**- Chandrani Singhand Aditi Khatri, Sage Publication 2016
3. **Organizational behaviour**, Stephen P. Robbins, Timothy A. Judge, Neharika Vohra, Pearson, 118/e, 2019

Reference Books

1. **Organizational Behaviour**, Fred Luthans, McGraw Hill International, 12/e, 2011
2. **Principles of Management**, Ramesh B. Rudani, Tata McGraw-Hill Education, 2013.
3. **Masters of Management Thought**, Mahanand Charati& M M Munshi, Swapna Book House,2015

Self Learning

Management - Meaning, Nature, Objectives, Importance, Difference between Administration and Management, Levels of Management, Types of Managers, Managerial Competencies, Scope of Management, Evolution of Management Thought.

Organization Structures- types.

Practical Component:

1. Planning an event of student's choice and incorporating the functions of management
2. Make a presentation with a SWOC analysis of yourself and acknowledge the people who have played a role in your life
3. Interview a successful Businessman/entrepreneur/HR Manager/ leader and understand the numerous roles played to achieve the position.
4. Conduct an event and try to understand the dynamics in the group.

MANAGERIAL ECONOMICS				
Course Code		21MBA12	CIE Marks	50
Teaching Hours/Week		3:0:2	SEE Marks	50
Teaching Hours of Teaching Learning		65	Total Marks	100
Credits		4	Exam Hours	3
COs	Description			CL
CO1	Interpret Managerial economics by applying models & Principles in decision making.			CL5
CO2	Examine the concepts in microeconomics for effective functioning of Firm or Industry			CL5
CO3	Make use of concepts in the production function and costing for optimal production.			CL3
CO4	Compare various economies to adopt the right pricing strategy.			CL4
CO5	Analyze various concepts in macro-economic.			CL4
CO – Assessment Mapping				
Course Outcomes	Continuous Internal Evaluation (CIE)			Semester End Exam
	Test 1	Test 2	Assignment/Activities	
	15%	15%	20%	
CO 1	x		x	x
CO 2	x		x	x
CO 3	x	x	x	x
CO 4		x	x	x
CO 5		x	x	x
Course Contents				
Module -1: Introduction to Managerial Economics				
Managerial Economics: Scope, & Significance, Uses of Managerial Economics in decision making, Role and Responsibilities of Managerial Economist. Theory of the Firm: Firm and Industry, Objectives of the firm, alternate objectives of firm. Managerial theories: Baumol’s Model, Marris’s Hypothesis, Williamson’s Model.				
Module -2: Law of Demand and Supply				
Law of Demand and Supply: Law of Demand, Exceptions to the Law of Demand, Elasticity of Demand –Classification of Price, Income & Cross elasticity, Advertising and promotional elasticity of demand. Uses of elasticity of demand for Managerial decision making, Measurement of elasticity of demand. Law of supply, Elasticity of supply, Demand forecasting: Meaning & Significance, Methods of demand forecasting. (with numerical)				
Module -3: Concepts of Production				
Concepts of Production: production function with one variable input - Law of Variable Proportions. Production function with 2 variable inputs and Laws of returns to scale, Indifference Curves, ISO-Quants & ISO-Cost line, least cost combination factor, Economies of scale, Diseconomies of scale. Technological progress and production function. Types of cost, Cost curves, Cost – Output Relationship in the short and long run, LAC curves. Break-Even Analysis – Meaning, Assumptions, Determination of BEA, Limitations, Uses of BEA in Managerial decisions (with numerical).				
Module-4: Markets and Pricing				
Markets and Pricing: Perfect Competition, Features, Determination of price under perfect competition, Monopoly: Features, Pricing under monopoly, Price Discrimination. Monopolistic Competition: Features, Pricing Under monopolistic competition, Product differentiation. Oligopoly: Features, Kinked demand Curve, Cartels, Price leadership. Descriptive Pricing				

Approaches: Full cost pricing, Product line pricing, Pricing Strategies: Price Skimming, Penetration Pricing, Loss leader pricing, Peak Load pricing.

Module-5: Macro Economic Concepts

Macro-Economic Concepts: Nature, Scope, Structure of Indian Business Environment – Internal and External Environmental factors. Political and Legal Environment, Economic Environment, Socio-Cultural Environment, Global Environment.

Measuring the Economy: Measuring GDP and GDP Growth rate, Components of GDP. (Calculation of GDP with numerical)

Indian Private Sector- Growth, Problems and Prospects, SMEs –Significance in Indian economy-problems and prospects. Fiscal policy and Monetary Policy. Foreign Trade: Trends in India's Foreign Trade.

CO-PO-PSO Mapping

COs.	Programme Outcomes (POs)												Programme Specific Outcome (PSO)		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3		3		2		2								
CO2	2	3		3		1	1								
CO3	2		1		2	1	2								
CO4	3	2		3	3	1	1								
CO5	3		1	3											

1 – Slight, 2 – Moderate, 3 – Substantial, BT – Blooms Taxonomy

Text Books

1. **Managerial Economics**, Geethika, Ghosh & Choudhury, McGraw Hill 3/e, 2017.
2. **Managerial Economics**, Dominick Salvatore, Oxford Publishers 8e, 2016.

Reference Books

1. **Managerial Economics**, R. Panneerselvam, P. Sivasankaran, P.Senthilkumar, Cengage 2018
2. **Managerial Economics**, Samuelson & Marks, Wiley 8/e, 2017
3. **Managerial Economics**, D.M Mithani, HPH 2016
4. **Managerial Economics**, H.L Ahuja Samuelson & Marks, S.Chanda 9/e, 2017

Self-Learning:

1. Managerial Economics: Meaning, Nature, & Significance.
2. SWOT Analysis for the Indian economy.
3. Basic Macro Economic Concepts: Open and Closed Economies, Primary, secondary and Tertiary sectors and their contribution to the economy.
4. Industrial Policies and Structure: A critical look at Industrial Policies of India, New Industrial Policy 1991.
5. Impact of WTO on India's Foreign Trade.

Practical Components:

House Economy Project: Individual Assignment

The student would be instructed to collect and prepare a cost sheet of their monthly home expenses for two months to analyze the elements on a Need basis, suggest their views about expenses and classify them as:

1. Essentials
2. Luxury Items
3. Avoidable
4. New additions (If required)

Our Dream Company: Group assignment

The class would be divided into 12 teams, and each team would have 5 members. They would have to select any Organization from the manufacturing industry. The team members would have to understand the responsibilities and duties of Departmental heads of that Organisation and provide their analysis regarding any improvements which can be made.

Departments:

1. Production & Operations
2. Finance
3. Marketing
4. Human Resources
5. R&D

Business Venture Proposal Preparation:

Students would have to plan a small or medium scale business and chalk out:

1. Which sector they are and what their company does
2. The problem their buyer is facing
3. The solution their company offers to alleviate the problem
4. How their company would implement the solution effectively
5. Critical Decision areas and KPI

An estimate of resources (time, money, etc) is required to implement the solution

ACCOUNTING FOR MANAGERS				
Course Code:		21MBA13	CIE Marks	50
Teaching Hours/Week		3:0:2	SEE Marks	50
Teaching Hours of Teaching Learning		65	Total Marks	100
Credits		4	Exam Hours	3
COs	Description			CL
CO1	By the end of this course, the student will be able to:			CL3
CO2	Utilize theoretical knowledge and its application in real-time accounting.			CL3
CO3	Apply the knowledge for preparing financial statement of companies.			CL5
CO4	Analyze financial statements and take decisions independently			CL5
CO5	Evaluate the Cost Volume and Profit for better decision making.			CL5
CO – Assessment Mapping				
Course Outcomes	Continuous Internal Evaluation (CIE)			Semester End Exam
	Test 1	Test 2	Assignment/Activities	
	15%	15%	20%	
CO 1	x		x	x
CO 2	x		x	x
CO 3	x	x	x	x
CO 4		x	x	x
CO 5		x	x	x
Course Contents				
Module-1 Introduction to Accounting and Emerging Issues in Accounting				
Classification of Accounting, <i>Single Entry System, Double Entry System</i> , Concepts and Conventions of Accounting, <i>Relation of Accounting with other disciplines</i> , Journal, Ledgers, Trial balance.				
Module -2 Financial Statements				
Preparation of final accounts of companies in vertical form as per Companies Act of 2013 (Basic problems of Final Accounts), Window dressing. Case Study problem on Final Accounts of Company- Appropriation accounts. <i>To get exposed to the use of accounting software's: Tally. ERP</i>				
Module -3 Analysis of Financial Statements				
Limitations of Financial Statements; Meaning and Purpose of Financial Statement Analysis, Trend Analysis, Comparative Analysis, Financial Ratio Analysis, Preparation of Financial Statements using Financial Ratios, Case Study on Financial Ratio Analysis. Preparation of Cash Flow Statement (indirect method). <i>Lab compulsory for Financial Statement Analysis using excel.</i>				
Module -4 Management Accounting				
Scope, Purpose of Management Accounting Cost Volume Profit Analysis: Meaning-Methods of Determination-Applications. Managerial Decision-Making-Make /Buy etc: Short-run Decision Analysis-Decision situations: Sales-volume related, Sell or further process, Make or Buy, Operate or shut-dow				
Module -5 Functional and Flexible Budgeting,				
Functional budgets, Flexible Budgets: Meaning-Measure of Volume-Cost Behaviour with volume change-Fixed, variable & fixed costs. Variance Analysis: Cost Variances – Revenue Variances-Variance Reporting- Disposition of variances.				

CO-PO-PSO Mapping															
COs.	Programme Outcomes (POs)												Programme Specific Outcome (PSO)		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3					2	2								
CO2	3	2		2		2	2								
CO3	3	2	3	3	3	3	3								
CO4	3	3	3	3	3	2	3								
CO5	3	2	3	3	3	2	3								
1 – Slight, 2 – Moderate, 3 – Substantial, BT – Blooms Taxonomy															
Text Books Accounting for Management-Text & Cases, S.K.Bhattacharya & John Dearden, Vikas Publishing House Pvt. Ltd. 3e, 2018. Financial Accounting, S.N.Maheshwari, Suneel K. Maheshwari, Sharad K. Maheshwari, Vikas Publishing House Pvt. Ltd. 6e, 2018. Computerized Accounting, Neeraj Goyal, Rohit Sachdeva, Kalyani Publishers, 1e, 2018															
Reference Books Accounting for Managers, J.Made Gowda, Himalaya Publishing House, 1e, 2007 Financial Accounting for Management, N. Ramachandran, Ram Kumar Kakani, McGraw Education (India) Private Limited, 4e., 2016 Management Accounting: Text, Problems and Cases, M Y Khan, P K Jain, Tata McGraw-Hill Education, 7e, 2007 Accounting and Finance for Non-Finance Managers, Jai Kumar Batra, Sage Publications, 1e, 2018. Advanced Accounts: M C Shukla, T S Grewal, S C Gupta, volume I & 2, 19 e. Financial Accounting: R Narayanaswamy, 6e, 2007.															
Self-Study: Single Entry System, Double Entry System, Relation of Accounting with other disciplines, Emerging Issues in Accounting: Human Resource Accounting, Forensic Accounting, Sustainability Reporting, (Theory) Applicability of Ind. AS – Indian Accounting Standards.(IFRS -1,2,3,4,5,10,21 & 29)															
Practical component 1: Choose a listed company from BSE/NSE website, Write a Brief introduction about the company, collect Annual reports of the company for 3 years (2018-19,2019-20, 2020-21) and analyze the financial statements using different techniques and presenting the same in the class. The following criteria would assess the answers: Understanding the financial statement and different techniques, Analysis, Presentation skills & Learning experience.															
Practical component 2: Choose a listed company from the BSE/NSE website & analyze the companies' cash flow statements, and present the same in the class.															

The following criteria would assess the answers:

Understanding the concepts, Analysis, Presentation skills & Learning experience.

Practical component 3:

Individual Presentation:

Case study on cost volume profit analysis and functional budgets.

The following criteria would assess the answers:

Understanding the concepts, Analysis, Presentation skills & Learning experience.

BUSINESS STATISTICS					
Course Code:		21MBA14		CIE Marks	50
Teaching Hours/Week		3:0:2		SEE Marks	50
Teaching Hours of Teaching Learning		65		Total Marks	100
Credits		4		Exam Hours	3
COs	Description				CL
CO1	To demonstrate the key concepts, tools and techniques used in Business statistics.				CL3
CO2	To identify the relationship between variables using Correlation and Regression.				CL3
CO3	To analyze basic probability and probability distribution to aid business decision-making.				CL4
CO4	To construct time series analysis and learn to use the appropriate forecasting method in various situation.				CL3
CO5	To infer and apply various data analysis functions for business problems				CL3
CO – Assessment Mapping					
Course Outcomes		Continuous Internal Evaluation (CIE)			Semester End Exam
		Test 1	Test 2	Assignment/Activities	
		15%	15%	20%	
CO 1		x		x	x
CO 2		x		x	x
CO 3		x	x	x	x
CO 4			x	x	x
CO 5			x	x	x
Course Contents					
Module -1 : Measures of central value					
Role of Statistical Techniques in Decision Making. Collection and presentation of data, frequency distribution, measures of central tendency - Mean, Median, Mode, Geometric mean, Harmonic mean. Measures of dispersion (Application on real data of the companies): Range – Quartile Deviation – Mean Deviation -Standard Deviation – Variance Coefficient of Variance - Comparison of various measures of Dispersion.					
Module -2 : Correlation and Regression Analysis					
Scatter Diagram, Karl Pearson correlation, Spearman Rank Correlation (one-way table only), Coefficient of correlation and probable error, Simple and multiple regressions (problems on simple regression only).					
Module -3 : Probability Distribution					
Rules of probability –Random variables – Concept of probability distribution – Theoretical probability distributions: Binomial, Poisson, Normal and Exponential – Theorems of probability, Addition and multiplication theorem, Baye’s theorem, (Problems only on Binomial, Poisson and Normal).					
Module -4 : Time Series Analysis					
Preliminary adjustments before analyzing Time Series, Variations in Time Series - Methods of Estimating Trend: Freehand Method - Moving Average Method - Semi-Average Method - Least Square Method. Methods of Estimating Seasonal Index: Method of Simple Averages - Ratio to Trend Method - Ratio to Moving Average Method.					

Module-5 : Hypotheses Testing & Parametric Methods

Hypothesis: Types, characteristics, source, formulation of hypotheses, Errors in hypotheses. Normality and reliability of hypothesis. Parametric and Non Parametric Tests- t-test, z-test, f-test, u-test, K-W Test, Chi-Square test (with numerical). Bivariate and Multivariate Analysis- ANOVA-one-way, two-way classification (theory only).

CO-PO-PSO Mapping

COs.	Programme Outcomes (POs)												Programme Specific Outcome (PSO)		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2	2	2		1	2								
CO2	2	3			2	2	2								
CO3	2	3	2	2		3	1								
CO4		2	2	3		3	2								
CO5	3	2			3	3	2								

1 – Slight, 2 – Moderate, 3 – Substantial, BT – Blooms Taxonomy

Text Books

1. Levin RI and Rubin D.S. **Statistics for management**, 7th edition, Printice hall of India Pvt ltd, New Delhi, 2021.
2. **Fundamentals of Statistics**, S C Gupta, Himalaya Publications, 7/e 2019.
3. **Research Methodology**, Ranjit Kumar, Sage Publications, 5/e 2019
4. **Parametric and Non-Parametric Statistics**, Vimala Veeraraghavan and Suhas, SAGE Publications India Pvt Ltd, SAGE Publications India Pvt Ltd
5. **Statistical Methods by S.P Gupta**, 43rd edition, 2014.
6. **Basic business statistics** by Berenson and Levine, 7th edition.

Reference Books

1. **MStatistical Methods**, Dr. S P Gupta, Sultan Chand & Sons, 2021.
2. **Research Methodology**, C R Kothari, Viswa Prakasam Publication, 2015.
3. **Business Research Methods**, S.N.Murthy and U.Bhojanna, Excel Books, 3/e, 2016.
4. **Discovering Statistics using IBM SPSS Statistics** by Andy Field, 4th editions, Sage Publications

Self Study:

1. Basics of Business Statistics
2. Scope and Limitations of Statistics.
3. Probability Distribution: Concept and definition
4. Objectives of Time series analysis

Practical Component:

1. Students need to be encouraged to do small primary research in groups and analyze the data using statistical tools like Mean, SD, Correlation (Ex: Motivation, Stress, etc.)
2. Students can also be encouraged to go out for a live survey in Malls, Showrooms, and other Colleges to collect and analyze data. Ex: Buying behaviour, Brand aspects etc.)

Framing hypotheses for any of the research and taking a sample with (t-test, z-test, f-test, u-test, K-W Test, Chi-Square test) any of the following tests and interpreting the data with finding and suggestions

BUSINESS STATISTICS				
Course Code:		21MBA15	CIE Marks	50
Teaching Hours/Week		3:0:2	SEE Marks	50
Teaching Hours of Teaching Learning		65	Total Marks	100
Credits		4	Exam Hours	3
COs	Description			CL
CO1	Develop an ability to assess the impact of the environment on the marketing function			CL2
CO2	To formulate marketing strategies that incorporate psychological and sociological factors which influence buying.			CL3
CO3	Understand the concept of Branding, development of product and significance of market segmentation, targeting and positioning.			CL5
CO4	Identifying marketing channels and the concept of product distribution.			CL4
CO5	Identifying techniques of sales promotion, the significance of marketing research			CL4
CO – Assessment Mapping				
Course Outcomes	Continuous Internal Evaluation (CIE)			Semester End Exam
	Test 1	Test 2	Assignment/ Activities	
	15%	15%	20%	
CO 1	x		x	x
CO 2	x		x	x
CO 3	x	x	x	x
CO 4		x	x	x
CO 5		x	x	x
Course Contents				
Module-1 Introduction to Marketing				
Marketing V/s Selling, Components of customer value and components of customer cost. Marketing Myopia. Marketing Environment -Components of Environment to be analyzed- Micro/ Macro Environment, Technological environment, Socio-cultural environment, Economic Environment, Legal Environment, Consumer/demographic environment, Government policies, Political environment. Techniques used in Environment Analysis. The Marketing Concepts Contemporary Indian Marketing Environment				
Module -2 Market Segmentation				
Market Segmentation: Concept of Market Segmentation, Benefits, Requisites of Effective Segmentation, Bases for Segmenting Consumer Markets, Market Segmentation Strategies. Segmentation method – Geographic segmentation and Demographic segmentation, psychographic segmentation, behavioural segmentation, volume segmentation, deep segmentation. Targeting - Bases for identifying target Customer target Marketing strategies, Positioning -Meaning, Product Differentiation Strategies, Tasks involved in Positioning. Monitoring brands performance and Positioning. Marketing Channels, Factors Affecting Channel Choice, Channel Design, Channel Management Decision, Channel Conflict, Designing a physical Distribution System, Network Marketing. Contemporary Channels and Retailing in India. Product Distribution Logistics: Product distribution Concept. Distinction between distribution logistics and Supply Chain Management. Assignment- Segmentation strategies by various FMCG companies				
Module -3 Analyzing Consumer Behaviour				

Consumer behavior, Factors influencing Consumer Behavior, Consumer characteristics influencing buying behavior- personal factors and cultural factors. Consumer Buying Decision Process, Buying Roles, Buying Motives. The black box model of consumer behavior. Psychological Processes underlying consumer behavior. Indian Consumer- Features about consumer India, Classifying Indian consumer by Income B2B marketing Vs Consumer Marketing. Live projects on consumer behavior

Module -4 Product, Brand Equity, Services Marketing, Pricing, Marketing Channels

Product Management- fundamentals, objective, hierarchy, product line, product mix, product mix strategies, PLC, New Product Development, packing as a marketing tool, Role of labelling in packing. Main tasks in product management. Components of Product personality.

Brand- selecting a brand name, selecting a logo, brand extension- effects. Introducing new products, innovations,

Branding - Concept of Branding, Types, Brand Equity, Branding strategies.

Services Marketing & its Characteristics- tasks involved in service marketing, differentiating, positioning and brand building in services, premiumization in service marketing.

Pricing decisions: Significance of pricing, factor influencing pricing (Internal factor and External factor), objectives, Pricing Strategies-Value based, Cost based, Market based, Competitor based, Pricing Procedure.

Marketing Channels: Roles and purpose of Marketing Channels, Factors Affecting Channel Choice, Channel

Design, Channel Management Decision, Channel Conflict, Designing a physical Distribution System, Network

Marketing. Contemporary Channels and Retailing in India.

Product Distribution Logistics: Product distribution

Concept. Distinction between distribution logistics and Supply Chain Management

Module 5 Emerging Trends in Marketing

Concept and components of digital marketing, (IMC)-communication objectives, steps in developing effective communication AIDA model, Traditional Vs. Modern Media- Online and Mobile Advertising, Social Media for Advertising. Customer

Relationship Management, Basic concepts of e-commerce, e-marketing, m-Commerce, m-marketing, e-networking, CRM, MkIS. -Marketing Planning: Meaning, Steps involved in Marketing planning. Marketing Audit-Meaning, components of Marketing Audit. Cause and Social Marketing alternate concepts like 3V concepts of Nirmalaya Kumar. Emerging areas-Neuro Marketing, Sensory Marketing- concepts only. Case study on Canon Blue Ocean strategy

CO-PO-PSO Mapping

COs.	Programme Outcomes (POs)												Programme Specific Outcome (PSO)		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2					2								
CO2	3	2	2	2			2								
CO3	2			2	2		3								
CO4	3	2	2	2			2								
CO5	2			2	2		3								

1 – Slight, 2 – Moderate, 3 – Substantial, BT – Blooms Taxonomy

Text Books

1. Marketing Management- Indian Context, Global Perspective, Ramaswamy & Namakumari, SAGE, 6th Edition
2. Marketing Management: A South Asian Perspective, Kotler, Keller, Koshy & Jha,

Pearson Education, Latest edition

3. New Product Management, Merle Crawford and Anthony Di Benedetto, McGraw-Hill, Latest Edition
4. Advertisement Brands & Consumer Behaviour, Ramesh Kumar, Sage Publications, 2020

Reference Books

1. Marketing in India: Text and Cases, Neelamegham S, Vikas, Latest edition
2. Marketing, Lamb, Hair, Mc Danniel, Cengage Learning, Latest edition.
3. Fundamentals of Marketing Management, Etzel M J BJ Walker & William J Stanton, Tata Macgraw Hill, Latest edition

Practical Components:

- Understanding Contemporary Indian Marketing Environment.
- Understanding and demonstrating their exposure to consumer behaviour

Effectively using their skill in creating and enacting a commercial on brand communication.

MANAGERIAL COMMUNICATION				
Course Code:		21MBA16	CIE Marks	50
Teaching Hours/Week		2:0:2	SEE Marks	50
Teaching Hours of Teaching Learning		52	Total Marks	100
Credits		3	Exam Hours	3
COs	Description			CL
CO1	Discover their communication skills and their potential to practice effective communication.			CL4
CO2	Compose business-related documents in English precisely and effectively.			CL6
CO3	Develop business reports to meet the challenges of a competitive environment.			CL3
CO4	Identify managerialcommunication practices in business that are in vogue.			CL3
CO5	Examine the art of Interpersonal communication, technological advancements and social media usage in communications by analyzing business situations.			CL4
CO – Assessment Mapping				
Course Outcomes	Continuous Internal Evaluation (CIE)			Semester End Exam
	Test 1	Test 2	Assignment/ Activities	
	15%	15%	20%	
CO 1	x		x	x
CO 2	x		x	x
CO 3	x	x	x	x
CO 4		x	x	x
CO 5		x	x	x
Course Contents				
Module -1 Introduction and Oral Communication				
Introduction: Meaning and Classification of communication – Communication Process – Characteristics of successful communication. Communication barriers, Communication in a cross-cultural setting.				
Oral Communication: Meaning, Principles of successful oral communication, Conversation control –Reflectionand Empathy: two sides of effective oral communication.				
Oral Presentation: What is a presentation – Elements of presentation – Designing & Delivering Business Presentations – Advanced Visual Support for managers				
Business Pitch: 10 steps in Pitching, Elevator Pitching				
Lab: MS-PowerPoint/Google Slides/CANVA APP				
Group Presentation on Cultural Diversity of various Countries				
Group Activity on the Business pitch with video recording using PowerPoint and feedback				
Module -2 Written Communication				
Written Communication: –Principles of effective writing – The 3X3 writing process for business communication Prewriting – Writing – Revising. Audience analysis, Writing Positive, Neutral, Persuasive and Bad-news Messages, Types of Written Communication in Business: Business Letters, Employee Reviews, Recommendation Letters, Thank You Letters, Memos, Proposals and Reports, Press Releases, Proactive Media Writing and E-mail.				
Lab: Language Lab Course on Written Communication – Email Writing				
Lab: Letter Writing				
Group Assignment: Writing Proposal for Business Deal or Govt. Funding				
Module -3 Business Reports				
Business Reports: Kinds and Objectives of reports – Organization & Preparing reports, short				

and longreports Writing, writing the executive summary.

Business Case Analysis: What is a case? Process of Case Analysis, Requirements of Case analysis, The structure of written cases analysis.

Business Meetings: Format, planning, facilitating, participating and following up.

Meeting Documentation: Notice, Agenda, and Resolution & Minutes

Group Assignment: Case Study Exercise and Presentation of views

Lab: Conduct a mock meeting of students in the class identifying an issue of their concern. The students should prepare notice, agenda and minutes of the meeting.

Module -4 Employment communication

Employment communication: Putting your best self forward, preparing your resume, Writing covering letters and Inquiry Emails, Preparing for a Job Interview, Conducting Yourself during the Interview, Following up throughout the process. Practising business etiquette

Lab: Preparation of Resume and Video Resume, Group Discussion and Mock Interview

Module-5 Interpersonal Communication

Interpersonal Communication: Nonverbal communication and Listening.

Conflict Management and Negotiation skills: Meaning of Conflict, Conflict management through communication, Managing the process of communication in Conflict, Verbal skills for communicating in conflict. Communication for effective negotiation – Meaning, Factors affecting negotiation, stages in the negotiation process, Negotiation strategies.

Technological Advancement and Business Communication: Intranet, Internet, Teleconference, Video conference, Blogs, Webinars, Chat rooms, Voice and Text messaging.

Social Media: Introduction, Classification, Nature and scope of Six types of Social Media

Lab: Make students enact and analyze the non-verbal cues.

Lab: Video conferencing across stakeholders

Lab: Mock press conference addressing the launch of a new product by an organization.

Individual Assignment: Create Blog / Vlog

Individual Assignment: LinkedIn Profile

CO-PO-PSO Mapping

COs.	Programme Outcomes (POs)												Programme Specific Outcome (PSO)		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2		2	3		3								
CO2	3	2	3	1			3								
CO3	3	1	2	1	2		3								
CO4	3	2		1			3								
CO5	3	2	3		2	2	3								

1 – Slight, 2 – Moderate, 3 – Substantial, BT – Blooms Taxonomy

Text Books

1. **Communicating in Business**, Ober Newman, Cengage, 8th Edition, 2018.
2. **BCOM A South-Asian Perspective**, Lehman, Dufrene, Sinha, Cengage Learning, 2nd Edition, 2012.
3. **Business Communication**, P D Chaturvedi Mukesh Chaturvedi, Pearson, 3rd Edition, 2013
4. **Business and Professional Communication**, Kelly m. Quintanilla Shawn T. Wahl,

Reference Books

1. **Communicating in Business**, Williams, Krizan Logan, Merrier, Cengage Learning, 8th Edition, 2017.
2. **Business Communication: Process**, Mary Ellen Guffey, Cengage Learning, 3rd Edition, 2002
3. **Business Communication**, Lesikar, Flatley, Rentz, Pande, TMH, 11th Edition, 2011.
4. **Communicating in Business**, Williams, Krizan, Logan & Merrier, Cengage Learning, 8e, 2014

Self-Learning:

Definition, Role and Purpose of communication, Communication flow, Communicating within Organizations – Levels of communication Media choices, Legal Consequences and Ethics, Role of business presentations

Purpose of writing and Clarity in writing

Purpose of Business Reports, Characteristics of Case and its Analysis

Nature and need for negotiation

Characteristics of Conflict

Choosing the most suitable social media. Using Social Media to build business relationships,

Characteristics of Social Media

Practical Component:

1. Make students enact and analyze the non-verbal cues.
2. Conduct a mock meeting of students in the class identifying an issue of their concern. The students should prepare notice, agenda and minutes of the meeting.
3. Organize a mock press conference addressing an organisation's launch of a new product.
4. Students should be assigned to draft a proposal to undertake a research project.
5. Video conferencing across stakeholders – Business meeting
6. Create a Blog
7. Business pitch with video recording using PowerPoint and feedback

MANAGERIAL COMMUNICATION																	
Course Code:								21MBA17				CIE Marks			50		
Teaching Hours/Week								0:0:2				SEE Marks			50		
Teaching Hours of Teaching Learning								13				Total Marks			100		
Credits								1				Exam Hours			3		
COs		Description												CL			
CO1		Demonstrate basic knowledge in creating Excel documents using business data												CL3			
CO2		Evaluate and present the data using various techniques in Excel												CL5			
CO3		Design a spreadsheet based on industry requirements												CL6			
CO – Assessment Mapping																	
Course Outcomes		Continuous Internal Evaluation (CIE)										Semester End Exam					
		Test 1	Test 2	Assignment/ Activities													
				50%						50%							
CO 1				x						x							
CO 2				x						x							
CO 3				x						x							
Course Contents																	
Excel Introduction: An overview of the screen, navigation, spreadsheet concepts																	
Layout Formatting and Managing tables																	
Using Basic Functions: Sum, Average, Max, Min, Count, Counif																	
Text Functions, Date and Time Functions																	
Sorting, Filtering Data: Basic Sorting, Multi-Level Sorting, Custom Sorting, Advance Filters																	
Custom and Conditional Formatting																	
Data Validation																	
Presentation and Visualization using charts																	
Pivot Table and Chart, Slicer																	
Shortcuts in Excel																	
Conditional Logic in Excel: If Nested If																	
Lookup Functions: HLookup and VLookup Functions																	
Automating Repetitive Tasks in Excel with Macros																	
Protecting File																	
CO-PO-PSO Mapping																	
COs.		Programme Outcomes (POs)												Programme Specific Outcome (PSO)			
		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	
CO1		2	1	-	1	-	2	2									
CO2		3	3	-	1	-	3	3									
CO3		3	3	-	1	-	3	3									

HUMAN RESOURCE MANAGEMENT				
Course Code:		21MBA21	CIE Marks	50
Teaching Hours/Week		3:0:2	SEE Marks	50
Teaching Hours of Teaching Learning		65	Total Marks	100
Credits		4	Exam Hours	3
COs	Description			CL
CO1	Develop their knowledge and skills in the field ofHuman resources in terms of Concepts, functions and theories.			CL3
CO2	Examine the conceptual insight of HumanResource Business Partner			CL4
CO3	Apply the acquired knowledge, facts and techniques in solving HR related matters			CL3
CO4	Identify the HR practices in SMEs, Service Sector and Innovative HR Practices.			CL3
CO5	Determine how an HR leads the Transformation in an organization for sustainable development			CL5
CO – Assessment Mapping				
Course Outcomes	Continuous Internal Evaluation (CIE)			Semester End Exam
	Test 1	Test 2	Assignment/ Activities	
	15%	15%	20%	50%
CO 1	x		x	x
CO 2	x		x	x
CO 3	x	x	x	x
CO 4		x	x	x
CO 5		x	x	x
Course Contents				
Module-1 Introduction, HR Planning, Recruitment & Selection and Training & Development				
Human Resource Management and Personnel Management, Functions of HRM, The Importance of Human Resource Management, Models of Human Resource Management: Harvard Business Model, Michigan Business School Model, 8-Box HRM Model				
Human Resource Planning: Factors Affecting HR Planning, HRP Process, Tools for Demand Forecasting, Job Analysis – Job Description and Job Specification, Job Analysis Process and Job Evaluation.				
Talent Acquisition: Talent Acquisition Policies, Factors Influencing Talent Acquisition, Talent Acquisition Process, Sources, Evaluation of Talent Acquisition Process, Talent Acquisition Strategy; Selection, Selection Tools, Selection Process; Factors Influencing Selections, Application Tracking System using MS-Excel (Lab)				
Training and Development: Process of training and Techniques of Training				
Lab: Present the learning from the Movie Clippings				
Group Assignment and Presentation: Movie Analysis on Functions of HR				
Lab: Calculation – Case Study on Manpower Planning using MS-EXCEL				
Lab: Application Tracking System using MS-Excel				
Module -2 : Human Resource Business Partner				
Defining HRBP, Models of HRBP - The Ulrich Model, Three-Legged Model; Role of HRBP, Managing Critical Relationship, Competencies of HRBP, HRBP as an Internal Consultant				
Individual Assignment: Design a Job Description of an HRBP for different sectors				
Module -3 Performance Management, Compensation & Benefits and Industrial Relations				

Performance Management Process, Types of Performance Rating Systems
 Compensation and Benefits: Introduction, Total Compensation, Total Rewards System, Forms of Pay, Factors influencing Compensation - External Factors, Internal Factors;
 Employee Welfare and Benefits: Types and Statutory Provisions

Industrial Relations: The Objectives of Industrial Relations, Approaches of Industrial Relations Systems,
 Essential Conditions for Sound Industrial Relations; Forms of Industrial Disputes – Strikes, Lockouts, Gherao, Picketing and Boycott
 Employee Grievance and Discipline: Model of Grievance Procedure; Whistle Blower and POSH
 Lab: Determining KRAs and Designing Performance Scorecard on MS-EXCEL
 Individual Assignment: Components of Compensation of various Sector
 Case Study on Industrial Relation: Maruthi Suzuki

Module -4 Human Resource Management in SMEs and Service Sector and HRM Innovations

Definition of SMEs, Factors influencing Adoption of HRM Practices in SMEs, Human Resource Management in the Specific industries in Service Sector

Human Resource Management Innovations

Introduction, Human Resource Management and Innovations, Factors Affecting the Innovation Process in Organizations, Current Trends in Human Resource Management Innovations

Case Study on “Harvard Case Study on Taj Mumbai Attack”.

Module - 5 HR Leadership and Organization Transformation

Future of Human Resource Management: The next generation HR professionalism, “Changing Mental Models: HR’s Most Important Task, HR roles critical for business survival, HR profession in today’s changeful workplace, HR and Technology”

Group Assignment: Challenges in HR as a Profession (Collect Data on LinkedIn)

CO-PO-PSO Mapping

COs.	Programme Outcomes (POs)												Programme Specific Outcome (PSO)		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	1	3		2	2	2								
CO2	3	1	3		2		2								
CO3	3	1	3	3	2	1	2								
CO4	3			1			2								
CO5	3		3		2		2								

1 – Slight, 2 – Moderate, 3 – Substantial, BT – Blooms Taxonomy

Text Books

1. **Human Resource Management:** Theory and Practices, R. C. Sharma, Nipun Sharma SagePublication India Pvt. Ltd., 2019,2019
2. **Human Resource Management:** Concepts Amitabha Sengupta Sage Publication India Pvt.Ltd. 2019Page 26 of 123
3. **Leadership: Theory and Practices** Peter G. Northouse Sage Publication 2016
4. **Human Resources Management** T.P Renuka Murthy HPH. 2015

Reference Books

1. **The HR Scorecard: Linking People, Strategy, and Performance** Brian Becker, Dave Ulrich, and Mark A. Huselid Harvard Business School Press2001

2. **The HR Answer Book: An Indispensable Guide for Managers and Human Resources Professionals** Shawn Smith and Rebecca Mazin AMACOM 2011
3. **Performance Management and Appraisal Systems HR Tools for Global Competitiveness** T. V. Rao First Edition, 2004
4. **Human Resource Management** Appasaba L.V and Kadakol A M College Book House 201
5. **Human Resource Management** V.S.P Rao 2014

FINANCIAL MANAGEMENT				
Course Code:		21MBA22	CIE Marks	50
Teaching Hours/Week		3:0:2	SEE Marks	50
Teaching Hours of Teaching Learning		65	Total Marks	100
Credits		4	Exam Hours	3
COs	Description			CL
CO1	Summarize the fundamentals of finance, financial management, and the Indian Financial System framework.			CL2
CO2	Apply the conceptual knowledge of the time value of money and loan amortization to real-time scenarios.			CL3
CO3	Assess the capital structure and dividend decision of a firm.			CL5
CO4	Interpret the investment decisions of a firm.			CL4
CO5	Examine the management of working capital in an organization.			CL4
CO – Assessment Mapping				
Course Outcomes	Continuous Internal Evaluation (CIE)			Semester End Exam
	Test 1	Test 2	Assignment/ Activities	
	15%	15%	20%	
CO 1	x		x	x
CO 2	x		x	x
CO 3	x	x	x	x
CO 4		x	x	x
CO 5		x	x	x
Course Contents				
Module-1 Introduction				
Meaning and objectives of Financial Management, changing role of finance managers. Interface of Financial Management with other functional areas.				
<u>Indian Financial System – structure and functions:</u> Financial markets, Financial Instruments, Financial institutions and financial services.				
Applicability of Emerging issues in Financial Management: Risk Management, Behavioural Finance, Financial Engineering, Derivatives (Theory).				
Sources of Financing: Shares, Debentures, Term Loans, Lease financing, Hybrid financing, Venture Capital, Angel investing and private equity, Warrants and convertibles (Theory Only).				
Module-2 Time value of money				
Meaning of Time value of money –Future value of single cash flow & annuity, the present value of single cash flow, annuity & perpetuity. Simple interest & Compound interest, Capital recovery & loan amortization. (Theory & Problem). Computer lab for calculating future value, present value and loan amortization in MS excel.				
Module -3 : Capital Structure and Dividend Decisions				
Cost of Capital: Computation of Cost of debenture capital, cost of preferential capital, cost of term loans, cost of equity capital (Dividend discounting and CAPM model) - Cost of retained earnings - Determination of Weighted average cost of capital (WACC) and Marginal cost of capital. (Theory & Problem).				
Capital structure and dividend decisions –Governance of Equity and Debt, Fall in interest rates and perils of Debt funding. Leverages, EBIT and EPS analysis. ROI & ROE analysis.				

Dividend policy – Factors affecting the dividend policy - Dividend Policies- Stable Dividend, Stable Pay-out, dividend theories to be covered. EBIT-EPS analysis & Leverages.

Module-4: Investment Decisions

Capital budgeting process, **computation of** Investment evaluation techniques – [Net present value, Internal rate of return, modified internal rate of return, Profitability index, Payback period, discounted payback period, accounting rate of return Problem). **Problems on** Replacement of capital project.

Computer lab for calculation of NPV, IRR, PI, Payback period, ARR in MS excel.

Module-5: Working Capital Management

Factors influencing working capital requirements - Current asset policy and current asset finance policy- Determination of operating cycle and cash cycle- Estimation of working capital requirements of a firm. (Does not include Cash, Inventory & Receivables Management).

Case study on Working Capital Determination and the impact of negative working capital Amazon-negative working capital and profitability.

Computer lab for calculation of working capital cycle and operating cycle in MS excel.

CO-PO-PSO Mapping

COs.	Programme Outcomes (POs)												Programme Specific Outcome (PSO)		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2						1								
CO2	3	2				2	2								
CO3	3	2				2	2								
CO4	3	2				2	2								
CO5	3	2			1	1	2								

1 – Slight, 2 – Moderate, 3 – Substantial, BT – Blooms Taxonomy

Text Books

1. **Financial Management**, I M Pandey, Vikas Publishing, 1/e, 2012.
2. **Financial Management**, Khan M. Y.& Jain P. K, TMH, 7/e.
3. **Financial Management**, Prasanna Chandra, TMH, 9/e
4. **Corporate Finance**, Aswath Damodaran, the latest edition
5. **Financial Management**, Prahlad Rathod, Babitha Thimmaiah and Harish Babu, HPH, 1/e, 2015.

Reference Books

1. **Financial Management: A Strategic Perspective**, Nikhil Chandra Shil & Bhagaban Das, Sage Publications, 1/e, 2016.
2. **Principles of Corporate Finance**, Brealey, Myers, Allen & Mohanty, McGrawHill Education, 11/e, 2014
3. **Cases in Financial Management**, I.M.Pandey & Ramesh Bhat, McGraw Hill Education, 3/e, 2015
4. **Corporate Finance**, Vishwanath S. R., Sage Publications, 3/e, 2019.

Self Study:

- Working of Indian Financial System and emerging issues in Financial Management
- Basic Concepts of cost of capital and Capital Structure Policy
- Risk analysis in Capital Budgeting

Practical Component: Mini Project

- Students will be able to understand the various financial institutions and their functions

in the capital market

- Students can compute of future value, present value and loan amortization in MS excel.
- Using the annual reports of selected companies, students can study the working capital management employed by them. Students can also compare the working capital management of companies in the same sector.
- Students can choose the companies that have gone for stock split and Bonus issues in the last few years and study the same impact on the stock price. (Return and Risk Comparison)
- Students can study any five listed company's capital structure
- Identifying the small or medium-sized companies and understanding the Investment evaluation techniques.

RESEARCH METHODOLOGY					
Course Code:		21MBA23		CIE Marks	50
Teaching Hours/Week		2:0:2		SEE Marks	50
Teaching Hours of Teaching Learning		52		Total Marks	100
Credits		3		Exam Hours	3
COs	Description				CL
CO1	Summarize basic terminologies in research, techniques and strategies used in the field of research methodology				CL2
CO2	Utilize various research designs in different research problems				CL3
CO3	Examine various components of experimental and quasi-experimental designs				CL4
CO4	Make use of sample techniques and identify various modes of sample collection				CL3
CO5	Choose various measurement scales for conducting research				CL 3
CO – Assessment Mapping					
Course Outcomes	Continuous Internal Evaluation (CIE)			Semester End Exam	
	Test 1	Test 2	Assignment/ Activities		
	15%	15%	20%	50%	
CO 1	x		x	x	
CO 2	x		x	x	
CO 3	x	x	x	x	
CO 4		x	x	x	
CO 5		x	x	x	
Course Contents					
Module-1 Business Research					
Business Research: Meaning, Types, research process- management problem, defining the research problem, research design formulation, planning and collecting the data for research, data analysis and interpretation. formulating the research Hypothesis Research Application in business decisions, Developing the research proposals					
Module -2 Business Research Design					
Meaning, types and significance of research design. Exploratory and Conclusive Research Design. Exploratory Research: Meaning, purpose, methods- Literature, analysis, gap identification, authentic sources , experience survey, focus groups and comprehensive case methods. Conclusive Research Design - Descriptive Research - Meaning, Types – Cross-sectional studies and longitudinal studies.					
Module -3 Experimental Research Design					
Experimental Research Design – Meaning and classification of experimental designs- formal and informal, Pre experimental design, Quasi-experimental design, True experimental design, statistical experimental design.					
Module -4 Sampling					
Sampling: Concepts- Types of Sampling - Probability Sampling – simple random sampling, systematic sampling, stratified random sampling, cluster sampling -Non-Probability Sampling – convenience sampling- judgemental sampling, snowball sampling- quota sampling - Errors in sampling.					
Module-5: Data Collection					
Meaning of Primary and Secondary data, Primary data collection methods - Meaning of Primary and Secondary data, Primary data collection methods - observations, survey, interview and Questionnaire, Qualitative Techniques of data collection, Questionnaire design – Meaning -					

the process of designing the questionnaire. Secondary data -Sources – advantages and disadvantages.

Measurement and Scaling Techniques: Basic measurement Scales-Nominal scale, Ordinal scale, Interval scale, Ratio scale. Attitude measurement scale - Likert's Scale, Semantic Differential Scale, Thurstone scale, Multi-Dimensional Scaling.

Report writing and presentation – types and features of good report writing

CO-PO-PSO Mapping

COs.	Programme Outcomes (POs)												Programme Specific Outcome (PSO)		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2		1			2								
CO2	3	2		1	2		2								
CO3	2	3			1		1								
CO4	2	3					2								
CO5	2	2					2								

1 – Slight, 2 – Moderate, 3 – Substantial, BT – Blooms Taxonomy

Text Books

1. **Research Methodology**, C R Kothari, Viswa Prakasam Publication, 2014.
2. **Business Research Methods**, S. N. Murthy & U. Bhojanna,, Excel Books,3e, 2016
3. **Research Methods**, M MMunshi & K Gayathri Reddy, HPH, 2015.

Reference Books

1. Research Methodology, Ranjit Kumar, Sage Publications.
2. Excel for dummies, Harvey .G John Wiley & Sons, 2016.
3. Research Methodology, Deepak Chawla and Neena Sondhi, Vikas Publications 2014

Practical Component:

- Literature survey.
- Surveying FCCG products.

OPERATIONS RESEARCH				
Course Code:		21MBA24	CIE Marks	50
Teaching Hours/Week		3:0:2	SEE Marks	50
Teaching Hours of Teaching Learning		65	Total Marks	100
Credits		4	Exam Hours	3
COs	Description			CL
CO1	Analyze operations research as a quantitative approach to decision-making models and solve linear programming			CL4
CO2	Formulate and solve transportation and assignment problems using the appropriate method.			CL5
CO3	Evaluate the techniques of decision theory and solve the simulation process in real-life scenario			CL5
CO4	Appraise the strategies obtained from game theory analyses.			CL5
CO5	Create a network diagram for managing projects			CL 5
CO – Assessment Mapping				
Course Outcomes	Continuous Internal Evaluation (CIE)			Semester End Exam
	Test 1	Test 2	Assignment/ Activities	
	15%	15%	20%	
CO 1	x		x	x
CO 2	x		x	x
CO 3	x	x	x	x
CO 4		x	x	x
CO 5		x	x	x
Course Contents				
Module -1: Operations Research: An Introduction and Linear Programming				
Operations Research – A Quantitative Approach to Decision Making; History; Definitions, the scope of Operations Research, Characteristics, Methods for solving OR problems and Methodology of OR, Advantages and Limitations. (Theory Only) Structure of Linear Program Model, Assumptions, Application Areas of LP, General Mathematical Model of LPP, Guidelines for Formulation of Linear Programming Model, Formulation of Problems, Graphical Method.				
Module -2: Transportation Problems and Assignment Problem				
Transportation Problems: General Structure of Transportation Problem, Methods of Finding Initial Basic Feasible Solution (NWCM, LCM & VAM), Degeneracy, Optimality Test Using Stepping Stone and MODI Methods. Assignment Problems - Introduction, General Structure, Minimization & Maximization (Hungarian Method), Unbalanced Problems.				
Module -3: Decision Theory and Simulation				
Steps of Decision-Making Process, Types of Decision-Making Environments, Decision Making Under Uncertainty- Optimism, Pessimism, Equal Probabilities, Coefficient of Optimism, Regret Criteria, Decision-Making Under Risk- Expected Value, Simple Decision Tree Problems. Simulation: Process of Simulation, Types of Simulation, Steps in Simulation Process, Monte Carlo Simulation (Simple Problems Only)				
Module-4: Theory of Games				
Formulation Of Game Models, Two-Person Zero-Sum Games, Pure Strategy Games with Saddle Point, Mixed Strategies: Games without Saddle Point (Graphical and Algebraic Methods)				
Module-5: Project Management: PERT and CPM				

Structure of Projects, Phases of Project Management-Planning, Scheduling, Controlling Phase, Work Breakdown Structure, Project Control Charts, Scheduling Techniques: PERT & CPM, Network Components and Precedence Relationships, Critical Path Analysis, Theory Of Crashing, Theory of Constraints (Theory Only)

CO-PO-PSO Mapping

COs.	Programme Outcomes (POs)												Programme Specific Outcome (PSO)		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3			1											
CO2	2	3					1								
CO3	1	2				3									
CO4				3		2	1								
CO5			2		3	1									

1 – Slight, 2 – Moderate, 3 – Substantial, BT – Blooms Taxonomy

Text Books

1. **Operation Research: An Introduction**, H.A. Taha, Pearson Publication, 10/e 2016
2. **Operation Research Theory and Applications**, J K Sharma, McMillan Publications, 5/e 2012
3. R. Pannerselvan, **Production and Operations Management**, PHI, 3/e

Reference Books

1. **Quantitative Techniques in management**, N D Vohra, McGraw Hill, 5/e 2017.
2. **Operations research: theory and applications**, J K Sharma, Trinity Press, 6/e 2017
3. **Management – A Quantitative perspective** by N. Paul Loomba, Lawbook Co of Australia, 1978

Self Study :

1. Advantages and Limitations of Linear Programming.
2. Advantages and Limitations of Simulation

Practical Component:

Students should demonstrate the application of the techniques covered in this course

STRATEGIC MANAGEMENT				
Course Code:		21MBA25	CIE Marks	50
Teaching Hours/Week		3:0:2	SEE Marks	50
Teaching Hours of Teaching Learning		65	Total Marks	100
Credits		4	Exam Hours	3
COs	Description			CL
CO1	Identify the concept of Strategic Management, its relevance, Characteristics, process nature and purpose.			CL3
CO2	Analyze the internal and external environment of business to build a long term sustainable Vision & Mission for the organization			CL4
CO3	Examine various strategic approaches to manage the business successfully in a global context			CL4
CO4	Assess the real-life company situations to implement the strategy effectively in an organization			CL5
CO5	Examine the tools & techniques to diagnose and solve organizational problems			CL 4
CO – Assessment Mapping				
Course Outcomes	Continuous Internal Evaluation (CIE)			Semester End Exam
	Test 1	Test 2	Assignment/ Activities	
	15%	15%	20%	
CO 1	x		x	x
CO 2	x		x	x
CO 3	x	x	x	x
CO 4		x	x	x
CO 5		x	x	x
Course Contents				
Module-1 Introduction				
Meaning and Nature of Strategic Management - Its Importance and Relevance - Characteristics of Strategic Management - The Strategic Management Process - Relationship Between a Company’s Strategy and its Business Model - Mintzberg's 5 Ps of Strategy – Distinction between Goals & Objective				
Module -2 : External Analysis & Internal Analysis				
Strategically Relevant Components of a Company’s External Environment – PESTLE Analysis - Industry Analysis - Factors Driving Industry Change and its Impact - Porter’s Dominant Economic Feature - Competitive Environment Analysis - Porter’s Five Forces Model – Describe Strategic Vision & Mission – Characteristics of Vision & Mission Statement– Goals - Long Term Objectives - Short-Term Objectives – Distinguish between Strategic Objectives & Financial Objectives Resource-Based View of the firm (RBV) - Balanced Score Card - SWOC Analysis - Value Chain Analysis - Benchmarking				
Module -3 : Strategy Formulation				
Business Strategies – Porter’s Generic Strategies: Low Cost, Differentiation, Best Cost, Focused Low Cost and Focused Differentiation, Corporate Strategies – Growth Strategies (Internal Growth, External Growth, Integration, Diversification, Mergers, Strategic Alliances) - Ansoff’s Matrix - Stability Strategies (No-Change, Profit and Proceed With Caution) - Retrenchment Strategies (Turnaround, Divestment and Liquation) - International Business Level Strategies - <i>GE nine cell planning gird and BCG matrix</i>				
Module-4 : Strategy Implementation				
Strategy Implementation - Organizational Structure, Strategic Leadership and Organisational				

Culture - Strategy and Innovation - Introduction to Innovation: Process, Product and Platform; Creative Destruction and Disruptive Technologies - Designing Organizations for Innovation - Innovation Environments - Institutional Innovation and Environments, The Co-creation of Value - Open Innovation and Open Strategy - National Innovation Systems - Learning Networks and Clusters - Social Innovation

Module-5 : Strategic Control

Strategic Control: Focus of Strategic Control - Establishing Strategic Controls (Premise Control, Strategic Surveillance, Special Alert Control, Implementation Control) - Exerting Strategic Control (through Competitive Benchmarking, Performance and Formal and Informal Organizations)

CO-PO-PSO Mapping

COs.	Programme Outcomes (POs)												Programme Specific Outcome (PSO)		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2		2			2								
CO2			3	3	2		2								
CO3		2	2	2	2										
CO4	2	2				3									
CO5	2		2		2	2	2								

1 – Slight, 2 – Moderate, 3 – Substantial, BT – Blooms Taxonomy

Text Books

1. Crafting and Executing Strategy: The Quest for Competitive Advantage – Concepts and Cases by Arthur A. Thompson Jr., Margaret A. Peteraf, John E. Gamble, A. J. Strickland III, Arun K. Jain, McGraw Hill Education, 19/e ,2017
2. Azhar Kazmi, Strategic Management & Business Policy, Tata McGraw Hill, Third Edition, 2008
3. Thomas L. Wheelen, J.David Hunger and Krish Rangarajan, Strategic Management and Business policy, Pearson Education, 15e

Reference Books

1. Strategy: Theory & Practice, Stewart Clegg, Chris Carter , Marting Kornberger, Jochen Schweitzer, Sage Publications, 3/e ,2020
2. Strategic Management: Planning for Domestic and Global Competition, John A. Pearce, Richard B. Robinson, McGraw Hill Education, 14/e, 2015
3. Upendra Kachru , Strategic Management concepts & cases , Excel Books, 8 th edition, 2006

Practical component:

Group Discussion

1. Analyzing the Mission and Vision statements of selected Indian companies

Case Study 1

1. Applying Michael Porter's model to an industry (Retail, Telecom, Infrastructure, FMCG, Insurance, Banking etc(Industry Note to be submitted)
2. Internal Analysis & Strategies of a listed company in the form of the report to be submitted.

Assignment & Presentation

1. Pick a company that has performed very badly compared to its competitors. Collect information on why the company failed.
2. Conduct SWOT analysis of companies around your campus
3. What were the issues in strategy and execution responsible for the company's failure in

the market; analyze the internal and external factors.

Group Discussion

1. Map out GE 9-cell matrix and BCG matrix for some diversified companies and compare them.

STRATEGIC MANAGEMENT				
Course Code:		21MBA26	CIE Marks	50
Teaching Hours/Week		3:0:2	SEE Marks	50
Teaching Hours of Teaching Learning		65	Total Marks	100
Credits		4	Exam Hours	3
COs	Description			CL
CO1	Make use of various entrepreneurial knowledge to grab several opportunities in the relevant domain			CL3
CO2	Examine various models and B-Plans across Business sectors			CL3
CO3	Utilize various marketing concepts & business formats			CL3
CO4	Compare various sources of funding and institutions			CL2
CO5	Plan for the full-fledged company along with the knowledge of Intellectual property rights			CL3
CO – Assessment Mapping				
Course Outcomes	Continuous Internal Evaluation (CIE)			Semester End Exam
	Test 1	Test 2	Assignment/ Activities	
	15%	15%	20%	
CO 1	x		x	x
CO 2	x		x	x
CO 3	x	x	x	x
CO 4		x	x	x
CO 5		x	x	x
Course Contents				
Module -1 : Introduction to Entrepreneur & Entrepreneurship				
Introduction to Entrepreneur & Entrepreneurship: Meaning of entrepreneur - Evolution of the concept - Functions of an Entrepreneur - Types of Entrepreneurs - Intrapreneur- an emerging class - Concept of Entrepreneurship -Entrepreneurial Culture - Stages in the entrepreneurial process.				
Creativity and Innovation: The role of creativity – The innovation Process – Sources of New Ideas – Creative Problem Solving – Entrepreneurial Process.				
Module -2 : Developing Business Model				
Developing Business Model: Importance of Business Model – Starting a small-scale industry - Components of an Effective Business Model, Osterwalder Business Model Canvas.				
Business Planning Process: Meaning of business plan - Business plan process - Final Project Report with Feasibility Study - preparing a model project report for starting a new venture. Practical Component and assignment: Designing a Business Model Canvas				
Module -3 : Marketing function and forms of Organisation				
Marketing function and forms of Organisation: Industry Analysis – Competitor Analysis – Marketing Research for the New Venture – Defining the Purpose or Objectives – Gathering Data from Secondary Sources – Gathering Information from Primary Sources – Analyzing and Interpreting the Results – The Marketing Process				
Forms of business organization: Sole Proprietorship – Partnership – Limited liability partnership - Joint Stock Companies and Cooperatives.				

Module-4 : Entrepreneurial finance & Institutions supporting Entrepreneurs

Entrepreneurial finance: Estimating the financial needs of a new venture, internal sources of finance, external sources of finance, components of financial plan (with numerical)

Institutions supporting Entrepreneurs: - A brief overview of financial institutions in India - Central level and state-level institutions - Indian Institute of Entrepreneurship - DIC - Single Window – Schemes and Initiatives of Government of India under Ministry of Skill Development and Entrepreneurship: New Organizations supporting Entrepreneurship, Short term Training Schemes/Initiatives & Long-term Training Schemes/Initiatives

Module-5 : Rules And Legislation of Company Incorporation

Rules and Legislation of Company Incorporation: Applicability of Legislation; Industries Development (Regulations) Act, 1951; Factories Act, 1948; Industrial Employment (Standing Orders) Act, 1946, Suspension, Stoppage of work, Termination of employment; Karnataka Shops and Establishment Act, 1961; Environment (Protection) Act, 1986; The sale of Goods Act, 1930; Industrial Dispute Act 1947.

Process of Company Incorporation; registration process; Importance of Marketing; Funding, four stages of Start-Up. Intellectual property protection and Ethics: Patents – Copyright - Trademark- Geographical indications – Ethical and social responsibility and challenges.

CO-PO-PSO Mapping

COs.	Programme Outcomes (POs)												Programme Specific Outcome (PSO)		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3				2										
CO2	3	3			2	2	3								
CO3	3		3	2	3		2								
CO4	3		3												
CO5	3		3		2	2	1								

1 – Slight, 2 – Moderate, 3 – Substantial, BT – Blooms Taxonomy

Text Books

1. **Ramachandran, Entrepreneurship Development**, Mc Graw Hill
2. **Katz, Entrepreneurship Small Business**, Mc Graw Hill
3. **Byrd Megginson, Small Business Management An Entrepreneur's Guidebook** 7th ed, McGraw-Hill
4. **Vasant Desai, The Dynamics of Entrepreneurial Development and Management**, Himalaya Publishing House, 2010.
5. **Donald F. Kuratko and Richard M. Hodgetts, Entrepreneurship**, South-Western, 2012.

Reference Books

1. Léo-Paul Dana, **World Encyclopedia of Entrepreneurship**, Edward Elgar
2. Robert Hisrich and Michael Peters, **Entrepreneurship**, Tata Mc Graw– Hill
3. Marc J Dollinger, **Entrepreneurship – Strategies and Resources**, Pearson Education
4. Gupta S.L., Arun Mittal, **Entrepreneurship Development**, International Book House, 2012. Managerial Economics, Samuelson & Marks, Wiley 8/e, 2017
5. Sudha G. S, **Management and Entrepreneurship Development**, Indus Valley Publication, 2009

Self-Learning:

1. Methods of generating Ideas
2. Advantages of business planning
3. Latest Industrial Policy of Government of India.
4. One-person company registration process
5. Rationale for Small industry financing in developing countries: SIDBI - NABARD - IDBI - SIDCO
6. Understand the working of DIC and its benefits
7. Patent registration process

Practical Component:**Business Plan:**

Students would be encouraged to develop ideas in various upcoming industries, and the faculty would provide handholding for building businesses.

Interview an Entrepreneur:

Students would be divided into groups of 5 each and would be instructed to select an Entrepreneur, and a questionnaire would be developed and provided to students for collecting information from these business persons.

Business Model Canvas:

The students would do Oster wielders business model canvas.

BUSINESS APPLICATION LABORATORY-2																
Course Code:					21MBA27					CIE Marks				50		
Teaching Hours/Week					0:0:2					SEE Marks				50		
Teaching Hours of Teaching Learning					13					Total Marks				100		
Credits					1					Exam Hours				3		
COs		Description												CL		
CO1		Dissect the research data based on relevant criteria												CL4		
CO2		Analyze research data by making use of various statistical techniques												CL4		
CO3		Interpret the output of the analysis												CL5		
CO – Assessment Mapping																
Course Outcomes		Continuous Internal Evaluation (CIE)											Semester End Exam			
		Test 1		Test 2		Assignment/ Activities										
						50%							50%			
CO 1						x							x			
CO 2						x							x			
CO 3						x							x			
Module-1																
Managing Data: Creating and Editing a Data File. Listing cases, replacing missing values, computing new variables, recoding variables, exploring data, selecting cases, sorting cases, merging files.																
Graphs: Creating and editing graphs and charts Frequencies: Frequencies, bar charts, histograms, percentiles																
Module -2																
Descriptive Statistics: Measures of central tendency, variability, deviation from normality, size, and stability. Cross tabulation and Chi-Square Analysis. The MEANS Procedure.																
Bivariate Correlation: Bivariate correlations, partial correlations, and the correlation matrix																
Module -3																
T-Test: Independent samples, paired-samples and one-sample tests. One-Way ANOVA. Two-Way Analysis of Variance. Simple linear regression, Multiple regression analysis																
Module -4																
Nonparametric Test: Nonparametric procedures, Multidimensional scaling, Factor analysis																
Module -5																
Conjoint analysis, Cluster analysis discriminant analysis. MANOVA and MANCOVA																
CO-PO-PSO Mapping																
Cos		Programme Outcomes (POs)												Programme Specific Outcome (PSO)		
		1	2	3	4	5	6	7	8	9	10	11	12			
CO1		3	2					1								
CO2		3	2				2	2								
CO3		3	2				2	2								
1 – Slight, 2 – Moderate, 3 – Substantial, BT – Blooms Taxonomy																

Reference Books

1. Darren George and Paul Mallery, **“IBM SPSS Statistics 21 Step by Step: A Simple Guide and Reference”**, 13th Edition, Pearson Education, 2013.
2. Andy Field, **“Discovering Statistics Using IBM SPSS Statistics”**, 4th Edition, SAGE Publications, 2013.
3. Susan B Gerber and Kristin Voelkl Finn, **“Using SPSS for Windows”**, Springer, 2006.
4. Raynald Levesque and SPSS Inc, **“SPSS Programming and Data Management”**, 4th Edition.

**Academic Regulations Governing the Degree of Under
Graduate and Post Graduate Programs of
Sahyadri College of Engineering & Management
(SCEM)**

2021

**Applicable to B.E., M.Tech., MBA Programs of the
Autonomous Scheme
(With Effect from the Academic Year: 2021-22)**



SAHYADRI

COLLEGE OF ENGINEERING & MANAGEMENT

Autonomous Institute, Affiliated to Visvesvaraya Technological University, Belagavi,

Approved by AICTE, New Delhi & Government of Karnataka

Accredited by NBA (CSE/ISE/ME/ECE) & NAAC with 'A' Grade

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1. INSTITUTE PROFILE

1.1. Bhandary Foundation

The **Bhandary Foundation** evolved on 18 November 2002 from the vision of Shri. Manjunath Bhandary and Smt. Prasanna Bhandary. The Foundation is dedicated to the cause of social justice, social development through education, and uplifting the less fortunate sections of the society. The Foundation, which believes in the holistic development of the individual, has been encouraging and promoting cultural and sports activities.

The Bhandary Foundation was envisioned by Shri. Manjunath Bhandary, while representing the Indian Government at the World HIV/AIDS Conference at Barcelona, Spain, in July 2002, as one of the Indian Delegates along with Mr. Shatrughan Sinha, Hon'ble Minister for Health, and Mr. Oscar Fernandes, Hon'ble Minister for Labour, Government of India. The conference was attended by the world's dignitaries like Mr Bill Clinton, Mr. Nelson Mandela, Mr. I. K. Gujral, and other prominent world leaders. In the conference, the leaders appealed to the delegates to fight against this disease, create awareness about HIV/AIDS and drug abuse in the younger generation, and work towards its prevention. Inspired by this, Shri. Manjunath Bhandary founded the Bhandary Foundation and started the Sahyadri Institute of Health Sciences at Mangaluru, from where they could get more and more hands to work in the field of HIV/AIDS and drug abuse.

1.2. Sahyadri College of Engineering & Management

Sahyadri College of Engineering & Management (SCEM), Mangaluru, was established in the year 2007 under the Bhandary Foundation. SCEM is one of the premier technological institutions inculcating quality and value-based education through the innovative teaching-learning process for the holistic development of the graduates. The Institute is affiliated with Visvesvaraya Technological University (VTU), Belagavi, with a permanent affiliation for most of the programs, approved by the AICTE and the Government of Karnataka, Accredited by the National Assessment and Accreditation Council (NAAC) with 'A' grade, National Board of Accreditation (NBA) for all the Engineering Programs, and the Institution of Engineers (India) (IE(I)). The Institution is recognised under Section 2(f) and 12(B) of the University Grants Commission (UGC) act and as an Innovation Cell by the Ministry of Human Resource Development (MHRD), India. SCEM has been accorded with the Scientific and Industrial Research Organization (SIRO) recognition by the Department of Scientific and Industrial Research (DSIR), Ministry of Science and Technology, Government of India. The Institute also houses New Age Incubation Network (NAIN)/k-Tech since 2017 to promote Product

Development and Incubation, recognised by MSME as Host Institute (HI) to establish technical Business Incubator (BI) in 2020; the Institute is listed under Top 25 Private Institute of most innovative Institute ranked under ATAL Ranking of Institutions on Innovation Achievements (ARIIA) and ranked 3rd in the state of Karnataka. SCEM has tie-up with many National and International research organisations, Educational Institutions and Industries.

Currently, around 3000 students are pursuing various Undergraduate (B.E.), Postgraduate (MBA), M.Sc. (Eng.) and Ph.D. research programs in the Institution and are mentored by around 250 well qualified and experienced Faculty and Staff members. The Institute promotes project-based learning through various activities and initiatives associated with various in-house industries, which helps the graduates improve their expertise. Students will be provided with an opportunity and platform by various institutional initiatives throughout the program to exhibit/improve their talents and skill in national and international events hosted by premier institutions.

The In-house Industries and Start-Ups are the main stay of the College. Sahyadri campus encompasses all the modern acoustic facilities, including a beautifully designed food court and a well-developed sports facility with 400mts. Athletic track, gymnasium, and other facilities. Our hostels provide a home away from home experience with round the clock mentoring by mentors. Sahyadri accommodates students from all backgrounds and nationalities based on their merit, thus making this campus culturally diverse.

2. PREAMBLE

Union Government of India introduced National Education Policy (NEP) - 2020 to transform a traditional 'Student Centric Education System' to 'Knowledge Centric Learning System'. There is a need to identify the talent among the pupils and nurture them to solve the local, national and global societal issues while adapting the local culture to enrich the students' knowledge and skill by practising a multidisciplinary environment. Academic Autonomy is essential to implement/modify the curriculum according to the industrial requirements. Following are the objective for the Institute to achieve excellence in Education, Research, Innovation, Incubation and Consultancy.

- Nurturing the leaders in the field of Technology, Social Enterprise
- Promote Multidisciplinary Projects related to Sustainable Development Goals(SDGs)
- Establishing Community Industry Partnership per individual programs level
- Promote Research Publications, Entrepreneurs, Innovations
- Digitalisation of Campus

- Excel in NIRF Ranking framework

Industrial Impact on Engineering Education

Autonomy may be defined as a functional status by giving greater flexibility towards flexible interdisciplinary academic development for improving academic standards and excellence with the following objectives;

- NEP - 2020 envisions an India-centric education system that contributes directly to transforming our nation sustainably into an equitable and vibrant knowledge society by providing high-quality education to all
- Widely spread of Information Technology in all sectors of societal and economic development
- The Industrial Revolution is the on-going automation of traditional manufacturing and industrial practices using modern smart technology
- Industry 4.0 focuses on the interconnectedness of machines and systems to achieve optimum performance and improve efficiencies and productivity. Industry 5.0 is touted as taking it a step further and refining the interaction between humans and machines
- To emphasise the importance of management inclination towards Industry 4.0 to 5.0, the integration of literature and logical beliefs in leadership, talent management, culture, and technology
- In today's competitive marketplace, Practical training and a curriculum meticulously framed to meet the job market requirements are imparted to the students to make them readily employable

Academic Autonomy for any institute will provide the freedom to design and develop the curriculum and Teaching-Learning Process incorporating the above points and emphasising the growth of personality development attributes among the graduates. Apart from the technological skills and competence, the following skillsets will be inculcated among the students to make them competent to excel in their personal and professional careers:

- The ability for rational, logical, orderly and objective thinking
- A sound skill in personnel management and human relations
- The leadership qualities include the spirit of tolerance, patience and teamwork

The autonomous College should exercise the academic freedom given to it by the University with the following commitments:

- Responsibility and Accountability

- Use the available opportunity to demonstrate its capabilities and innovative skills to become visible in the higher education system
- Gain all stakeholders' confidence, gratitude, and respect, especially students, alumni, parents, recruiters, and society

Hence, it becomes essential for the College and the University to maintain and enhance their reputation, image, and visibility in the technical education system as a whole.

3. SHORT TITLE AND COMMENCEMENT

The regulations listed under this head are standard for all programs offered by the College and are amended based on the Guidelines for Implementation of Academic Autonomy at Colleges by VTU, Belagavi, in line with the UGC Autonomous Act 1956 (Amended-2021-22). These regulations shall be effective from the Academic Year 2021-22.

The regulations are subject to amendments made by the Academic Council with the approval of the Governing Council of the College from time to time and keeping the recommendations of the Board of Studies (BoS) and Internal Quality Assurance Cell (IQAC) in view.

4. DEFINITIONS AND ABBREVIATIONS

4.1. Definitions

- Program:** This is an educational program in a particular stream/ branch of Engineering / branch of specialization leading to the award of the Degree. It involves events/activities, comprising of lectures/tutorial/laboratory work/fieldwork/outreach activities/project work/vocational training/viva-voce/seminars/internship/assignments/ presentations/ self-study etc., or a combination of some of these.
- Branch:** Means Specialization or discipline of B.E. Degree Programme, like Computer Science and Engineering, Mechanical Engineering etc.
- Semester:** Refers to one of the three sessions of an academic year, with the first two regular sessions (Odd/Even) of sixteen weeks each and one supplementary semester of 8 Weeks.
- Academic Year:** Refers to the sessions of three consecutive semesters (odd followed by an even followed by a supplementary semester) including periods of vacation.
- Course:** Usually referred to as subject and is a component of a Program. All Courses need not carry the same weightage. The Courses should define learning objectives and learning

outcomes. A Course may be designed to comprise lectures/ tutorials/ laboratory work/ fieldwork/ outreach activities/project work/ vocational training/ viva-voce/ seminars/ term papers/assignments/ presentations/ self-study etc., or a combination of some of these.

- vi. **Credit:** Refers to a unit by which the Course work is measured. It determines the number of hours of instructions required per week. One credit is equivalent to one hour of lecture or two hours of laboratory/practical Courses/ tutorials/ fieldwork etc., per week.
- vii. **Audit Courses:** This means the knowledge / skill enhancing courses without the benefit of credit for a course.
- viii. **Choice Based Credit System (CBCS):** Refers to customizing the course work, through core, elective, and skill-based ability enhancement courses to provide the necessary support for the students to achieve their goals.
- ix. **Course Registration:** Refers to formal registration of the courses in the study in every semester (credits and audit) by every student under the supervision of a faculty advisor (also called mentor) in the Institution to maintain the proper record.
- x. **Continuous Internal Evaluation (CIE):** Refers to the evaluation of students' performance in the learning process. CIE shall be by the conducted by the departments as per the guidelines issued by the CoE. The CIE will have the following component:
 - **Test:** Consists of 3 unit tests designed for assessing the learning outcomes of the course.
 - **Activity Based Assessment (ABA):** This is conducted by the Course Instructor/Course Coordinator and may include activities like - homework, problem-solving, group discussion, quiz, mini-project, and seminar, field work, industry visits, case studies, etc., with a weightage for the different components being fixed by the college.
- xi. **Semester End Examinations (SEE):** Refers to the examinations conducted by the college covering the entire course syllabus. For this purpose, the syllabi have to be modularized and SEE questions need to be set from each module appropriately.
- xii. **Course Evaluation:** Means Continuous Internal Evaluation (CIE) and Semester End Examination Evaluation (SEE) with equal weightage for each course (CIE: SEE = 50:50). Course to be evaluated for 100 marks, irrespective of its Credits.

- xiii. **First Attempt:** Refers to a student who has completed attendance requirements and CIE requirements has become eligible to attend the SEE and has attended at least one head of passing the SEE. Such an attempt shall be considered as the first attempt.
- xiv. **Credit-Based System (CBS):** Refers to quantification of Course work (by credits and quantification of contact hours) as mentioned in Table 9.1. Under CBS, the requirement for awarding a degree is prescribed in terms of the total number of credits to be earned by the students with pass grades in all the courses and obtaining a minimum CGPA of 5, completing NCMC courses and obtaining the prescribed AICTE Activity Points.
- xv. **Credit Representation:** Refers to the Credit Values for different academic activities considered. Credits for the seminar, project phases, project viva-voce and internship shall be as specified in the scheme of teaching and examinations.
- xvi. **Non-Credit Mandatory Course (NCMC):** In the non-credit mandatory courses, students shall attend the classes during the respective semesters to complete all the formalities of the course and appear for the Continuous Internal Evaluation (CIE). In case, any student fails to register for the said course/fails to secure the minimum 40% of the prescribed CIE marks, he/she shall be deemed to have secured an F grade. In such a case, the student has to fulfil the requirements during subsequent semester/s to appear for CIE. These Courses shall not be considered for CGPA calculation and vertical progression, but completion of the courses shall be mandatory for the award of degree.
- xvii. **Universal Human Value Course:** The courses which teach: a holistic perspective based on self-exploration about themselves (human beings), family, society, and nature. Understanding (or developing clarity) of the harmony in the human being, family, society, and nature.
- xviii. **Passing Standards:** Refers to passing a Course (as mentioned in Table 10.8)
- xix. **Cumulative Grade Point Average (CGPA):** This is a measure of the cumulative performance of a student at a higher semester and is computed from the second semester onwards.
- xx. **Grade Card:** Refers to the certificate showing the grades earned by a student. A grade card shall be issued to all the registered students after every semester-end examination. The grade card will display the Program details (Course code, title, number of credits, grades secured, number of attempts, and alternate course taken in lieu of successive failure after 4

attempts) along with the SGPA of that semester and CGPA (except for the first semester) earned till that semester.

- xxi. **University:** Visvesvaraya Technological University (VTU), Belagavi.
- xxii. **Semester Grade Point Average (SGPA):** Refers to the measure of academic performance of a student in a semester including the backlog subjects of previous semesters
- xxiii. **Academic Autonomy:** Freedom granted by the University to the College in all the aspects of conducting its academic programs for promoting academic excellence
- xxiv. **College:** Refers to Sahyadri College of Engineering & Management (SCEM)
- xxv. **Commission:** Refers to the University Grants Commission (UGC), New Delhi
- xxvi. **Council:** Refers to the All India Council for Technical Education (AICTE), New Delhi
- xxvii. **Principal:** Refers to the Head of the College.
- xxviii. **HoD:** Refers to the HoD
- xxix. **Regular Students:** Refers to the students who are admitted to the first year of the respective program.
- xxx. **Lateral Entry Students:** Refers to those students who are admitted to the third semester of the Undergraduate Engineering Program, based on the qualification at the time of entry.

4.2. Abbreviations

- i. UGC : University Grants Committee
- ii. AICTE: All India Council for Technical Education
- iii. VTU : Visvesvaraya Technological University
- iv. SCEM: Sahyadri College of Engineering & Management
- v. UG: Under Graduate
- vi. PG: Post Graduate
- vii. B.E.: Bachelor of Engineering
- viii. B.Sc.: Bachelor of Science
- ix. M.Tech.: Master of Technology
- x. M.Sc.: Master of Science
- xi. MBA: Master of Business Administration
- xii. PGDM: Post Graduate Diploma in Management
- xiii. Ph.D.: Doctor of Philosophy
- xiv. PUC: Pre- University College

- xv. KEA: Karnataka Examination Authority
- xvi. DTE: Department of Technical Education
- xvii. CET: Common Entrance Test
- xviii. DCET: Diploma Common Entrance Test
- xix. JEE: Joint Entrance Examination
- xx. PG CET: Post Graduate Common Entrance Test
- xxi. KMAT: Karnataka Management Aptitude Test
- xxii. NRI: Non-Resident Indian
- xxiii. PMSS: Prime Minister Scholarship Scheme
- xxiv. PIO: Person of Indian Origin
- xxv. KUPECA: Karnataka Unaided Private Engineering College Association
- xxvi. NAAC: National Assessment and Accreditation Council
- xxvii. NBA: National Board of Accreditation
- xxviii. GC: Governing Council
- xxix. AC: Academic Council
- xxx. IQAC: Internal Quality Assurance Cell
- xxxi. AAC: Academic Administrative Committee
- xxxii. CoE: Controller of Examination
- xxxiii. CS: Chief Superintendent
- xxxiv. JBoS: Joint Board of Studies
- xxxv. BoS: Board of Studies
- xxxvi. BoE: Board of Examiners
- xxxvii. ABC: Academic Bank of Credits
- xxxviii. CIE: Continuous Internal Evaluation
- xxxix. ABA: Activity Based Assessment
- xl. SEE: Semester End Examination
- xli. SGPA: Semester Grade Point Average
- xl.ii. CGPA: Cumulative Grade Point Average
- xl.iii. PDC: Provisional Degree Certificate
- xl. iv. PAC: Program Assessment Committee
- xl. v. DAC: Department Advisory Committee

- xlvi. PAQIC: Program Audit and Quality Improvement Committee
- xlvii. NGO: Non- Governmental Organization
- xlvi. MSME: Ministry of Micro, Small & Medium Enterprises
- xlvi. AAPIMC: AICTE Activity Points Implementation and Monitoring Committee
 - I. ABC: Academic Bank of Credit
 - li. DR&D: Departmental Research and Development Committee
 - lii. ERC: Examination and Results Committee
 - liii. IAC: Institute Advisory Committee
 - liv. IPEC: Interdisciplinary Project Evaluation Committee
 - lv. MBA: Master of Business Administration
 - lvi. MCQ: means Multiple Choice Questions
 - lvii. UFM: Un-Fair Means

5. ACADEMIC PROGRAMS

5.1. Conventions

Following conventions are followed for Academic practices in the College:

- i. Academic Autonomy is applicable for all programs offered by the College: Certification Courses, Diploma Certification Courses, B.E. Degree programs at UG level, M.Tech., M.Sc.(Engg.), and MBA programs at the PG level, Post Graduate Diploma in Management and the Ph.D. program. The programs shall fulfil the minimum academic quality and standards for the award of degrees prescribed by the University, the Council and the Commission.
- ii. The Academic Autonomy provides an opportunity to the college to make schemes of instruction, syllabi, scheme of examinations and other aspects, with the approval of its AC, while fulfilling the minimum academic standards of the University for the Award of degrees.
- iii. The college has the freedom to start Diploma (post- Diploma, post-UG and post-PG levels) and/or certificate programs with the approval of its AC. The issuance of certificates/diplomas on completion of such programs shall be made under the seal of the college only.
- iv. The college has the freedom to evolve methods for assessing the students' performance, notifying the results, issuing the grade cards/transcripts, migration, PDC and other certificates except the degree certificates.
- v. To avail the various benefits of academic autonomy, the college will structure its various academic programs based on the semester scheme by introducing credits for the academic

activities. Examination Reforms for better assessment, for the award of Letter Grades and Numerical Grade Points / Averages for student's performance and set appropriate Passing criteria are described in later sections of this regulation.

- vi. Following the guidelines recommended by the University concerning to semester scheme, credit system, examinations, letter grades, and numerical grade points/averages enables their students to avail of horizontal/ vertical mobility. Also, transfer of credits from one autonomous college to another and related benefits of academic autonomy.

5.2. Specification of Degrees

The College uses the specification of their Degree programs as specified by the Council/Commission, and the degree and diploma certificates issued by the University to their awardees bear the college's name as well. This helps maintain the identity of each program conducted at the college and ensure its accountability.

The following are the nomenclatures and abbreviations that shall continue to be used for the degree programs offered by the college under the University:

5.2.1. UG Level:

- i. Bachelor of Engineering (B.E.)
- ii. Bachelor of Engineering (B.E.) with Minor Degree
- iii. Bachelor of Engineering (B.E.) with Honours Degree
- iv. Bachelor of Science (B.Sc.) Four Years Degree
- v. Intermediate Exit Scheme as per NEP – 2020

5.2.2. PG Level:

- i. Master of Technology (M. Tech.)
- ii. Master of Business Administration (MBA)
- iii. PG Diploma Certificate (PGDC)

5.2.3. Research Level:

- i. Master of Science (Engineering) (M. Sc. (Engg.)),
- ii. Doctor of Philosophy (Ph. D.)

Besides, if any, the branch's subject of specialisation shall be indicated in brackets after the abbreviation, e.g., B.E. (Mechanical Engineering), MBA (Marketing, HR, Finance), etc.

5.3. Programs Offered by the College

The UG degree programs offered by the College, their total credits, maximum duration, minimum duration and year of the offering are listed in Table 5.1.

Table 5.1: Undergraduate Programs

Sl. No.	Program	Abbreviation	Year of Establishment	Total Credits W.E.F 2021-22	Regular Students		Lateral Entry Students	
					Minimum Duration	Maximum Duration	Minimum Duration	Maximum Duration
1	Computer Science and Engineering	CS	2007	160	4 Years	8 Years	3 Years	6 Years
2	Electronics and Communication Engineering	EC	2007	160	4 Years	8 Years	3 Years	6 Years
3	Mechanical Engineering	ME	2007	160	4 Years	8 Years	3 Years	6 Years
4	Information Science and Engineering	IS	2007	160	4 Years	8 Years	3 Years	6 Years
5	Computer Science and Engineering (Artificial Intelligence and Machine Learning)	AI& ML	2020	160	4 Years	8 Years	3 Years	6 Years
6	Computer Science and Engineering (Data Science)	CD	2020	160	4 Years	8 Years	3 Years	6 Years
7	Computer Science and Engineering (Cyber Security)	CY	2021	160	4 Years	8 Years	3 Years	6 Years
8	Artificial Intelligence(AI) and Data Science	ID	2021	160	4 Years	8 Years	3 Years	6 Years
9	Robotics and Automation	RA	2021	160	4 Years	8 Years	3 Years	6 Years

The PG degree programs offered by the College, their total credits, maximum duration, minimum duration and year of the offering are listed in Table 5.2.

Table 5.2: Postgraduate Programs

Sl. No.	Program	Abbreviation	Year of Establishment	Total Credits W.E.F 2021-22	Minimum Duration	Maximum Duration
1	Masters of Business Administration	MBA	2008	100	2 Years	4 Years

The Research Programs offered by the College, along with their maximum duration, the

minimum duration is listed in Table 5.3.

Table 5.3: Research Programs

Sl. No.	Research Programs	Abbreviation	Minimum Duration	Maximum Duration
1	Master of Science (Engineering)	M.Sc. (Engg)	2 Years	6 Years
2	Doctor of Philosophy	Ph.D.	3 Years	9 Years

For pursuing the Research Programs, the College has various Research Centres recognised by the University, which is listed in Table 5.4.

Table 5.4: Research Centres

Sl. No.	Program	Abbreviation
1	Mechanical Engineering	ME
2	Electronics and Communication Engineering	ECE
3	Computer Science and Engineering	CSE
4	Physics	PHY
5	Chemistry	CHE

6. ADMISSION PROCESS

6.1. Eligibility Criteria

6.1.1. Admission to UG Programs

6.1.1.1. Admission to 1st Year B.E. Program – Eligibility

- i. Candidate should have passed in 2nd PUC / 12th Standard / Equivalent Exam with English as one of the languages and obtained a minimum of 45% of marks in aggregate in Physics and Mathematics along with one of the following subjects, namely Chemistry/Bio-Technology/Biology/ Electronics/Computer Science etc. (40% for SC, ST, Cat-1, 2A, 2B, 3A and 3B category candidates of Karnataka). The above criteria are based on the notification of the higher education department, the Government of Karnataka.
- ii. **For admission under Government Quota (CET Quota) and CET-SNQ:** In addition to Section 6.1.1.1(i), candidates should have a qualifying rank in the CET conducted by the KEA for candidates of Karnataka domicile.
- iii. **For admission under Comed-K Quota:** In addition to Section 6.1.1.1(i), candidates should have a qualifying rank in Comed-K Entrance Test conducted by KUPECA for both Karnataka and Non-Karnataka candidates.

- iv. **For admission under NRI and other Quota:** In addition to Section 6.1.1.1(i), candidates should have a qualifying rank in either CET, Comed-K or JEE Mains entrance tests.
- v. Candidates, who have passed a qualifying examination other than 2nd PUC of the Pre-University Education Board of Karnataka, must obtain an eligibility certificate for seeking admission to B.E. Degree Program from the University.

6.1.1.2. Admission to 2nd Year B.E. Program (Lateral Entry) for students who have passed 3-Year Diploma – Eligibility

- i. Candidates should have passed a Three-year diploma or equivalent examination in the appropriate branch of engineering as recognised by the Government/University and secured not less than 45% marks [40% for SC, ST and Backward Classes of Karnataka candidates] in the final year (5th and 6th semesters).
- ii. Those candidates who have completed a Diploma from other than Karnataka state shall provide the Equivalence/ Eligibility Certificate from the Director of Technical Education of the Government.
- iii. Candidates who have passed B.Sc. Degree: Candidates should have passed B.Sc. Degree from a recognised University as defined by UGC with at least 45% marks [40 % in case of SC, ST and Backward Classes of Karnataka candidates] and passed 10+2 examination with Mathematics as a subject.

6.1.1.3. Admission to 2nd Year B.E. Program (Lateral Entry) for students who have passed B.Sc. Degree – Eligibility

As notified by the Government of Karnataka and/ or as notified by KEA from time to time for admission 3rd semester B.E. program

6.1.2. Admission to PG Programs

6.1.2.1. Admission to M.Tech. Program – Eligibility

- i. The Candidate should have passed in B.E./B. Tech. examinations of VTU or any other recognized University or Institution/ AMIE in respective branches and obtained 50% of the marks in the aggregate from all the years of the degree examination (45% in case of SC, ST and Category -1 Karnataka candidates).
- ii. Candidates who have completed their degree through distance mode education from any University (National or International) are not eligible for admission to M. Tech. Programs under any quota.

- iii. **For admission under Government Quota (PGCET Quota):** In addition to Section 6.1.2.1(i), the candidate should have a qualifying rank in the PG Entrance Examination conducted by an authority recognised and approved by the Government of Karnataka.
- iv. **For Admission of Candidates from Other Universities of Karnataka/Outside Karnataka [Other than VTU]:** The candidates from Universities other than VTU shall have to obtain migration certificate from concerned University and obtain Eligibility approval from VTU.
- v. **For admission under NRI & Other Quota:** In addition to Section 6.1.2.1(i), candidates should be GATE qualified or have a qualifying rank in the Entrance Examination conducted by an authority recognised by the Government of Karnataka/VTU/any other University on approval by Government of Karnataka.

6.1.2.2. Admission to MBA Program – Eligibility

- i. Admission to MBA Program shall be open to the candidates who have passed recognised Bachelor's Degree of minimum of 3 Years duration or equivalent examination and obtained an aggregate minimum of 50% marks taken together in all the subjects including languages in all the years of the Degree Examination and 45% of marks in case of SC, ST and Category-I of Karnataka candidates. (Reservation is applicable only for Karnataka Candidates).
- ii. A Faculty / Employee working on a Full-Time basis in an Institution / Organization and pursuing/pursuing any Full-Time Course for the same duration as that of Regular Shift shall be considered ineligible for employment / higher studies.
- iii. There shall be an Entrance Examination for admission to the MBA program. A candidate seeking admission to MBA Program offered in any engineering colleges affiliated with VTU shall appear for this Examination. For admission under the Government quota, ranks obtained in the PG entrance examination conducted by KEA shall be considered.
- iv. **For admission under NRI & Other Quota:** The candidates should have appeared for the Entrance Examination conducted by KEA / KMAT or appeared and qualified under any approved entrance examination conducted by the authority recognised by the Government of Karnataka/VTU.

- v. **For Admission of Candidates from Other Universities of Karnataka/Outside Karnataka [Other than VTU]:** The candidates from Universities other than VTU shall have to obtain migration certificate from concerned University and obtain Eligibility approval from VTU.
- vi. The intake under various categories (regular, SC/ST and category I) shall be as sanctioned by the AICTE, State Government, VTU and by a competent authority from time to time.

Note:

Admission to Vacant Seats:

Seats remaining vacant (unfilled) after completing the UG&PG admission process by KEA shall be filled by the Institution by inviting applications through Press notification, considering their eligibility criteria as specified by the notification of the Department of Higher Education, Government of Karnataka.

6.1.3. Minimum and Maximum Duration of the Program

6.1.3.1. For UG – Regular Students:

Minimum duration: For students admitted to the first semester of B.E., the minimum duration of the program shall be four academic years (divided into eight semesters). The actual Teaching and Learning days shall be for at least 90 working days in a semester.

Maximum Duration: Students admitted to first-semester B.E. shall complete the program within eight academic years from the year of the first admission, failing which they will not be eligible for the award of degree.

6.1.3.2. For UG – Lateral Entry Students (Diploma/B.Sc.):

Minimum duration: For students admitted to the third semester of B.E., the minimum duration of the program shall be three academic years (divided into six semesters). The actual Teaching and Learning days shall be at least 90 working days in a semester.

Maximum Duration: Students admitted to third semester B.E., shall complete the program within six academic years from the year of the first admission, failing which they will not be eligible for the award of degree.

6.1.3.3. For PG Students

Minimum duration: For students admitted to the first semester of MBA-PG Program, the minimum duration of the program shall be two academic years (divided into four semesters). The actual Teaching and Learning days shall be for at least 90 working days in a semester.

Maximum Duration: Students admitted to first-semester MBA-PG Program shall complete the program within four academic years from the year of the first admission, failing which they will not be eligible for the award of degree.

6.1.4. Registration Procedure (For both UG and PG)

- i. Post admission counselling of KEA, Comed-K and KMAT, the students will report to the College.
- ii. The e-registration process must be completed by entering/uploading relevant documents as specified by the Admission Officer of the College.

Note:

The above eligibility criteria may be amended from time to time as and when notified by the governing and affiliation authorities.

6.2. Admission Categories

As per the Consensual Agreement between the Government of Karnataka and the KUPECA, the following seat-sharing matrix has been agreed upon:

6.2.1. Regular

- i. CET - 45%
- ii. Comed-K -30%
- iii. NRI & Other Quota - 25%
- iv. SNQ -5%*

***Additional government seats based on the sanctioned intake.**

6.2.2. Lateral Entry

- i. DCET – 10%
- ii. NRI & Other Quota – 5% of approved Intake

6.2.3. Migration from other Institute

As per the University norms.

Note:

Admission under Regular and Lateral, category wise reservations are as per the Government of Karnataka notification.

6.3. Student Induction Program

Student Induction Program is conducted during the first 3* weeks of the first semester, where external resource persons from various sectors are invited to conduct sessions on Personality development and Universal Human Values.

*** Subjected to change as per the University Notification**

6.4. Registration for Odd/Even Semester

- a. The students have to meet the concerned HoD/Director on the registration day.
- b. HoD/Director will counsel the students and advise the students regarding the courses to be registered during the current semester, taking into account the student's performance during the previous semesters.
- c. HoD/Director will issue a registration form (Form-1) suggesting the courses to be registered.
- d. Students will pay the prescribed fee online and collect the receipt from the Account Section.
- e. Students will produce the fee paid receipt to the HoD, and the HoD will enrol the students for the courses indicated in the registration form.

6.5. Registration for Supplementary Semester

- a. The supplementary semester is of eight weeks of duration and is offered after completing an even semester in an academic year.
- b. The supplementary semester is for students who have secured F grades and dropped or withdrawn courses during the regular semester.
- c. The list of courses offered during the supplementary semester will be displayed in the Departments after announcing even semester results.
- d. Registration by the students should be completed on or before the registration dates specified in the academic calendar.
- e. A student can register for a maximum of four theory courses during the supplementary semester plus one mandatory course provided that there is no overlap of class timings.

Note:

- i. Dropping and withdrawal of courses are not allowed in supplementary semesters.*
- ii. Compensatory Tests will not be conducted in the supplementary semester.*

iii. *X and I grades are not awarded in the supplementary semester.*

6.6. Change of Branch

Change of Branch is granted at the beginning of the III Semester as per the VTU norms based on AICTE guidelines.

- a. The students, who have passed all the 1st and 2nd Semesters courses, including Mandatory courses, are only eligible to apply for Change of Branch.
- b. The facility of branch change is available at the 3rd Semester level, only to meritorious students and shall not be considered as a Matter of Right.
- c. Branch change is permitted, strictly adhering to the strength in any branch not falling below 75% of the prescribed intake and only against clear vacancy available in a particular branch.
- d. Students admitted under SNQ, PMSS, PIO & NRI quota are not eligible for branch change.
- e. Vacancy (V) is defined as

$$V = I - (\text{Reg.} + \text{Rep})$$

where, I = The prescribed Intake for the branch
Reg. = Number of regular students who become eligible to be promoted to III Semester
Rep = Number of students from previous batches who become eligible to join III Semester (along with regular students)

- f. Once the student accepts the branch change, they will not be allowed to revert to the former branch as the list will be sent to the University on the date of counselling itself for approval.
- g. As applicable, the student is given a change of branch has to pay the prescribed amount.

6.7. Change of College

As per VTU Norms, as amended from time to time.

7. COURSES AND COURSE REGISTRATION

7.1. Courses

There shall be the following types of Courses:

- i. **Humanities, Social Sciences, and Management Courses (HSMC):** These are mandatory for all disciplines.
- ii. **Basic Science Courses (BSC):** Basic Science Courses (BSC): Physics, Chemistry, and Mathematics. These are mandatory for all disciplines.

- iii. **Engineering Science Courses (ESC):** Materials, Workshop, Drawing, and Basics of Electrical/ Electronics/ Civil/ Mechanical/ Computer Engineering, etc. These are mandatory for all disciplines.
- iv. **Professional Core Courses (PCC):** Are the professional Core Courses, relevant to the chosen specialization/ program. The core courses are to be compulsorily studied by students and it is mandatory to complete them to fulfil the requirements of a program.
- v. **Professional Elective Courses (PEC):** Are professional Electives, relevant to the chosen specialization/branch and can be chosen from the pool of courses. It shall be supportive to the discipline providing extended scope/enabling exposure to some other discipline /domain and nurturing student proficiency skills
- vi. **Open Elective Courses (OEC):** Are the Elective Courses from other technical areas and/ or from emerging fields. Students of other departments will opt these courses subject to fulfilling of eligibility as stipulated by the University Regulations.
- vii. **Integrated Professional Core Course (IPCC):** It refers to Professional Theory Core Course Integrated with Practical of the same course. Credit for IPCC can be 04 considering L: T: P as 3:0:2 or L:T:P as 2:2:2. For an IPCC, the theory component shall be evaluated by both CIE and SEE, and the practical component is evaluated by CIE only (there shall be no semester-end examination (SEE) for the practical component).
- viii. **Project Work:** Mini-project work and Major Project work carried out at the parent Institution or any recognized organization without affecting the regular class work.
- ix. **Seminar:** Deliverable at the Institution under the supervision of a faculty coordinator.
- x. **Internship (INT):** Preferably at an industry/ R and D organization/IT company /Government organization /a ecognized organization of significant reput e for a specified period as mentioned in Scheme of Teaching and Examinations.
- xi. **Non-Credit Mandatory Courses (NCMC):** These Courses are mandatory, without the benefit of a grade or credit, for students admitted to B.E. Program. A pass in each mandatory Course is required to qualify for the award of degree.
- xii. **Ability Enhancement Courses (AEC):** Refers to the course that leads to Knowledge enhancement.
- xiii. **Universal Human Values Courses (UHV):** The courses which teach: a holistic perspective based on self-exploration about themselves (human being), family, society, and nature.

Understanding (or developing clarity) of the harmony in the human being, family, society, and nature. These are mandatory for all disciplines

7.2. Course Registration

In order to maintain a proper academic record of each student at the Institution, every student shall register for the Courses of a semester (Credit/Audit) under the supervision of a Mentor at the beginning of each semester.

7.3. Registration for Elective Courses

The minimum number of students registered to any Elective Course offered by the Departments shall not be less than ten. However, the above condition shall not apply to Programs having class strength of less than 10. In such cases, only one elective course shall be offered.

If more number of students is opting for the same elective, it shall be offered on a first come first serve basis, up to one division i.e. 60 students. If the department has the facility to offer the same elective for another division, it may do so else the students must opt for a different elective, depending on the strength of the division. A student shall exercise the option in respect of Elective Course/s and register for the same at the end of the previous semester. However, the student may be permitted to opt for a change of Elective Course/s within one week from the date of commencement of the semester as per the academic calendar of the College.

7.4. Attendance Requirements

As per the VTU Norms, as amended from time to time. Each semester shall be considered as a unit for the calculation of attendance. Candidates have to put in a minimum of attendance of 75% in each course with a provision for condoning up to 10% of the attendance by the Principal on the specific recommendations of the HoD of the Department, based on medical grounds, participation in University/State/ National/ International level sports and cultural activities, seminars, workshops, paper presentation, etc., of significant value.

The supporting documents for condoning the shortage of attendance shall be submitted to the office of the Principal along with the recommendations through the office of the HoD.

7.4.1. Attendance Calculations

The basis for the calculation of attendance shall be the period prescribed by the College through its academic calendar of events and as notified. In case of late admissions, approved by competent authority (KEA/DTE/VTU), to I semester (for the regular scheme) and III

semesters (for lateral entry scheme) of Engineering Program, the attendance shall be reckoned from the date of admission to the Program.

7.4.2. Attendance Monitoring

The Course Instructor/ Mentor/ College shall inform the students as well as their parents /guardians about the attendance status regularly. Students who are facing a shortage of attendance shall be mentored to make up for the shortage. The HoD shall also notify before the commencement of CIEs, the list of candidates who are falling short of required attendance.

7.4.3. Attendance Shortage

A student who does not satisfy the attendance requirement in one or more Courses (including bridge courses for lateral entry students) shall not be eligible to appear for the SEE of that course(s). The candidate shall be required to repeat that course during the subsequent semester(s) whenever the respective courses are offered.

7.5. Internship

The internship is an extended period of work experience undertaken by university/Institute students looking to supplement their degree with professional development. The students are allowed to prepare themselves for the workplace and develop practical skills as well as academic ones. The Internship shall be completed during the period specified in the Scheme of Teaching and Examinations.

There will be three internships:

I. Summer Internship-I: All students admitted to engineering programs shall have to undergo a mandatory Summer Internship of 03 weeks during the intervening vacation of 2nd and 3rd semesters. Summer Internship shall include Inter / Intra Institutional activities. Viva-Voce examination (Presentation followed by question-answer session) shall be conducted during 3rd semester and the prescribed credit shall be included in 3rd semester.

I.[A] Summer Internship-I (for Lateral Entry students): All the students admitted to engineering programs under the lateral entry category shall have to undergo a mandatory Summer Internship-I off 03 weeks during the intervening vacation of 3rd and 4th semesters. Summer Internship shall include Inter / Intra Institutional activities. Viva-voce examination shall be conducted during the 4th semester examinations and the prescribed credit earned after successful completion of the

course shall be included in the 3rd semester grade card. The 3rd semester grade card shall be issued only after passing the courses.

II. Summer Internship-II: At the end of the 4th Semester, 4 weeks of Summer Internship shall be carried out—based on industrial/Govt./NGO/MSME/Rural Internship /Innovation / Entrepreneurship. Viva-Voce examination on (Presentation followed by question-answer session) shall be conducted during the 5th semester and the prescribed credit shall be included in the 5th semester grade card.

III. Research/Industry Internship: At the end of the 6th / 7th semester (in two cycles to accommodate all the students of the College) Research/Industrial Internship shall be carried out – Based on Industrial/ Govt./ NGO/ MSME/ Rural internship / Innovation / Entrepreneurship. All the students admitted shall have to undergo a mandatory internship of 24 weeks during the vacation of 6th / 7th semester. Viva-Voce examination shall be conducted during 7th /8th semester and the prescribed credit shall be included in 7th/8th semester.

Industry internship: This is an extended period of work experience undertaken by the students looking to supplement their degree with professional development. The students are allowed to prepare themselves for the workplace and develop practical skills as well as academic ones.

Note:

Research internship Students have to take up research internships at Centers of Excellence / Study Centers established in the same institute and /or out of the institute at reputed research organizations / Institutes.

The internship shall be considered as a head of passing and shall be considered for the award of degree. Those, who do not take up / complete the internship shall be declared fail and shall have to complete it during subsequent Semester examination after satisfying the internship requirements. During subsequent semesters, the faculty coordinator or mentor has to monitor the students' internship progress and interact to guide them for the successful completion of the internship.

7.5.1. Felicitating Internship

- i. The HoD shall nominate one faculty member as internship coordinator to facilitate the internship process.

- ii. Every student will have an external guide for the internship, who will be their reporting manager in the organization where they pursue the internship.
- iii. The mentor (internal guide) allocated to the students shall facilitate, guide, and supervise students under internship.
- iv. The students shall report the progress of the internship to the mentor via a logbook at regular intervals and seek their advice.
- v. After the completion of the Internship, students shall submit a report with a completion certificate to the Internship Coordinator with the approval of mentor and external guide.
- vi. The internship examination is conducted as mentioned in the scheme of evaluation.
- vii. The internal guide shall be the internal examiner for the SEE.
- viii. The external guide for the Internship shall be the external examiner for SEE.
- ix. Examination for internship shall be conducted at the college and the date shall be fixed in consultation with the external Guide. The Examiners shall jointly award the SEE marks.
- x. In case the external Guide expresses his/her inability to conduct the Examination, the Principal /Chief Superintendent of the Institute shall appoint a senior faculty of the Department to conduct the Examination along with the internal Guide.
- xi. Non-availability of Internal guide due to inevitable situations for the conduct of SEE, the Principal /Chief Superintendent of the respective institute shall appoint a senior faculty of the Department to conduct the Examination.
- xii. The students are permitted to carry out the internship anywhere in India or abroad. The college will not provide any financial assistance to any student for carrying out the Internship.

7.6. Technical Seminar

Technical Seminar is one of the heads of passing.

- i. The HoD shall nominate one faculty member as Technical Seminar coordinator to facilitate the seminar activities.
- ii. Every student will have their mentor as the guide for the technical seminar.
- iii. The student shall deliver a Technical seminar on the topic chosen from the relevant field/ list provided by the department.
- iv. The HoD shall make arrangements for the conduct of seminars through concerned faculty members of the department. The committee, constituted for the purpose by the HoD, shall

award the CIE marks for the seminar. The committee shall consist of 2 senior faculty members of the department with the senior-most among them acting as the Chairperson.

7.7. Mini Project

Based on the ability/abilities of the student/s and recommendations of the mentor, a single discipline or a multidisciplinary Mini-project can be assigned to an individual student or a group having not more than 2 students (A Mini Project is a laboratory-oriented course that will provide a platform to students to enhance their practical knowledge and skills by the development of small systems/applications).

7.8. Major Project

Based on the ability/abilities of the student/s and recommendations of the mentor, a single discipline or a multidisciplinary major-project can be assigned to a group having not more than 4 students. The main project work needs to be taken up within the institute/ research laboratory/industry. It is desirable, that the outcome of the project work may be published/patented.

7.9. Dropping of the Course

A student, who wants to drop a theory course, has to apply through the concerned Class Teacher/Course Faculty, Mentor and HoD to the Dean (Academic) for approval.

- a. The dropping of the course is allowed within the date specified in the academic calendar of the semester, usually eight weeks from the commencement of the semester.
- b. Students are not permitted to drop the following courses in any semester:
 - i. Theory courses that are integrated with laboratory courses
 - ii. Mandatory Credit and Mandatory Non-credit Courses
 - iii. Laboratory course(s)
 - iv. Mini Project, Major Project, Technical Seminar, Internship
 - v. Design Thinking (Personality Development) Courses
 - vi. Universal Human Value Course
 - vii. Ability Enhancement Course(s)
- c. The course dropped will not be indicated in the grade card.

Note:

A student can drop a maximum of two theory courses per semester. However, after dropping, a student has to obtain a minimum of 14 credits in that semester and have the required 160

credits towards the end of the Program. Further, the student has to provide valid reasons for Dropping/ Withdrawing from the Course.

7.10. Withdrawal of the Course

- i. The students who do not meet the CIE requirements/having poor performance in the CIE will be provided with a provision of withdrawing the course(s).
- ii. A student, who wants to withdraw from a course, has to apply through the concerned Course Faculty, Mentor and HoD to the Dean (Academic) for approval.
 - a. The withdrawal of the course is allowed within the date specified in the Academic Calendar of the semester, usually the 14th week from the commencement of the semester.
 - b. The students are not permitted to withdraw the following courses in any semester:
 - i. Theory courses that are integrated with laboratory courses
 - ii. Mandatory Non-credit Courses
 - iii. Laboratory course(s)
 - iv. Mini Project, Major Project, Technical Seminar, Internship
 - v. Design Thinking (Personality Development) Courses
 - vi. Universal Human Value Course
 - vii. Ability Enhancement Course(s)
 - c. The course will be indicated in the grade card with a 'W' Grade.
 - d. Such courses have to be re-registered by these students, whenever the course(s) is offered by the Department.

Note:

A student can withdraw a maximum of two theory courses per semester. However, after withdrawing, a student has to obtain a minimum of 14 credits in that semester and have the required 160 credits towards the end of the Program. Further, the student has to provide valid reasons for Dropping/ Withdrawing from the Course.

7.11. Withdrawal from Program

7.11.1. Temporary Withdrawal

A student who has been admitted to the degree program of the college, may be permitted once during the program to withdraw temporarily, on the grounds of prolonged illness or grave calamity in the family etc. provided

- i. The student applies to the College within six weeks of the College's commencement, stating the reasons for withdrawal fully together with supporting documents and endorsement from his parents/Guardian.
- ii. There are no outstanding dues or demands with the departments /college/hostels/library etc.
- iii. Scholarship holders are bound by the appropriate rules applicable to them.
- iv. The request has to be given to the Principal through the HoD. The period of temporary withdrawal will be decided by the AAC, considering the duration of the program and other criteria.

7.11.2. Permanent Withdrawal

As per the University guidelines, the candidate may permanently withdraw from the Program, with the following conditions:

- i. There are no outstanding dues or demands with the departments /college/hostels/library etc.
- ii. Scholarship holders are bound by the appropriate rules applicable to them.
- iii. The request has to be given to the Principal through the HoD. The AAC will decide the permanent withdrawal.

7.12. Termination from the Program

A student shall be required to leave the college without the award of the degree under the following circumstances:

- i. Failure (getting F grade) and not passing a subject to earn credits for the same despite five successive attempts.
- ii. Absence from attending classes for more than 6 weeks continuously in a semester without prior approval from the competent authority
- iii. Failing to secure a CGPA greater than or equal to 5 at the end of any semester for the first time attracts a warning before approval to continue in the following semester. However, a student failing to secure a CGPA greater than or equal to 5 on 3 consecutive occasions would be asked to discontinue the program.
- iv. Failure to complete a full time 4 Year B.E program within 8 years as regular students, 6 years for the lateral entry students and 4 years for PG program.

8. ACADEMIC YEAR

8.1. Academic Year Break-up

The break-up of the Academic Year for regular semesters and the supplementary semester is given in Tables 8.1 and 8.2.

Table 8.1: Break-up of the academic year for regular semesters UG

Sl. No.	Action Plan	Odd Semester	Even Semester
1	Registration of courses	2 days (before the Commencement of the semester)	2 days (before the Commencement of the semester)
2	Course Work	16 weeks	16 weeks
3	Examination Preparation holidays	1 week	1 week
4	Semester End Examination	2 weeks	2 weeks
5	Evaluation and Announcement of Results	1 week	1 week
Total		20 weeks	20 weeks

Table 8.2: Break-up of supplementary (summer) semester UG

Sl. No.	Action Plan	Odd Semester
1	Registration of courses	1 day (before the Commencement of the semester)
2	Course Work	6 weeks
3	Examination Preparation holidays	0.5 week
4	Semester End Examination	1 week
5	Evaluation and Announcement of Results	0.5 week
Total		8 weeks

Table 8.3: Break-up of the academic year for regular semesters PG

Sl. No.	Action Plan	Odd Semester	Even Semester
1	Registration of courses	2 days (before the Commencement of the semester)	2 days (before the Commencement of the semester)
2	Course Work	16 weeks	16 weeks
3	Examination Preparation holidays	1 week	1 week
4	Semester End Examination	2 weeks	2 weeks
5	Evaluation and Announcement of Results	1 week	1 week
Total		20 weeks	20 weeks

Table 8.4: Break-up of supplementary (summer) semester PG

Sl. No.	Action Plan	Odd Semester
1	Registration of courses	1 day (before the Commencement of the semester)
2	Course Work	6 weeks
3	Examination Preparation holidays	0.5 week
4	Semester End Examination	1 week
5	Evaluation and Announcement of Results	0.5 week
Total		8 weeks

8.2. Inter Semester Break

The student has to undergo a mandatory internship during the semester breaks as per the university regulations.

8.3. Academic Calendar

The academic calendar gives information about the commencement of classes, courses registration, Continuous Internal Evaluation and Semester End Examinations, announcement of results, and other academic activities.

9. GENERAL STRUCTURE OF CREDIT SYSTEM

The Institution follows a CBCS from 2015-16 onwards. The CBCS for the various programs provides an excellent opportunity for the students in their preparation to meet the challenging opportunities ahead. The students can choose from a wide range of electives (department, cluster and institutional) and complete the program at their own pace. Value-added courses are also offered as a part of extended learning in inter-disciplinary and multi-disciplinary domains. Thus the CBCS facilitates continuous learning and evaluation.

The major benefits accruing by adopting the Credit System are listed below:

- ✓ Quantification and uniformity in the listing of courses for all programs at a College, like core (hard/soft), electives and project work
- ✓ Ease of allocation of courses under different heads by using their credits to meet national/international practices in technical education
- ✓ Convenience to specify the minimum/ maximum limits of course load and its average per semester in the form of credits to be earned by a student
- ✓ Flexibility in program duration for students by enabling them to pace their course load within minimum/maximum limits based on their preparation and capabilities
- ✓ Wider choice of the subject available from any department of the same College

- ✓ Improved facility for students to optimise their learning by availing the credits earned by them through ABC

9.1. Credit Definition

One unit of course work is assigned one credit in the regular semester (Odd/Even/Supplementary semester) for:

- 1) 1-hour Lecture (L) per week per semester =1 Credit
- 2) 2 hours Tutorial (T) per week per semester =1 Credit
- 3) 2 hours Practical/Laboratory/Drawing (P) per week per semester=1 Credit.
- 4) Four-credit Theory courses shall be designed for a minimum of 50 hours of the Teaching-Learning process.
- 5) Three-credit Theory courses shall be designed for a minimum of 40 hours of the Teaching-Learning process.
- 6) Two-credit Theory courses shall be designed for a minimum of 25 hours of the Teaching-Learning process
- 7) One credit Theory course shall be designed for a minimum of 15 hours of the Teaching-Learning process

However, in the case of the Supplementary semester, the course load is multiplied by two. These regulations form the basis to fix semester course load and weekly contact hours in the regular/Supplementary semesters.

Note:

Other student activities like study tours, industrial visits, guest lectures shall not carry any credits.

9.2. Prescribed Number of Credits for a Program

9.2.1. For UG:

- i. The total number of credits to be completed by students admitted to the first semester of 04 years B.E., program shall be 160.
- ii. The total number of credits to be completed by students admitted to the third semester of 04 years B.E., program under lateral entry scheme shall be 120.
- iii. A student shall be eligible to get an Undergraduate degree with Honours/ Minors, if they earn additional credits as specified by the University from time to time.

9.2.2. For PG:

The total number of credits to be completed by students admitted to the first semester of 2 years PG, program shall be 100.

9.3. Credit Structure

A typical Credit Structure for coursework based on the above definition is given in Table 9.1. This shall be applicable for the coursework of students registered for all programs offered by the Institution.

Table 9.1: Typical Credit Structure for Course

Theory/Lectures (L) (hours/week/Semester)	Tutorials (T) (hours/week/Semester)	Laboratory/ Practical (P) (hours/week/Semester)	Credits (L:T:P)	Total Credits
4	0	0	4:0:0	4
3	0	2	3:0:1	4
2	2	2	2:1:1	4
3	0	0	3:0:0	3
2	2	0	2:1:0	3
2	0	2	2:0:1	3
0	0	6	0:0:3	3
2	0	0	2:0:0	2
1	0	0	1:0:0	1
0	2	0	0:1:0	1
0	1	1	0:0.5:0.5	1
0	0	2	0:0:1	1
Activities like Practical Training, Study Tour, and participation in Guest Lectures do not carry any Credits				

Considering the expectations from engineering professionals with UG, PG and Research Degrees in the number of contact hours for students is fixed up to 36 hours/week. This will help students get enough time and opportunity to prepare for the courses prescribed for credit, take up self-study, and develop their creative talents. This can also enable them to prepare for challenging and exciting careers ahead.

9.4. Contact Hours

A typical example showing the calculation of contact hours based on course credits is given in Table 9.2

Table 9.2: Typical Courses with Contact Hours

Nature of the Course	L T P	Total credits	Contact Hours
Theory Course	3:0:0	3	3

Theory Integrated with Practical Course	3:0:2	4	5
Theory Courses with 2 Credits	2:0:0	2	2
Theory Course 1 credit	1:0:0	1	1
Laboratory Course	0:0:2	1	2
Mandatory Non-Credit Course	2 units	-	2

9.5. Course Load per Semesters

9.5.1. Regular Semester

- i. The ODD and EVEN semesters are known as regular semesters. The course load for a student per semester and its minimum and maximum limits are based on the guidelines by the University, which is based on the AICTE Model Curriculum for UG/PG Programs (February 2018) and considering the academic strength and capability of an average student.
- ii. In the first two semesters, the prescribed course load per semester is fixed and is mandated (20 credits/semester for the BE program, 22 credits/semester for the M.Tech., 24 credits/semester for the MBA programs)
- iii. Withdrawal from the program or dropping course(s) in the First and Second semesters is not permitted.
- iv. In higher semesters, i.e., from the 3rd semester onwards, the average load is 20 credits /semester, with a minimum of 12 credits and a maximum of 24 credits.
- v. Students are allowed to drop the courses in consultation with mentor without affecting the minimum credit of the semester.
- vi. The student can drop a maximum of 5 courses in the entire program duration.
- vii. This flexibility enables students to cope-up with the coursework and helps in improving their academic performance, and optimises the learning outcome.

9.5.2. Supplementary Semester

- i. The Supplementary semester is provided to benefit the academically weak students who have failed (Grade F) in their regular Semester End Examinations and those with Transition Grades (I, W and X Grades) to cope with bright students.
- ii. The supplementary semester is a special semester, and the student cannot demand it as a Matter of Right.
- iii. The Supplementary semester will also help the student to avoid losing an Academic Year and complete the program within the minimum duration.

- iv. The Department/College may offer some courses based on the availability of resources in hand.
- v. A student is permitted to register for a maximum of 14 credits only.
- vi. A student has to opt for those courses offered by the department in a given Supplementary semester.
- vii. The student registering for the supplementary semester has to undergo mandatory CIE procedures for the said course again (The previously obtained CIE marks will be nullified)
- viii. The student has to pay a special fee prescribed by the College to register for a course in the Supplementary semester.

10. EXAMINATION AND EVALUATION

The assessment of students' performance in coursework is done using examinations. Achievement-testing type of assessment is chosen to assess a student's knowledge, understanding correctly, and competence in the course studied.

Achievement-testing is done in two parts as follows:

1. **Sessional** involving **Continuous Internal Evaluation** (CIE)
 - i. Sessional Marks Awarded through CIE (CIE Marks): 50 Marks
2. **Terminal** covering **Semester End Examinations** (SEE)
 - i. Terminal Marks Awarded through SEE (SEE Marks): 50 Marks

Both CIE and SEE are assigned equal (50:50) weightage as they are equally important in judging the coursework performance of students. They are to be conducted with equal rigor and seriousness.

10.1. Consideration of CIE and SEE to Judge the Academic Performance

10.1.1. In Credit Courses

- i. The Student's performance in all credit courses [excluding Major Project (Phase-I) and Technical Seminar] shall be assessed, and grades will be awarded by considering the performance in both CIE and SEE, i.e., Total Marks considered in awarding a grade in credit course is

Total Marks = CIE Marks + SEE Marks

- ii. Student's performance in Mini Project and Technical Seminar courses shall be assessed, and grades will be awarded by considering the performance in CIE only, i.e., Total Marks considered in awarding a grade in these courses is

Total Marks = CIE Marks Only

10.1.2. In Mandatory Non-Credit Courses

- i. Student's performance in Mandatory Non-Credit Courses of UG/PG excluding the Additional Mathematics course for the Lateral Entry UG Students shall be assessed considering the performance in the CIE only.

Total Marks = CIE Marks Only

- ii. In Additional Mathematics courses for lateral entry B.E. students, performance shall be assessed considering the performance in both CIE and SEE.

Total Marks = CIE Marks + SEE Marks

- iii. In Mandatory Non-credit subject, Students will be only considered Pass/Fail based on the performance (Total Marks), and no grade will be awarded.
- iv. A "Pass" in a Mandatory Non-credit course shall require the student to qualify for the degree award.

10.2. Continuous Internal Evaluation (CIE)

CIE has different components depending on the type of course.

10.2.1. CIE Assessment Pattern – Theory Courses (3 Credits)

This section of regulations applies to all credit and non-credit theory-based courses, including Languages, Skill Development (Aptitude and Logical Reasoning) and a few theory-based Career Electives.

Table 10.1: CIE Assessment Pattern – Theory Course

Components		Number	Weightage	Max. Marks
i.	Test (A)	3	60%	30
ii.	Activity Based Assessment (ABA) suggested by the BoS and PAC (B)		40%	20
Total				50

Final CIE Marks = (A) + (B)

Activity Based Assessment (ABA)

- i. Activity-Based Assessment will be designed to assess higher-order cognitive skills and professional or generic skills.

- ii. Includes seminars, surveys, use of modern tools, group discussions, open-ended problem-solving assignments, mini-projects, MOOCs, paper publications, activities, and other means excluding module tests and group assignments.
- iii. Marks awarded are based on the rubrics described by the course instructor for the identified assessment tool. If required, assessment can be made for any higher marks and then scaled down to the maximum marks assigned for ABA.

10.2.2. CIE Assessment Pattern – Theory Integrated with Practical Courses [TIPC] (4 Credits)

The CIE marks for the TIPC Course is a combination of Theory and Laboratory components, whose weightage is as shown in Table 10.2.

Table 10.2: CIE Assessment Pattern – TIPC

Components		Number	Weightage	Max. Marks
i.	Test (A)	3	60%	30
ii.	Laboratory (B)		40%	20
Total				50

$$\text{Final CIE Marks} = (A) + (B)$$

CIE for Practical Component

- i. The Weekly assessment of the laboratory work is done for a total of 25 marks which is evaluated across different components, as per the rubrics. Finally, the overall marks obtained will be scaled down to 10 Marks (Component A)
- ii. The laboratory test (duration 03 hours) towards the end of the semester /after completion of all the experiments (whichever is early) shall be conducted for 50 marks and scaled down to 10 Marks (Component B)
- iii. The CIE Marks for the TIPC Practical component will be the addition of Component A and Component B.

Note:

- i. The minimum marks to be secured in CIE to appear for SEE shall be the 15 in theory component and 10 in practical component. The laboratory component of the TIPC shall be for CIE only.
- ii. The theory component of the TIPC shall be for both CIE and SEE

- iii. In case, students satisfy the attendance requirement of both theory and laboratory components of the TIPC, but fail to secure the minimum CIE marks in any one of the two, such students shall not be permitted to appear for SEE of course.

10.2.3. CIE Assessment Pattern – Theory Courses (1 Credits)

Three CIE tests containing preferably MCQs are conducted for Theory Course having 1 Credit. The weightage is as shown below.

Table 10.3: CIE Assessment Pattern – TIPC

Components		Number	Weightage	Max. Marks
i.	Test (A)	3	60%	30
ii.	Activity Based Assessment (ABA) suggested by the BoS and PAC (B)		40%	20
Total				50

$$\text{Final CIE Marks} = (A) + (B)$$

Activity Based Assessment (ABA)

- Activity-Based Assessment will be designed to assess higher-order cognitive skills and professional or generic skills.
- Includes seminars, surveys, use of modern tools, group discussions, open-ended problem-solving assignments, mini-projects, MOOCs, paper publications, activities, and other means excluding module tests and group assignments.
- Marks awarded are based on the rubrics described by the course instructor for the identified assessment tool. If required, assessment can be made for any higher marks and then scaled down to the maximum marks assigned for ABA.

10.2.4. CIE Assessment Pattern – Theory Courses (2 Credits)

The CIE tests for First and Second Semesters is same as mentioned in Section 10.2.3.

However, for the higher semesters, the CIE may be non-MCQ based (i.e. same as the other core theory courses)

Table 10.4: CIE Assessment Pattern – TIPC

Components		Number	Weightage	Max. Marks
i.	Test (A)	3	60%	30
ii.	Activity Based Assessment (ABA) suggested by the BoS and PAC (B)		40%	20
Total				50

Final CIE Marks = (A) + (B)

Activity Based Assessment (ABA)

- i. Activity-Based Assessment will be designed to assess higher-order cognitive skills and professional or generic skills.
- ii. Includes seminars, surveys, use of modern tools, group discussions, open-ended problem-solving assignments, mini-projects, MOOCs, paper publications, activities, and other means excluding module tests and group assignments.
- iii. Marks awarded are based on the rubrics described by the course instructor for the identified assessment tool. If required, assessment can be made for any higher marks and then scaled down to the maximum marks assigned for ABA.

10.2.5. CIE Assessment Pattern – Engineering Graphics/Drawing/Field Works

- i. The CIE marks awarded in the case of Drawing shall be based on the weekly evaluation of classwork (sketching and computer-aided drawing) each drawing will be evaluated for marks as mentioned module-wise in the syllabus. Marks for all the drawing sheets are added and scaled down to 30 marks.
- ii. One class test similar to SEE will be conducted after completion of the syllabus for 100 marks and scaled down to 20 marks.
- iii. CIE marks (out of 50) scored by the student is the sum of classwork evaluation and test marks.
- iv. The CIE marks awarded for higher semester Drawings/ Design Drawings offered by various programs shall be based on the evaluation of the sheets and one test in the ratio 80:20.

10.2.6. CIE Assessment Pattern –Field Works

- i. The Surveying Practice / Socio-Economics/ Marketing/ traffic/ environmental survey CIE marks will be split into two components 80% of maximum marks (40 marks) are given for fieldwork report evaluation and 20% of maximum marks (10 marks) for internal assessment test evaluation.
- ii. Fieldwork evaluation includes attendance, data collection through survey, use of data for design drawing, and report. The split-up of marks for the report will be decided by the faculty who is guiding them for the design drawing and report.
- iii. The criteria for split-up of marks shall be done to achieve the learning outcome of the course.

- iv. The report evaluation shall be carried out for 100 marks and scored marks shall be scaled down to 40 marks.
- v. The assessment shall be a presentation of the report followed by the Viva Voce, which will be conducted by the fieldwork project guide and fieldwork coordinator.
- vi. If the fieldwork coordinator happens to be the same faculty then, HoD or a senior faculty nominated by the HoD will conduct the test with the guide.
- vii. A test similar to SEE will be conducted for 100 marks and marks scored by the student will be scaled down to 10 marks. The sum of the report and test marks will be total CIE marks for fieldwork.

10.2.7. CIE Assessment Pattern – Laboratory Courses

This section of regulations applies to all laboratory-based, activity-based, and experiential learning courses viz., Laboratory courses, Social Innovation, Engineering Exploration, Skill Development (Soft Skills), Design Thinking, Career Electives and Leadership & Team Building.

Table 10.5: CIE Assessment Pattern – Laboratory Course

Components		Weightage	Max. Marks
i.	Laboratory Work (A)	50%	25
ii.	Laboratory Test (B)	30%	15
iii.	Open-ended Experiments (C)/Mini Projects	20%	10
Total			50

$$\text{Final CIE Marks} = (A) + (B) + (C)$$

- i. In Laboratory Courses where Laboratory Test (B) and Open-Ended Experiments (C)/Mini Projects are not the components of the assessment pattern, then Laboratory Work (A) will have 100% weightage (50 Marks).
- ii. In Laboratory Courses where Open-Ended Experiments (C)/Mini Projects is a component of the assessment pattern, then Laboratory Work (A) will have 50% weightage (25 Marks), and Laboratory Test (B) will have 50% weightage (25 Marks).
- iii. The respective course instructor will design the assessment criteria for the said assessment components.
- iv. The assessment components will be made known to the students by the respective Course Coordinators prior to the commencement of the Laboratory Work.

- v. In case of i., the laboratory work marks will be awarded based on the continuous internal assessment (Weekly Assessment) of the students in each laboratory session. The Final marks obtained will be the average of all the marks obtained across the sessions.
- vi. In case of ii., the laboratory work marks will be awarded based on the Continuous Internal Assessment (Weekly Assessment) of the students in each laboratory session. The evaluation will be done for 25 marks. The final marks obtained for the Laboratory Work will be the average marks obtained across each session of the laboratory.
- vii. In case of ii., in addition to vi., one Laboratory test will be conducted towards the end of the semester for 25 marks.
- viii. In case of ii., the Final Marks obtained for the laboratory will be the sum of Marks obtained in vi. and vii.
- ix. In all the cases (v to viii), the assessments will be done based on the criteria designed by the Course Coordinator, as mentioned in iii.

10.2.8. CIE Assessment Pattern – Internship Course

10.2.8.1. General

The Internship shall be completed during the period specified in the Scheme of Teaching and Examinations [Refer Section 7.5.1]

10.2.8.2. Duration of Internships

- i. Summer Internship-I: 03 weeks
- ii. Summer Internship-II: 04 weeks
- iii. Industry / Research Internship: 24 weeks

10.2.8.3. Internship Evaluation

- i. Evaluation of the Internship shall be carried out by the faculty mentor/ guide who are monitoring the progress of the internship of the student.
- ii. Split up for CIE for report and viva-voce are in the ratio of 50:50
- iii. The Report evaluation will be common for all the three internships, which will be based on the Rubrics provided by the College
- iv. The Viva-Voce will be conducted as per the rubrics provided by the College
- v. Viva Voce will be conducted by the Mentor/ HoD/ One senior faculty nominated by HoD

Note:

In Report Evaluation, more weightage may be given for paper publications in reputed journals/ refereed journals/ conferences/ product development/ patent filed – only for Industry/Research Internship

10.2.9. CIE Assessment Pattern – Technical Seminar

- i. Technical Seminar is one of the heads of passing [Refer Section 7.6]
- ii. The CIE marks awarded for Technical Seminar shall be based on the evaluation rubrics provided by the college.

10.2.10. CIE Assessment Pattern – Mini Project

- i. The Mini Project shall be completed as specified in the Scheme of Teaching and Examinations.
- ii. The maximum marks allotted for the mini project is 50 marks
- iii. The CIE marks awarded for Mini - Project, shall be based on the evaluation rubrics provided by the college.
- iv. The HoD shall make arrangements for the conduct of viva-voce evaluation of the mini-project.
- v. The committee shall consist of a guide/mentor and one senior faculty member of the Department
- vi. The marks awarded for the Mini-Project report shall be the same for all the batch mates.

10.2.11. CIE Assessment Pattern – Major Project Work

- i. The Major Project shall be completed as specified in the Scheme of Teaching and Examinations.
- ii. The HoD shall make arrangements for the monitoring of activities of the major project and will constitute a Departmental Project Evaluation Committee (DPEC).
- iii. The DPEC will consist of the HoD as the chairperson and 3 senior faculties as the member of the committee.
- iv. The Project work will be assessed based on the evaluation rubrics provided by the college.
- v. Final project reports must go through the plagiarism check, and the plagiarism index must be less than or equal to 25% to be eligible for submission.

10.2.12. Passing Standards in CIE – Minimum marks to obtain**Table 10.6: CIE Passing Standards**

Program	Courses	CIE Passing Standards	
		Percentage	Marks
B.E.	Theory Courses	40% of CIE Marks	20 out of 50
	Laboratory Course/Mini Project/ Summer Internship- I and II	50% of CIE Marks	25 out of 50
	Research Internship/Industry Internship/Major Project	50% of CIE Marks	50 out of 100
M. Tech.	All Course	50% of CIE Marks	25 out of 50
MBA	All Course	50% of CIE Marks	25 out of 50

- i. In credit courses for which SEE is conducted, a student must satisfy the attendance requirements and obtain the prescribed minimum CIE marks to be eligible to take SEE— failing which, the students will not be eligible to appear for SEE and will be awarded an ‘F’ grade. Such students must repeat the course in its entirety by re-registering it when offered by the department. However, they can appear for the SEE of other courses, where they have the eligibility.
- ii. Students who have satisfied the attendance requirement but not the CIE requirements shall be permitted to register afresh and appear for SEE after satisfying the CIE requirements in the same Course(s) when offered during subsequent semester/s.
- iii. In mandatory non-credit courses (excluding Additional Mathematics courses for lateral entry students), students securing minimum CIE marks will be considered ‘Pass’ and awarded a ‘PP’ Grade. There will be no SEE for these courses.
- iv. A ‘Pass’ in a mandatory non-credit course shall require the student to qualify for the degree award.
- v. Students not securing minimum CIE marks in mandatory non-credit courses will be considered ‘Not Pass’ and awarded an ‘NP’ Grade. Such students must repeat the course in its entirety by re-registering it when offered by the department and ‘Pass’ the course.
- vi. In credit courses for which SEE is not conducted, Students obtaining minimum CIE marks or more than the minimum marks are eligible to be awarded an equivalent Letter Grade based on the CIE marks scored only. Students failing to obtain minimum CIE marks will be awarded an ‘F’ grade, and such students must repeat the course in its entirety by re-registering to that course when the department offers it.

- vii. In Research Internship/Industry Internship/Major Project, students failing to obtain minimum CIE marks (50% of the Max marks) will have to rework the assessment criteria in the semester vacation, present the work before appropriate evaluation committee for re-assessment and obtain a Passing Letter Grade with the minimum CIE marks before proceeding to carry out Research Internship/Industry Internship/Major Project.

10.2.13. Compensatory CIE

10.2.13.1. Eligibility

- i. A student has satisfactory attendance in the course but remained absent for the CIE due to valid reasons like severe illness or representing the College in the co-curricular and extra-curricular activities with prior permission from the HoD.
- ii. A student can take only one compensatory CIE for a course in a semester.
- iii. The Students involved in malpractice/UFM during CIE will not be eligible.
- iv. Compensatory CIE is not for the improvement of marks.
- v. Compensatory CIE will not be provided in the supplementary semester.

10.2.13.2. Procedure

- i. Eligible students will have to submit a request letter in the prescribed format with all supporting credentials to claim for a compensatory CIE to the Office of CoE forwarded through their HoD within one week after the CIE in which they are absent.
- ii. Eligible students will appear before a committee comprising CoE, Dean (Academic), Dean (Student Welfare) and HoDs.
- iii. Committee will grant permission after verifying all the documents and indeed that the student's claim is genuine and deserving.

10.2.13.3. Schedule

Compensatory CIE tests will be conducted 15th or 16th week of the semester as mentioned in the Academic Calendar of the College.

10.2.13.4. Syllabus

The syllabus of the CIE for which the student is absent, as decided by the committee based on the reasons the benefit is claimed.

10.2.14. CIE Procedure

- i. The CIE will be conducted as notified in the Academic Calendar.

- ii. The concerned departments will conduct the CIEs as per the guidelines provided by the office of CoE.
- iii. The Departments will tabulate the results of the CIE, and notify the students for verifications.
- iv. Any corrections or overwriting of CIE marks on the blue book/drawing sheet shall bear the signature(s) of concerned faculty member(s).
- v. Post verifications, the finalized CIE Marks will be uploaded into the portal.
- vi. The average of the three CIEs and the marks obtained in the Activity Based Learning will be the final CIE marks.
- vii. The finalized CIE marks shall reach the Office of CoE before the commencement of the SEE as per the notification from the office of the CoE from time to time.
- viii. CIE marks of those students, who come under 10.2.12 (i.) and 10.2.12(ii.), shall also be sent to the office of CoE along with other course CIE Marks.
- ix. After the submission of CIE marks to the office of CoE, any request under any circumstances for change of CIE marks shall not be considered.
- x. The final list, incorporating corrections (if any), of CIE marks awarded to the students in the Theory/ Practical/ Internship/ Technical Seminar/ Mini – Project/ Major-Project shall be displayed on the notice board of the college much before the closure of the semester.

10.3. Semester End Examination (SEE)

10.3.1. Details of SEE

10.3.1.1. Courses for which SEE is conducted

- i. All credit courses in UG and PG Program shall have SEE. However, a few courses involving experiential learning, self-learning and activity-based learning viz., Minor Project, Technical Seminar and MOOCs etc., will not have SEE.
- ii. Mandatory non-credit courses in UG and PG Programs will not have SEE. However, Additional Mathematics-I & II Courses, even though a Mandatory non-credit course, will have SEE for lateral entry students of the B.E Program.

10.3.1.2. Maximum Marks

- i. In UG Program, SEE for all theory courses, laboratory courses will be conducted for a maximum of 100 marks, which will be scaled down to 50 marks.

- ii. In PG Program, SEE for all theory courses, laboratory courses, Seminars, and Internships will be conducted for a maximum of 100 marks, scaled down to 50 marks.

Table 10.7: Course-wise Maximum Marks of SEE

Table 2017: Course-wise Maximum Marks of SEE			
Course Type	Max. Marks	Duration	Remarks
Theory Course with 3 credits	100	3hrs.	Marks scaled down to 50
Theory Integrated with Practical Course (TIPC)	100	3hrs.	
Theory Course with 2 Credits*	100	2hrs.	
Laboratory Course	100	3hrs.	
Engineering Graphics and Drawing	100	3hrs.	
Field Work	100	3hrs.	
Theory Course with 1 Credit	50	1hrs.	
Summer Internship – I and II	50	2hrs.	
UG Major Project	100	3hrs.	
PG Project	100	3hrs.	
Industry Internship	100	3hrs.	
* The suggested question paper pattern is MCQ for the 1 st and 2 nd semester. However, for higher semester/s SEE may be a written examination pattern similar to other theory courses.			

10.3.1.3. Passing Standards in SEE - Minimum Marks to obtain in SEE**Table 10.8: Course- wise Minimum Marks of SEE**

Program	Course	SEE Passing Standards	
		Percentage	Marks
B.E.	All credited Theory Courses(including Professional and open Electives, TIPC)	40% of SEE Marks	20 out of 50
	Practical/Project/Internship/Seminar	50% of SEE Marks	25 out of 50
M.Tech	All Theory Courses(Professional Electives)	50% of SEE Marks	25 out of 50
	Practical/Project/Internship/Seminar	50% of SEE Marks	25 out of 50
MBA	All Theory Courses	50% of SEE Marks	25 out of 50
	All Laboratory Courses	50% of SEE Marks	25 out of 50
	Practical/Summer Internship/Project	50% of SEE Marks	25 out of 50

- i. Depending on the case, a student failing to obtain minimum SEE marks will be awarded an 'F' Grade or 'X' Grade (Refer Table 10.8) However, 'X' Grade will not be awarded in make-up examinations or supplementary semesters.
- ii. Students who obtain an 'F' Grade will have to repeat the course in its entirety by re-registering to that course when it is offered by the department and shall secure

required CIE and SEE marks. This shall continue until a letter grade 'E' or above is obtained in the said course.

iii. Students who obtain X Grade will be permitted to appear for make-up examinations.

10.3.1.4. Category of SEE

A. Theory Course with 3 Credits

- i. Theory SEE will be conducted by College as per the scheduled timetable, with common question papers for the Course (duration 03 hours)
- ii. The question paper will have ten questions. Each question is set for 20 marks.
- iii. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), should have a mix of topics under that module.
- iv. The students have to answer 5 full questions, selecting one full question from each module.

B. Theory Integrated with Practical Course (TIPC)

SEE for the theory part (Duration 03 hours) is the same as that mentioned in 10.3.1.4(A)(ii) (questions mentioned in SEE paper shall not include questions from the practical component).

C. Theory Course with 1 Credit

SEE paper will be set for 50 questions, each of 01 mark. The pattern of the question paper is MCQ. The time allotted for SEE is 01 hour

D. Theory Course with 2 Credits

- i. SEE paper will be set for 100 questions each of 01 mark.
- ii. The pattern of the question paper is MCQ.
- iii. The time allotted for SEE is 120 minutes. Marks scored are scaled down to 50 Marks.
- iv. The suggested question paper pattern is MCQ for the 1st and 2nd semester however, for higher semester/s SEE may be a written examination pattern similar to other theory courses.

E. Engineering Graphics and Drawing

- i. SEE shall be conducted and evaluated for maximum marks 100.
- ii. Marks obtained shall be accounted for SEE final marks, reducing it by 50%

- iii. Different set of Question paper shall be set jointly by the two examiners different batches.
- iv. Evaluation shall be carried jointly by both the examiners.

F. Fieldwork

- i. SEE for fieldwork Conducted by the two examiners.
- ii. Report and design drawing evaluation and viva-voce are in the ratio 60:40.
- iii. The duration of SEE is 03 hours.

G. Laboratory Course

- i. SEE marks for the practical course is 50 Marks.
- ii. SEE shall be conducted by the two examiners
- iii. All laboratory experiments are to be included for practical examination.
- iv. (Rubrics) Breakup of marks and the instructions printed on the cover page of the answer script to be strictly adhered to by the examiners OR based on the course requirement, evaluation rubrics shall be decided jointly by the two examiners.
- v. Students can pick one question (experiment) from the questions lot prepared by the examiners.
- vi. General rubrics for SEE are mentioned here:
 - Procedure / Writeup-20%,
 - Conduction and result in -50%
 - Viva-voce 30% of maximum marks
- vii. SEE for practical shall be evaluated for 100 marks and scored marks shall be scaled down to 50 marks (however, based on course type, rubrics shall be decided by the examiners)
- viii. Change of experiment is allowed only once and 20% Marks allotted to the procedure/ write-up part to be made zero (Evaluation is to be carried out for 80% of total maximum marks).
- ix. The duration of SEE is 03 hours.

H. Major Project

- i. Maximum SEE marks for the Major Project is 100 marks
- ii. Will be conducted by the two examiners.

- iii. Rubrics for evaluation may be the same as suggested for CIE or Internal and external examiners shall devise rubrics for SEE and the same may be submitted to the office of CoE along with evaluation marks.

10.3.1.5. Examination Schedule

SEE of courses will be conducted as per the exam timetable announced by the office of CoE.

10.3.1.6. Absent to SEE

- i. A student who remains absent to SEE due to valid reasons like serious illness/disaster in their family should immediately apply for the Award of 'I' Grade in that course. Applications received after the conduction of examination shall not be considered (Refer to Section 12.4 for more details).
- ii. A student who remains absent to SEE without any valid reasons will be awarded an 'F' Grade. Such students shall register and repeat the course in its entirety when offered.

10.3.2. Eligibility to take SEE

- i. Students who have registered for the course and satisfy the attendance requirement in the respective course.
- ii. Students who have obtained minimum CIE marks in a course [Refer Section 10.2.12]
- iii. Students have paid the prescribed fee.
- iv. Students who do not have any pending disciplinary action in the College.

10.3.3. Evaluation Process

10.3.3.1. B.E. Program

A. First Evaluation

Answer scripts (coded scripts) shall be evaluated by examiners from the panel of examiners, preferably having a minimum of 3 years of experience, according to the evaluation scheme for the respective course.

B. Moderation

Answer scripts are blind reviewed to ensure quality and accuracy of evaluation as per the scheme.

(i) **Moderator:** An examiner chosen from the panel of examiners approved by respective BoE.

(ii) **No. of Scripts:** Approximately 10% of total scripts spanning the entire

range of marks awarded in the first valuation are selected for moderation.

(iii) Final Marks Awarded After Moderation:

- i. If the difference between the evaluator & moderator marks is less than 10% of the maximum marks, then the marks awarded by the evaluator will be considered.
- ii. If the difference between evaluator & moderator marks is more than 10% of the maximum marks, then the marks awarded by the moderator will be considered.

C. Revaluation

A student may apply for revaluation and photocopy of the answer scripts of SEE for theory courses only.

A student can apply for revaluation of the answer script(s), in the prescribed form along with the prescribed fee to the CoE within the specified time schedule as in the Academic Calendar.

- If the decrease in the revaluation marks is by any margin, then the student's original marks corresponding to the first evaluation marks are awarded
- If the increase in the revaluation marks is less than or equal to fifteen, then the revaluation marks corresponding to the revaluation marks is awarded to the student
- If the increase in the revaluation marks is more than fifteen, then the answer script will be sent for additional valuation and the average of the best two marks shall be awarded

10.3.3.2. PG Program

A. Double Evaluation

Answer scripts (coded scripts) shall have a double evaluation, valued independently by two examiners from the panel.

B. Final Marks Awarded

- i. If the difference between the marks awarded by two evaluators is less than equal to 10% of the maximum marks, then the average of the two evaluation marks will be awarded.

- ii. If the difference between the marks awarded by two evaluators is more than 10% of the maximum marks, then such scripts will go for a third evaluation.

10.3.3.3. Third Evaluation (PG Program)

A. Evaluator

An examiner chosen from the panel of examiners or a senior professor in the department, who has taught the course earlier, nominated by CoE in consultation with the BoE Chairperson, will be the evaluator.

B. Final Marks Awarded after the Third Evaluation

- i. The average marks of the nearest two evaluation marks are taken as final marks.
- ii. If one of the three evaluation marks falls halfway between the other two, then higher two evaluation marks are taken, and the average is awarded as final marks.

10.3.4. Disclosure of Answer Books (Answer Book Seeing)

The evaluated answer books and the marks awarded to each question are disclosed to students on request to bring transparency to the evaluation system;

10.3.4.1. Who can see?

- i. Interested students who are not satisfied with the results of a course can see the answer books after applying for it.
- ii. Such students will have to appear in person and produce proof of their identity to the concerned authorities before seeing answer books. Answer books will not be disclosed to anyone other than the one who has written the exam.

10.3.4.2. Who will Show the Answer Books?

The Office of the CoE will display the Answer Books

10.3.4.3. When will the Answer Books be shown?

The Answer Books will be shown within 3 to 4 working days, post the result announcement.

10.3.4.4. How to Apply?

- i. Interested students must pay the prescribed fee, fill the application form and submit the duly signed application form along with the fee paid receipt to the office of COE by appearing in person before the last date mentioned. If the student cannot appear in person for some reason, represent/guardian of the student may apply on their behalf. However, the student should authorise the same.

- ii. When applying, the student will produce proof of their identity to the concerned authorities.
- iii. Applications received after the last date and applications found to be not correct in any respect will not be considered.

10.3.4.5. Grievances

- i. If a student is satisfied with the valuation of their book and has no grievance, they will fill a 'Satisfactory Evaluation Form' and submit it to the Office of CoE.
- ii. If a student has any grievance regarding totalling of marks or marks not being awarded to any question/s, they had to fill an 'Evaluation Grievances Form' and submit the same to the Office of CoE.
- iii. The BoE chairperson will look into such grievances mentioned in Section 10.3.4.5 and take corrective measures under the directions of CoE.
- iv. If a student has any grievance regarding wrong evaluation or expected marks not being awarded, they had to apply for 'Revaluation' by filling a 'Challenge Evaluation Form' and paying the prescribed fees. The form and the copy of the fee paid receipt will have to be submitted to the office of CoE before the notified last date.

10.3.5. Challenge Evaluation

10.3.5.1. Who can apply?

Any student who has a grievance concerning the revaluation of their answer book can apply.

10.3.5.2. How to Apply?

- i. Students must pay the prescribed fee, fill the 'Challenge Evaluation Form' and submit the duly signed application form along with the fee paid receipt to the office of COE by appearing in person before the last date mentioned.
- ii. At the time of applying, the student will produce proof of their identity to the concerned authorities
- iii. Applications received after the last date and applications not duly signed and submitted by the person seeking challenge evaluation will not be considered.

10.3.5.3. Process

- i. Challenge evaluation will be done jointly by Two Examiners with more than five years of experience and who have recently taught the course.

- ii. The examiner who has evaluated the same answer book earlier will not be called for challenge evaluation.
- iii. The course for which the student has applied for revaluation will be evaluated in challenge evaluation.
- iv. The existing marks will not be disclosed to the examiners during challenge evaluation

10.3.5.4. Challenge Evaluation Marks

The marks awarded in the challenge evaluation will be the final SEE marks. There will be no scope for any further review or appeal over and above this result.

10.3.6. Gracing Policy

- i. Suppose the candidate has failed in only one subject of the examination. In that case, they shall be eligible for a maximum of 3 marks (out of 50 marks) if, after gracing, the candidate gets minimum prescribed marks and passes in the subject.
- ii. The students are eligible in gracing policy not more than three courses in their tenure of UG Studies and one course for PG studies.
- iii. Grace marks awarded as per Section 10.3.6 (i) for passing the examination is shown only in the ledger and not in the statement of marks.

10.4. Make-up Examination

10.4.1. Courses

Make-up examinations are conducted only for courses offered in main (odd/even) semesters of an academic year and not for courses of the supplementary semester.

10.4.2. Eligibility

Students who have been awarded the transitional grades, 'I' Grade or 'X' Grade [As covered in Section 12.4.1 (II) and 12.4.1 (III)], are eligible to take make-up examinations

10.4.3. Non-Eligibility

Make-up examinations are not applicable for students awarded 'F' and 'W' Grades.

10.4.4. Registration

Eligible students will have to apply for make-up examinations in the office of CoE by paying the prescribed fee.

10.4.5. Exam Schedule

A make-up exam of courses will be conducted as per the exam timetable announced by the office of CoE.

10.4.6. Grades Awarded

- i. Students obtaining the required minimum marks in make-up examinations and, on becoming eligible for the Award of credits and grade, will be awarded a Letter Grade from 'S' to 'E' based on the performance.
- ii. Suppose the student fails to obtain the minimum marks in the make-up examination. In that case, they will be awarded an 'F' Grade, and such students will have to repeat the course in its entirety by re-registering to that course when the department offers it.

10.4.7. Absent to Make-up Examination

If the student does not appear for the make-up examinations, the 'I' Grade or 'X' Grade shall be converted to an 'F' Grade.

10.5. Rejection of Results

- i. The student will not be allowed to appear for the examination of the course in which he has already passed and cleared unless he/she opts for rejection of results of all courses of that semester.
- ii. However, students who have a CGPA of less than 5 but pass in all courses at the end of the academic Program, subject to the provision of maximum duration, shall be allowed to appear for only SEE of Course/s to make up for the deficiency in CGPA and become eligible for the award of the degree.
- iii. A student may, at his/her desire, can reject the total performance of a semester (including CIE marks) or reject only the result of his/her performance in SEE of a semester.
- iv. The rejection is permitted only once during the entire Program of study.
- v. Students who desire to reject the SEE results of a semester shall reject the total performance (irrespective of the earned Course grades) in all the Courses of the semester either rejecting or retaining the CIE marks.
- vi. Rejection of the performance of the VIII semester project shall not be permitted.

- vii. Students who desire to reject the total SEE performance of an odd or even semester including CIE marks, have to repeat that odd or even semester of the prevailing scheme by taking readmission during the subsequent academic year/s.
- viii. They shall also be governed by Readmission and Maximum duration clauses.
- ix. If the rejection of SEE results excluding CIE marks is of the odd semester, students shall be allowed to take admission to the immediate next even semester.
- x. If the rejection of SEE results excluding CIE marks is of even semester, then students shall be allowed to take admission to the next odd semester.
- xi. Readmission to odd/even semester shall not be considered as fresh admission and therefore students shall continue to have the same University Seat Number, which was allotted earlier. The maximum duration of the Program shall be counted with reference to the old University Seat Number.
- xii. Applications for rejection and approval to reappear for SEE shall be sent to the CoE through the HoD, duly approved by the Principal within 30 days from the date of announcement of the results. Late submission of applications shall not be accepted for any reason.
- xiii. Application for approval of readmission shall be sent to Dean(Academic) through the HoD within 30 days from the date of the announcement of the results. Late submission of application shall not be accepted for any reason.
- xiv. Students who opt for rejection of results of University examination shall be eligible for the award of the degree and Honours / Minor Degree but not for the award of ranks.

10.6. Passing Standards in the Course for Award of Credit/Grade

Table 10.9: Passing Standards for the Award of Credit/Grade

Program	Course	Passing Standards	
		Percentage	Marks
B.E.	All Theory and Laboratory Courses	Min. 40% of Total Course Marks	Min. 40 out of 100
	Project Work, Internship/Seminar	Min. 50% of Total Course Marks	Min. 50 out of 100
M.Tech	All Theory Courses	Min. 50% of Total Course Marks	Min. 50 out of 100
MBA	All Theory Courses	Min. 50% of Total Course Marks	Min. 50 out of 100

- i. Courses for which SEE is not conducted, CIE marks would be the Total Marks for that course

- ii. Only those students meeting the passing standards in a course as per the Table 10.6 shall earn the prescribed credits for the course and shall be eligible to be awarded a corresponding Passing Letter Grade based on their performance as detailed in Section 12.2

11. SUPPLEMENTARY SEMESTER

11.1. General

- i. Supplementary Semester will be conducted to benefit students who have dropped/withdrawn course(s) or failed in their odd/even semester examinations and avoid losing an academic year.
- ii. The department may offer some courses based on the availability of resources in hand. It is the discretion of the department / College whether to offer the Supplementary semester or not. The supplementary semester is a special semester, and the student cannot demand it as a matter of right.
- iii. The CIE marks obtained in the main semester for courses the student registers in the supplementary semester will not be carried forward to the supplementary semester.
- iv. Students appearing for the supplementary semester should gain prescribed attendance and CIE marks for the registered courses, and only then the student is eligible to appear for supplementary SEE.
- v. A student cannot apply for Dropping/withdrawal from a course during the Supplementary Semester.

11.2. Duration

The supplementary semester is for 8 weeks' duration, including the examinations and is offered at the end of even semester.

11.3. Beneficiaries

- i. The supplementary semester is for students who have obtained an 'F' Grade or a 'W' Grade or dropped course(s) in the main semester (Odd/Even).
- ii. Suppose the student with a 'W' Grade in a course in the main semester (Odd/Even) does not register for that course in supplementary semester or registers but does not obtain minimum attendance and/or minimum CIE marks. In that case, the 'W' Grade shall be converted to an 'F' Grade.
- iii. Suppose the student with an 'F' Grade in the main semester (Odd/Even) does not register for supplementary semester or registers but does not obtain minimum attendance and/or minimum CIE marks. In that case, the 'F' Grade shall be retained.

11.4. Registration

- i. Students who want to benefit from the supplementary semester must register for the same in the respective department (Faculty Advisor) by paying the prescribed fees.
- ii. Registration should be completed on or before the registration dates specified in the academic calendar. Registrations after the last date will not be considered.
- iii. The list of courses offered during the supplementary semester will be announced at the end of even semester.
- iv. A student can register for courses to a maximum of 14 Credits or not exceeding four courses.

11.5. Attendance Requirement

- i. A candidate must obtain a minimum attendance of 85% in each course to appear for Supplementary SEE.
- ii. However, such of the students who have attendance between 75% and less than 85% may get condonation of attendance by the Principal, only on valid grounds such as hospitalisation, participation in University and intercollegiate sports, cultural activities and participation in the seminar, workshop and paper presentation with prior permission.
- iii. Students must submit the request for condonation of attendance to the Principal in the prescribed format with supporting documents and duly recommended by the HoD and Dean (Student Welfare) at least one week before the commencement of the examination, failing which condonation of attendance will not be considered.

11.6. CIE in Supplementary Semester

- i. CIE of the supplementary semester will be conducted as notified in the academic calendar.
- ii. The standard of the supplementary semester CIE shall be the same as that of the main semester CIE for any course.

11.7. SEE in Supplementary Semester

- i. SEE of the supplementary semester will be conducted as notified by the office of COE.
- ii. The standard of the supplementary SEE shall be the same as that of the main SEE for any course.

11.8. Absent to Supplementary Semester

- i. If the student with a 'W' grade is absent, the 'W' Grade shall be converted to an 'F' Grade.
- ii. The student with an 'F' Grade is absent; then, the 'F' Grade shall be retained.
- iii. Students absent for a course that they had dropped in the main semester shall be awarded 'F' Grade

- iv. Students of (i), (ii) and (iii) of the above need to re-register in entirety for such courses

11.9. Grades Awarded

- i. Students obtaining the required minimum marks in SEE of the supplementary semester and becoming eligible for the Award of credits and grade will be awarded a Letter Grade from 'S' to 'E' based on the performance.
- ii. Suppose the student fails to obtain the minimum marks in the supplementary examination. In that case, they will be awarded an 'F' Grade, and such students will have to repeat the course in its entirety by re-registering to that course when the department offers it.
- iii. 'I' and 'X' Grades are not awarded during the supplementary semester.

12. GRADING SYSTEM

SCEM adopts an absolute grading system wherein the marks are converted to grades, and every semester results shall be declared in terms of SGPA considering all the courses that appeared in that Semester End Examinations including backlog course(s)/arrear papers (refers to courses other than the current semester courses that have not yet been completed) and CGPA. The CGPA will be calculated for every semester, except for the first semester.

12.1. Letter Grades

- ✓ The student's performance in a course is indicated by awarding a Letter Grade, which corresponds to the qualitative measure of the student performance in that course
- ✓ The Letter Grade for a course is awarded based on the marks obtained in the CIE and SEE

12.2. Grades in the Credit Courses

12.2.1. For UG Theory Course

For the credit course, Letter Grades are awarded based on the total marks scored in the CIE and SEE taken together as per the following table

Table 12.1: Letter Grade for UG Courses – Theory and Laboratory

Nature of Grades	Letter Grades	Grade Points	Absolute Marks Range	Marks Range	Level
Pass Grades	S	10	≥ 90	(90-100)	Outstanding
	A	9	$< 90 - \geq 80$	(80-89)	Excellent
	B	8	$< 80 - \geq 70$	(70-79)	Very Good
	C	7	$< 70 - \geq 60$	(60-69)	Good
	D	6	$< 60 - \geq 50$	(50-59)	Average
	E	4	$< 50 - \geq 40$	(40-49)	Poor

Fail Grade	F	0	< 40	(0-39)	Fail
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12.2.2. UG Laboratory, Seminar, Project Work, Internship and PG Course

For the credit course, Letter Grades are awarded based on the total marks scored in the CIE and SEE taken together as per the following table

Table 12.2: Letter Grade for Seminar, Project Work, Internship and PG Course

Nature of Grades	Letter Grades	Grade Points	Absolute Marks Range	Marks Range	Level
Pass Grades	S	10	≥ 90	(90-100)	Outstanding
	A	9	$< 80 - \geq 89$	(80-89)	Excellent
	B	8	$< 70 - \geq 79$	(70-79)	Very Good
	C	7	$< 60 - \geq 69$	(60-69)	Good
	D	6	$< 55 - \geq 60$	(55-60)	Average
	E	4	$< 50 - \geq 55$	(50-55)	Poor
Fail Grade	F	0	< 50	(0-50)	Fail

Note:

- A student will be awarded 'F' grade in a course under the following circumstances:
 - Fails to meet the minimum attendance requirement.
 - Fails to secure minimum passing marks in CIE
 - Fails to secure minimum passing marks in SEE
 - Absent for the SEE
 - Fails to secure minimum passing marks for earning the credits and Award of the degree
- Student obtaining 'F' grade in a course shall re-register for the same course when offered next.
- If the student obtains 'F' grade in an elective course, an option will be provided to the student to either repeat the same elective course when offered next or can register for any other elective course.

12.3. Grades in the Mandatory Non-Credit Courses

- In Mandatory Non- Credit Courses, the student will be provided with only 'PASS' or 'NOT PASS' Grade.
- 'PP' refers to the Pass Grade in Mandatory Non-Credit Course, which is awarded to the student satisfying both the Attendance and CIE marks requirements

- iii. 'NP' refers to the Not Pass Grade in Mandatory Non-Credit Course, which is awarded to the student not satisfying the prescribed Attendance and CIE marks requirements.
- iv. Students obtaining 'NP' grade shall re-register to the course in its entirety, when offered by the department and obtain 'PP' grade to qualify for the Award of degree.

12.4. Transitional Grades

- ✓ In addition to the Letter Grades, Transitional Grades are also given to the students to indicate the failure of the student to meet the requirements for the Award of credits
- ✓ The Transitional grades are equivalent to the 'F' Grade
- ✓ Appropriate Letter grades will replace these grades once the student meets all the requirements for the Award of credits
- ✓ Transitional grades are awarded only during Odd and Even semesters and not in the Supplementary semesters
- ✓ The Transitional Grades along with their Letter symbols, are indicated in the table shown below

Table 12.3: Transitional Grades

Grade Nomenclature	Letter(s)
Withdraw/Drop	W
Incomplete	I
X grade	X

12.4.1. Description of Transitional Grades

I. Withdraw (W)

- i. W Grade is awarded only to theory courses. A maximum of two courses can be withdrawn in a semester
- ii. W grade will not be awarded to the same course more than once
- iii. Student wishing to withdraw from any course have to apply between the ninth and fourteenth week (or as mentioned in the Academic Calendar) from the start of the semester. Post fourteenth week (or after the date mentioned in the Academic Calendar), the provision for Withdrawing the course will cease
- iv. To obtain permission to withdraw a course, the student has to approach the Dean (Academic) after discussing with the Faculty member handling the Course, Mentor and the HoD.

II. Incomplete(I)

- i. 'I' Grade is temporarily awarded to the student meeting the prescribed attendance and CIE requirements, but remain absent for the SEE for valid and convincing reasons, acceptable to the College like
 - a. Accident/Illness leads to the hospitalisation of the student, thus disabling them from attending SEE.
 - b. A calamity in the family at the time of SEE, which require the student to be away from the College
 - c. Any other verifiable exigency
- ii. In the event of a) or b) or c) of the above clause, it is the responsibility of the student/parent/guardian to inform the Office of the CoE immediately through their faculty mentor & HoD and apply for the Award of 'I' grade.
- iii. Applications requesting for the Award of 'I' Grade received after the conduction of examination will not be considered.
- iv. The candidate must submit all the relevant documentary evidence to the AAC (hospital reports, police reports (if any), certificates from competent authorities, etc.) to support their claim.
- v. The AAC will decide the awarding of the 'I' Grade for the course, and the student has to re-register for the course in its entirety when offered.
- vi. If the AAC does not approve to the conferment of the 'I' grade to the student, then 'F' grade will be awarded to the student, who has to re-register to the course in its entirety, when offered.
- vii. The student awarded with 'I' grade in a course is permitted to attend the Make-Up examination in that Academic Year. After completion of the Make-Up examination, based on the performance of the student, the 'I' grade is converted into an appropriate Letter Grade (S to F)
- viii. If the student awarded with 'I' grade does not turn up for the Make-Up examination, then the 'I' grade will be subsequently converted to 'F' grade.
- ix. 'I' grade will not be awarded in the Make-Up examination or Supplementary SEE

III. X-Grade (X)

- i. X grade is awarded to a student with satisfactory attendance requirements and a CIE rating $\geq 90\%$ in a course, but SEE performance is observed to be poor, resulting in an overall F grade.
- ii. X Grade can be awarded to both the Theory and Practical courses of all nature.
- iii. The student who is awarded 'X' Grade in a course is permitted to attend the make-up examinations in that academic year. After completing the make-up examinations, 'X' Grade shall be converted to one of the other letter grades (S to F) based on the performance.
- iv. If the student does not appear for the make-up examinations, the 'X' Grade shall be converted to an 'F' Grade.
- v. 'X' Grade is not awarded in Make-up examinations or Supplementary SEE.

12.5. Grade Points

The credit index can be used further for calculating the Semester Grade Point Average (SGPA) and the cumulative Grade Point Average (CGPA), both being important academic performance indices of the student.

12.5.1. Semester Grade Points Average (SGPA)

- i. SGPA equals the credit index for a semester divided by the total number of credits registered by the student in that semester.
- ii. The SGPA is the weighted average of the grade points obtained in all the courses registered by the student during a particular semester.
- iii. The SGPA is computed using the following formula

$$SGPA = \frac{\sum (Course\ Credit \times Grade\ points\ of\ the\ letter\ grade) \text{ for all the courses registered during the semester}}{\sum (Course\ Credit) \text{ for all the courses registered during the semester excluding transitional grades}}$$

SGPA will be rounded off to two decimal places.

- iv. While computing SGPA, the Dropped Courses and Withdrawn Courses are treated as NOT REGISTERED.

12.5.2. Cumulative Grade Points Average (CGPA)

- i. CGPA is an indication of the student's cumulative performance from the first semester up to the current semester.

- ii. The CGPA is the weighted average of the grade points obtained in all the courses registered by the student from the I semester up to the current semester
- iii. The CGPA is calculated to the second decimal position.
- iv. Credits for subjects with transitional grades will be taken into calculation of
- v. CGPA on their conversion to one of the letter grades (S to F).
- vi. The MNC course will not be accounted for the computation of CGPA.
- vii. CGPA is computed by considering the latest grade obtained by the student in the courses repeated.
- viii. The CGPA is computed using the following formula

$$CGPA = \frac{\sum (Course Credit \times Grade points of the letter grades of passed courses) \text{ till the current semester}}{\sum (Course Credit) \text{ for all the passed courses till the current semester}}$$

- ix. The sample calculation of SGPA and CGPA is tabulated below

Table 12.4: SGPA and CGPA Calculation

Semester	Course Code	Credits	Grade	Grade Points	Credit Points	SGPA / CGPA
I	21MAT11	3	B	8	24	SGPA = 110/17 SGPA = 6.47 (Excluding 3 credit course for which 'W' Grade is awarded)
	21CEH12	3*	W	-	-	
	21CPS13	3	A	9	27	
	21ELN14	3*	F	0	0	
	21ME15	3	D	6	18	
	21CHEL16	1	E	5	5	
	21CPL17	1	C	7	7	
	21EGH18	2	S	10	20	
	21DT19	1	A	9	9	
T		20 (17*)			110	
CGPA at the end of I Semester (Considering Grades E and above and excluding F & W Grades)						CGPA = 110/14* CGPA = 7.85
II	21MAT21	3	C	7	21	SGPA = 120/17 SGPA = 7.05
	21PHY22	3	B	8	24	
	21ELE23	3*	W	-	-	
	21CIV24	3	E	4	12	
	21EGDL25	3	A	9	27	
	21PHYL26	1*	F	0	0	
	21EEL27	1	B	8	8	
	21EGH28	2	A	9	18	
	21SFH29	10	S	10	10	
T		20 (17*)			120	

CGPA at the end of II Semester (Considering Grades E and above and excluding F & Transitional Grades(I,X,W) from first to current semester)						CGPA = (110+120)/(14*+16*) CGPA = 230/30=7.66 CGPA = 7.00
Suppleme ntary	21CEH12	3	E	4	12	SGPA = 40/10 SGPA = 4.00
	21ELN14	3	E	4	12	
	21ELE23	3	E	4	08	
	21PHYL26	1	B	8	8	
T		1			40	
CGPA at the end of I Year (Considering Grades of first & second semester)						CGPA = (110+12+12) +(120+8+8)/40 CGPA = 6.75

12.6. Awarding of Classes:

Class awarded and range of SGPA/CGPA is shown in Table 12.5 given below

Table 12.5: Award of Classes

SGPA/CGPA Range	Class Awarded
5.0 to 6.74	Second
6.75 to 7.74	First
7.75 to 10.0	Distinction

13. VERTICAL PROGRESSION

All the below clauses are subject to maximum duration of eight (Regular Students) / six years (Lateral Entry Students) as applicable.

- There shall be no restriction for promotion from an odd semester to the next even semester, provided the student has fulfilled the attendance requirement.
- There shall be no restriction for promotion from an even semester to the next odd semester, provided the student has fulfilled the attendance requirement
- Obtaining CIE:** The student who obtains required attendance for the course, but not the required CIE marks is allowed to move forward to next semester. However, the student has to mandatorily obtain the required CIE whenever offered next. Obtaining minimum CIE marks for the course is mandatory. It may also be noted that the student shall not be permitted to appear for SEE in such courses until he / she obtains the required CIE.
- Carryover of backlog courses:** The student who obtains required attendance and CIE and appears for university examinations but fails (F Grade) to pass a course is allowed to move forward to next semester (odd /even) irrespective of number of F grades. However, for the award of degree the student has to pass in all courses as per applicable and prevailing

scheme and regulations. This is subject to permitted maximum duration. However, the student will be given admission to 7th semester provided he/she passes all courses of 1st and 2nd semesters.

v. Students not satisfying attendance requirement shall take readmission.

vi. Successive Failures:

- a) If a student fails to pass a Course even after four attempts, that course is deemed to be exempted for him/her. Then, the student shall choose a course of his / her choice with equal credit from online (NPTEL course) or the pool of courses suggested by the concerned Board of Studies either from open elective / professional elective course groups. The course so selected should not have been studied by student or to be studied in higher semester/s. The mentor shall guide/ advice the student in this regard
- b) This provision is given only for one course during the entire duration of the program
- c) This provision of course of their choice should reflect in the grade card of the respective semester

vii. Readmission:

- a) Students who are temporarily discontinuing the program and getting readmitting/rejoining the eligible semester are subject to a maximum duration of 8 (Regular) / 6 (lateral Entry) years as applicable.
- b) The permission for readmission is only on request through the Principal and is not treated as a matter of right. Such students will not claim any benefits based on the readmission.
- c) Students who take re-admission to any semester of the existing scheme from another scheme, as a repeater/fresher because of various reasons, shall attend and complete all the remaining semester/s of the Program adhering to the regulations of the prevailing scheme and shall complete additional Course/s, if any, as per the decision of equivalence committee in concurrence with concerned Board of Studies on establishing the equivalence between two schemes. Such a candidate shall not be eligible for the award of rank.
- d) Readmission to odd/even semester shall not be considered as fresh admission and therefore students shall continue to have the same University Seat Number, which

was allotted earlier. The maximum duration of the Program shall be counted with reference to the old USN (University Seat Number)

14. AICTE ACTIVITY POINTS (400 HRS. FOR THE ENTIRE PROGRAM)

Apart from technical knowledge and skills to be successful as professionals, students should have excellent soft skills, leadership qualities and team spirit. They should have entrepreneurial capabilities and societal commitment. In order to match these multifarious requirements, AICTE has created a unique mechanism of awarding Activity Points over and above academic grades.

Following suggestive activities as Long Term Goals may be carried out by students in teams:

- Prepare and implement a plan to create local job opportunities
- Prepare and implement a plan to improve education quality in the village
- Prepare an actionable DPR for doubling the village Income
- Developing Sustainable Water Management System
- Prepare and improve a plan to improve the health parameters of villagers
- Developing and implementing Low-Cost Sanitation facilities
- Prepare and implement a plan to promote Local Tourism through Innovative Approaches
- Implement/Develop Technology solutions that will improve quality of life
- Prepare and implement solutions for energy conservation
- Prepare and implement a plan to develop the skills of village youth and provide employment
- Develop localized techniques for the reduction in construction Costs
- Prepare and implement a plan of sustainable growth of the village
- The setting of Information imparting club for women leading to contribution in social and economic issues
- Developing and managing an efficient garbage disposable system
- Contribution to any national level initiative of the Government of India

For example, Digital India/ Skill India/ Swachh Bharat Internship etc.

A student has to earn 100 points (75 points for lateral entry students).

The activities can be spread over the entire duration of the program and reflected in the student's 8th semester Grade Card. The total duration of the entire program's activities is 400 hours for regular students and 300 hours for late. It shall not be considered for computation of SGPA/CGPA and for vertical progression.

- AICTE Activity Points Implementation and Monitoring Committee have been constituted under the Chairmanship of Principal and NSS Coordinator as convener, and Dean Academic, Dean Student Welfare, Chief Warden, NCC Coordinator and
- Two Senior Professors as members. This Committee shall arrange for logistics and material support wherever necessary and review the progress at the end of each Semester.

Procedure:

- Students can take up listed activities individually or in a group
- HoDs shall monitor the progress of students' work
- They can work on a daily basis/ weekends/ or in one shot, continuously for 400 hours to earn 100 points. The schedule is at the convenience of the group of students
- For every FOUR hours of work, students will get ONE Activity Point
- Students shall submit a report and photographs related to activities carried out to the respective HoD
- Students shall maintain a "Activity Logbook"
- Students shall register to "Activity Points" during VIII Semester
- Department Seminar Evaluation Committee will review the work done by students during VIII Semester

Note:

- No examination will be conducted for awarding of Activity Points*
- Students will be awarded either NP or PP grades based on their performance*
- Students will be awarded a degree only on earning PP grade in the Activity Points*

15. AWARD OF DEGREE

15.1. Requirements for Awarding Degree

- The Minimum earned credit requirement for the degree is 160 and 100 for UG and PG respectively
- Completed all the prescribed credit requirements for the Award of degree in each of the courses indicated in the syllabus scheme.
- Completion of mandatory Bridge courses, if any
- Satisfactory completion of all mandatory non-credit courses.
- Obtained CGPA of greater than or equal to five at the end of the semester in which they complete all the requirements for the Award of degree.

- vi. Paid all the dues to the College, including the department, hostel, library and other units and
- vii. No case or disciplinary action is pending against them.
- viii. Mandatory earning of AICTE Activity points as shown in the table below

Table 15.1: AICTE Activity Points

Student Category	Activity Points prescribed by the AICTE
Regular students admitted to the 4 years Degree program 100	100
Students entering 4 years Degree program through lateral entry 75	75
Students transferred from other Universities to the fifth semester 50	50

15.2. Requirements for Awarding Minor Degree

A student shall be declared to have completed the Program of B.E. degree and shall be eligible to get undergraduate B.E., degree with Regulations Governing the Degree of Bachelor of Engineering/Technology (B.E.) Under Outcome Based Education (OBE) and Choice Based Credit System (CBCS) effective from the Academic Year 2021-22 VTU, Belagavi Page 34 minors, provided.

- i. The student has undergone the stipulated Course work of all the semesters under the same Scheme of Teaching and Examinations and has earned the prescribed number of credits, i.e. 160 credits for I semester admitted student and 120 for III semester lateral entry admitted student
- ii. Has earned additional 18 or more credits through University-approved online Courses. For Guidelines refer to Annexure - I

15.3. Requirements for Awarding Honours Degree**15.3.1. General**

A student shall be declared to have completed the Program of B.E., degree and shall be eligible to get undergraduate B.E., degree with Honours, provided.

- i. The student has undergone the stipulated Course work of all the semesters under the same Scheme of Teaching and Examinations and has earned the prescribed number of credits, i.e. 160 credits for I semester admitted students and 120 for III semester lateral entry admitted student as per Section 15.1
- ii. Has earned an additional 18 or more credits through University approved online Courses.

- iii. Satisfied the Regulations Governing the Award of Honours at B.E. Degree Programs – as mentioned in the Guidelines – Annexure-II

15.4. Noncompliance of CGPA ≥ 5 at the end of the Program

- i. Students who have completed all the courses of the Program but do not have a CGPA ≥ 5.00 at the end of the Program, shall not be eligible for the award of the degree.
- ii. In the cases of 15.4.i., students shall be permitted to appear again for SEE in course/s [other than Internship, Technical seminar, Project (Mini and Main), and Laboratories] of any Semester/s without the rejection of CIE marks for any number of times, subject to the provision of the maximum duration of the Program to make up the CGPA equal to or greater than 5.00 for the award of the Degree.
- iii. In case the student earns improved grade/s in all the reappeared course/s, the CGPA shall be calculated considering the improved grade/s. If it is ≥ 5.00 , the students shall become eligible for the award of the degree. If CGPA < 5.00 , the students shall follow the procedure laid down in 15.4.ii.
- iv. In case the students earn improved grade/s in some course/s and the same or lesser than the previously earned pass grade/s in the other reappeared course/s, the CGPA shall be calculated considering the improved grade/s and the pass grades earned before the reappearance. If it is ≥ 5.00 , the student shall become eligible for the award of the degree. If CGPA < 5.00 , the students shall follow the procedure laid down in 15.4.ii.
- v. In case the student earns improved grade/s in some courses and fails in the other reappeared course/s, the CGPA shall be calculated by considering the improved grade/s and the previously earned pass grade/s of the reappeared course/s in which the student has failed. If it is ≥ 5.00 , the student shall become eligible for the award of the degree. If CGPA < 5.00 , the student shall follow the procedure laid in 15.4.ii.
- vi. In case the student fails (i.e., earns F grade) in all the reappeared course/s, pass grade/s of the course/s earned by the students before reappearance shall be retained. In such cases, the student shall follow the procedure laid in 15.4.ii.
- vii. The student shall obtain written permission from the CoE to reappear in SEE to make up the CGPA equal to or greater than 5.00.
- viii. **Noncompliance of Mini-project:** The mini-project shall be considered as a head of passing and shall be considered for the award of degree. Those, who do not take up/complete the mini-

project shall be declared to fail in that course and shall have to complete the same during subsequent SEE after satisfying the Mini project requirements.

- ix. **Noncompliance of Major-project:** The Major-project shall be considered as a head of passing and shall be considered for the award of degree. Those, who do not take up/complete the Major-project shall be declared to fail in that course and shall have to complete the same during subsequent SEE after satisfying the Major-project requirements.
- x. **Noncompliance of Internship:** All the students of B.E. shall have to undergo mandatory internship as per **Section 7.5**. SEE shall be conducted and the prescribed credits shall be included with the credits of respective semesters. The internship shall be considered as a head of passing and shall be considered for the award of degree. Those, who do not take up/complete the internship shall be declared to fail in that Course and shall have to complete the same during subsequent University examinations after satisfying the internship requirements

16. GRADUATION CEREMONY

- i. The College conducts an annual Graduation Day ceremony before the University Convocation for the Award of Provisional Degrees to students completing the prescribed academic requirements within the normal duration. Only those students recommended for the Award of Degree by CoE and subsequently approved by Academic Council shall be entitled to receive the Provisional Degree upon submission of application in prescribed format to the Office of CoE and payment of prescribed fees.
- ii. Such students recommended for the Award of Degree by CoE and subsequently approved by Academic Council shall apply for the convocation and the prescribed fee to the University for the Award of degree.
- iii. The College awards Ranks and Medals to the meritorious students during the Graduation Day Ceremony to encourage the students to strive for excellence

17. RANKS AND AWARD OF MEDALS

17.1. Ranks

17.1.1. No. of Ranks Awarded

- i. The total number of ranks awarded in each branch of B.E program, each specialisation of M. Tech. program and MBA program will be 10 or 10% of total number of candidates appeared in final semester in that

Branch/specialisation, whichever is less.

- ii. In any of the branch of B.E program and/or specialisation of M. Tech. program and/or MBA program the total number of candidates appeared in final semester are less than 10, then, in that branch/specialisation Ranks will not be awarded.

17.1.2. Criteria to Award Rank

Ranks are awarded based on the merit of the students as determined by CGPA.

- i. For Award of Rank in any branch of BE Program, the CGPA secured by the students from III to VIII semesters is considered.
- ii. For Award of Rank in any specialisation of M.Tech. Program and MBA program, the CGPA secured by the students from I to IV semesters is considered

17.1.3. Resolving a Tie in the Criteria

- i. If two or more students get the same CGPA, the tie shall be resolved by considering the actual marks obtained by the student to decide the order of the rank.
- ii. If the tie is not resolved even after the case mentioned in Section 17.1.3 (i) then, the number of times a student has obtained higher SGPA is considered to decide the order of the rank.
- iii. If the tie is not resolved even after the case mentioned in Section 17.1.3 (ii), then, the number of times a student has obtained higher grades like S, A, B etc. shall be considered to decide the order of the rank.

17.1.4. Eligibility

A student shall be eligible for a rank at the time of Award of degree, if

- i. Student is eligible for the Award of degree as per the Section 15.1 and recommended by COE for the Award of the degree.
- ii. Student has passed all the courses in all the years of study in first attempt only (do not obtain 'F' Grade in any courses of their study).
- iii. Student is not a repeater in any semester because of rejection of result of a semester/shortage of attendance etc.
- iv. Student has completed all the semesters without any break/discontinuity.
- v. Student has not dropped any course in any semester.
- vi. Student has not written Make-up examinations and/or Supplementary examinations in any semester.
- vii. Student has not been awarded I/W/X/F Grade in a course in any semester.

17.2. Medals

For the Award of Medals, the conditions stipulated by the Donor may be considered as per the statutes framed by the College for such awards.

USN

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Sahyadri College of Engineering & Management, Mangaluru

An Autonomous institute under VTU, Belagavi

Department of ABCDEFG

Continuous Internal Evaluation Test- I/II Odd Semester 2021- 22

Course Title:		Course Code:
Date:	Time: 60min	Sem / Section:
Faculty:		Max. Marks: 30

Note: Answer any TWO full questions, choosing one full question from Part-A and one full question from Part-B.

PART A

Module -X

Module -X					
Q. No.		Questions	Marks	Bloom's Level	CO No.
1	a.		15	CL2/CL3	
	b.			CL2/CL3	
OR					
2	a.		15	CL2/CL3	
	b.			CL2/CL3	

PART-B

Module -Y

Module -Y					
Q. No.		Questions	Marks	Bloom's Level	CO No.
3	a.		15	CL3/CL4	
	b.			CL3/CL4	
OR					
4	a.		15	CL3/CL4	
	b.			CL3/CL4	

No.	CL1	CL2	CL3	CL4	CL5	CL6
Level	Remember	Understand	Apply	Analyze	Evaluate	Create

Course Outcomes

CO No.	CO Description	Bloom's Level
CO 1		
CO 2		
CO 3		
CO 4		
CO 5		

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21CPS13/23



Sahyadri College of Engineering & Management, Mangaluru
First/Second Semester B.E. Degree Examination, 2021-22
PROBLEM SOLVING USING C

Time: 3 hrs

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Q. No.	Questions	Mark	Bloom's Level	CO No.
Module -1				
1	a. Discuss the advantages of algorithm using suitable example	6	CL2	CO1
	b. Explain the general structure of C program with an example	6	CL2	CO1
	c. Explain the different operators using code snippets.	8	CL2	CO1
OR				
2	a. What are flowcharts? Discuss the importance of flowchart using suitable example	6	CL2	CO1
	b. Explain the different types of tokens available in C language with an example.	6	CL2	CO1
	c. Implement C program swapping of two numbers both way with using temporary variable and without using temporary variable.	8	CL2	CO1
Module – 2				
3	a. Explain if, if-else, nested if-else and cascaded if-else with examples and syntax.	10	CL2	CO2
	b. Apply the concept of for-loop to find the sum and average of first 'N' numbers in C.	10	CL3	CO2
OR				
4	a. Discuss different the branching statements used in C with a suitable program.	10	CL2	CO2
	b. Apply the concept of while-loop to print all even numbers between 1to100 in c. Comparison between while and do-while statements.	10	CL3	CO2
Module – 3				

5	a	Explain any five string manipulation library functions with example.	10	CL2	CO3
	b	Demonstrate Binary search algorithm for the following example to search the key element '49'. 13 23 34 39 45 49 54 65	10	CL3	CO3
		OR			
6	a	Discuss the declaration and initialization of single dimension and two-dimension arrays with a code snippet.	10	CL2	CO3
	b	Illustrate bubble sort algorithm and apply the same for the following example: 45 12 9 34 23 11 5	10	CL3	CO3
		Module 4			
7	a	Differentiate Call by value and Call by reference with a suitable example.	10	CL2	CO4
	b	Demonstrate Binary search algorithm and implement the same in C Program.	10	CL3	CO4
		OR			
8	a	Explain the function prototype with example.	10	CL2	CO4
	b	Implement the Fibonacci series for the first 10 natural numbers in C by applying the concept of recursion.	10	CL3	CO4
		Module 5			
9	a	Explain structure and implement c program for employee.	10	CL2	CO5
	b	Write a C-program using structures to read, write, compute average - marks and display the students scoring above and below the average marks for a class of N students.	10	CL3	CO5
		OR			
10	a	Explain the array of pointer with a sample program that computes the sum of elements stored in an array.	10	CL2	CO5
	b	Write a C program that takes a number from the user and stores in the file 'num.txt'. Display appropriate error messages.	10	CL3	CO5

Cognitive Levels of Bloom's Taxonomy

No.	CL1	CL2	CL3	CL4	CL5	CL6
Level	Remember	Understand	Apply	Analyze	Evaluate	Create

Course Outcomes

CO1	Inculcate computational thinking for problem solving using C	CL3
CO2	Apply the concepts of branching and looping in problem solving	CL3
CO3	Demonstrate the arrays, strings, searching and sorting algorithms	CL3
CO4	Illustrate the functions and recursions to solve problems using modular programming constructs	CL3
CO5	Demonstrate the concept of structures, pointers, files and dynamic memory allocation.	CL3

USN

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21CPS13/23



Sahyadri College of Engineering & Management, Mangaluru
First/Second Semester B.E. Degree Examination, 2021-22
PROBLEM SOLVING USING C

Time: 3 hrs

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Q. No.	Questions	Mark	Bloom's Level	CO No.
Module -1				
1	a. Construct an algorithm to verify whether the given number is palindrome.	6	CL3	CO1
	b. Implement C program to calculate simple interest.	6	CL3	CO1
	c. Explain the different operators with example.	8	CL2	CO1
OR				
2	a. Implement flowchart for quadratic equations.	6	CL3	CO1
	b. Implement C program to find the area of circle.	6	CL3	CO1
	c. Explain C keywords with example.	8	CL2	CO1
Module – 2				
3	a. Explain formatted and unformatted I/O statement with example	10	CL2	CO2
	b. Explain the syntax for switch statement. Implement C program for finding roots of quadratic equation, using switch.	10	CL3	CO2
OR				
4	a. Compare looping statements with suitable examples.	10	CL2	CO2
	b. Implement C program to find i. Largest of three numbers, ii. Find cubic root of a number	10	CL3	CO2
Module – 3				
5	a. Demonstrate selection sort technique using C program. (Note::number of elements n=10)	10	CL3	CO3

	b	Demonstrate the working of linear search for the given elements {2, 0, 1,12,5,2,7, 11,19,22,100,210} with key=120.	10	CL3	CO3
		OR			
6	a	Illustrate how to declare and initialize arrays and strings.	10	CL3	CO3
	b	Demonstrate bubble sort technique in C. (Note:: number of elements n=10)	10	CL3	CO3
		Module 4			
7	a	Categorize user defined functions based on the return type and input parameters. Write a C Program to demonstrate the use of recursion to print Fibonacci series.	10	CL3	CO4
	b	Explain the structure of a function with examples.	10	CL2	CO4
		OR			
8	a	Implement call by reference and call by value concepts to swap two values.	10	CL2	CO4
	b	Utilize and implement user defined functions for Binary to Decimal Conversion.	10	CL3	CO4
		Module 5			
9	a	What is dynamic memory allocation? Explain the library functions that facilitate dynamic memory allocation in C programming.	10	CL2	CO5
	b	Demonstrate a C Program to read and print N student record (record should contain Name, roll number, marks) using structures.	10	CL3	CO5
		OR			
10	a	Explain preprocessor directives with examples. Write a directive that defines “MESSAGE” only if “MESSAGE isn't already defined.	10	CL2	CO5
	b	Illustrate the initialization and declaration of pointers. Demonstrate a C program to swap two variables by passing address to a function.	10	CL3	CO5

Cognitive Levels of Bloom’s Taxonom

No.	CL1	CL2	CL3	CL4	CL5	CL6
Level	Remember	Understand	Apply	Analyze	Evaluate	Create

Course Outcomes

CO1	Inculcate computational thinking for problem solving using C	CL3
CO2	Apply the concepts of branching and looping in problem solving	CL3

CO3	Demonstrate the arrays, strings, searching and sorting algorithms	CL3
CO4	Illustrate the functions and recursions to solve problems using modular programming constructs	CL3
CO5	Demonstrate the concept of structures, pointers, files and dynamic memory allocation.	CL3



SAHYADRI
COLLEGE OF ENGINEERING & MANAGEMENT
An Autonomous Institution

Academic Calendar - First Year

Odd Sem. 2021-22

WEEK	SUN	MON	TUE	WED	THU	FRI	SAT	DAYS	EVENT
W-1	Dec-12	Dec-13	Dec-14	Dec-15	Dec-16	Dec-17	Dec-18	Dec 2021 16	11 th : Registration of Courses 13 th : Commencement of ODD Sem 13 th - 20 th : Induction Program 17 th - 18 th : Parent Interaction 22 nd : Teaching Staff Meeting -I 25 th : Christmas
W-2	Dec-19	Dec-20	Dec-21	Dec-22	Dec-23	Dec-24	Dec-25		
W-3	Dec-26	Dec-27	Dec-28	Dec-29	Dec-30	Dec-31	Jan-1		
W-4	Jan-2	Jan-3	Jan-4	Jan-5	Jan-6	Jan-7	Jan-8		
W-5	Jan-9	Jan-10	Jan-11	Jan-12	Jan-13	Jan-14	Jan-15	Jan 2022 25	2 nd : Mentor-Mentee Meeting-I 14 th : Makara Sankranti 17 th -22 nd Evaluation of Assignments / Activities 26 th : Republic Day (Staff Sports Day) 31 st : Dropping of Courses - Last Date
W-6	Jan-16	Jan-17	Jan-18	Jan-19	Jan-20	Jan-21	Jan-22		
W-7	Jan-23	Jan-24	Jan-25	Jan-26	Jan-27	Jan-28	Jan-29		
W-8	Jan-30	Jan-31	Feb-1	Feb-2	Feb-3	Feb-4	Feb-5		
W-9	Feb-6	Feb-7	Feb-8	Feb-9	Feb-10	Feb-11	Feb-12	Feb 2022 24	3 rd - 5 th : Continuous Internal Evaluation (CIE) - I 7 th - 12 th : Student Feedback - I 12 th : Cultural Day 15 th : Teaching Staff Meeting -II 24 th : Mentor-Mentee Meeting -II
W-10	Feb-13	Feb-14	Feb-15	Feb-16	Feb-17	Feb-18	Feb-19		
W-11	Feb-20	Feb-21	Feb-22	Feb-23	Feb-24	Feb-25	Feb-26		
W-12	Feb-27	Feb-28	Mar-1	Mar-2	Mar-3	Mar-4	Mar-5		
W-13	Mar-6	Mar-7	Mar-8	Mar-9	Mar-10	Mar-11	Mar-12	Mar 2022 26	1 st Sports Day (Mahashivarathri) 3 rd - 5 th : Continuous Internal Evaluation (CIE) - II 7 th - 12 th : Student Feedback - II 14 th -19 th Evaluation of Assignments / Activities 24 th -26 th : Continuous Internal Evaluation (CIE) - III 27 th Mentor-Mentee Meeting-III 28 th -29 th Componeesetory CIE 30 th : Last Working Day
W-14	Mar-13	Mar-14	Mar-15	Mar-16	Mar-17	Mar-18	Mar-19		
W-15	Mar-20	Mar-21	Mar-22	Mar-23	Mar-24	Mar-25	Mar-26		
W-16	Mar-27	Mar-28	Mar-29	Mar-30	Mar-31	Apr-1	Apr-2		
W-17	Apr-3	Apr-4	Apr-5	Apr-6	Apr-7	Apr-8	Apr-9	April 2022	2 nd : Chandramana Yugadi 7 th - 16 th : Theory Examination - I Sem 14 th : Ambedkar Jayanthi 15 th : Good Friday 18 th - 23 rd : Practical Examinations - I Sem 25 th - 14 th May: Internship 30 th : Announcment of Results
W-18	Apr-10	Apr-11	Apr-12	Apr-13	Apr-14	Apr-15	Apr-16		
W-19	Apr-17	Apr-18	Apr-19	Apr-20	Apr-21	Apr-22	Apr-23		
W-20	Apr-24	Apr-25	Apr-26	Apr-27	Apr-28	Apr-29	Apr-30		
W-21	May-1	May-2	May-3	May-4	May-5	May-6	May-7	May 2022	2 nd : Eid Al-Fitr 4 th - 7 th : Answer Script Seeing 9 th - 11 th : Application for Revaluation 9 th -14 th II Sem Course Registration 16 th : Commencement of Even Semester
W-22	May-8	May-9	May-10	May-11	May-12	May-13	May-14		
W-23	May-15	May-16	May-17	May-18	May-19	May-20	May-21		



SAHYADRI
COLLEGE OF ENGINEERING & MANAGEMENT
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Academic Calendar - First Year MBA

Odd Sem. 2021-22

WEEK	SUN	MON	TUE	WED	THU	FRI	SAT	DAYS	EVENT
W-1	Dec-12	Dec-13	Dec-14	Dec-15	Dec-16	Dec-17	Dec-18	Jan 2022	14 th : Makara Sankranti 26 th : Republic Day (Staff Sports Day) 31 st : Commencement of class/Induction
W-2	Dec-19	Dec-20	Dec-21	Dec-22	Dec-23	Dec-24	Dec-25		
W-3	Dec-26	Dec-27	Dec-28	Dec-29	Dec-30	Dec-31	Jan-1		
W-4	Jan-2	Jan-3	Jan-4	Jan-5	Jan-6	Jan-7	Jan-8		
W-5	Jan-9	Jan-10	Jan-11	Jan-12	Jan-13	Jan-14	Jan-15	Feb 2022	3 rd - 4 th : Course Registration 7 th - 9 th : Student Feedback - I 12 th : Cultural Day 15 th : Teaching Staff Meeting -II 24 th : Mentor-Mentee Meeting -II
W-6	Jan-16	Jan-17	Jan-18	Jan-19	Jan-20	Jan-21	Jan-22		
W-7	Jan-23	Jan-24	Jan-25	Jan-26	Jan-27	Jan-28	Jan-29		
W-8	Jan-30	Jan-31	Feb-1	Feb-2	Feb-3	Feb-4	Feb-5		
W-9	Feb-6	Feb-7	Feb-8	Feb-9	Feb-10	Feb-11	Feb-12	Mar 2022	1 st Sports Day (Mahashivarathri) 14 th -19 th : Evaluation of Assignments / Activities 28 th -30 th : Continuous Internal Evaluation (CIE) - I 31 st : 1 st : Student Feedback - I
W-10	Feb-13	Feb-14	Feb-15	Feb-16	Feb-17	Feb-18	Feb-19		
W-11	Feb-20	Feb-21	Feb-22	Feb-23	Feb-24	Feb-25	Feb-26		
W-12	Feb-27	Feb-28	Mar-1	Mar-2	Mar-3	Mar-4	Mar-5		
W-13	Mar-6	Mar-7	Mar-8	Mar-9	Mar-10	Mar-11	Mar-12	April 2022	1 st : Dropping Course 2 nd : Chandramana Yugadi 12 th -14 th : Continuous Internal Evaluation (CIE) - II 14 th : Ambedkar Jayanthi 15 th -16 th : Student Feedback -2 / Course Outcome Feedback 15 th : Good Friday
W-14	Mar-13	Mar-14	Mar-15	Mar-16	Mar-17	Mar-18	Mar-19		
W-15	Mar-20	Mar-21	Mar-22	Mar-23	Mar-24	Mar-25	Mar-26		
W-16	Mar-27	Mar-28	Mar-29	Mar-30	Mar-31	Apr-1	Apr-2		
W-17	Apr-3	Apr-4	Apr-5	Apr-6	Apr-7	Apr-8	Apr-9	May 2022	2 nd : Eid Al-Fitr 16 th : Withdrawal from Course 17 th -19 th : Compensatory CIE 21 st : Last Working Day
W-18	Apr-10	Apr-11	Apr-12	Apr-13	Apr-14	Apr-15	Apr-16		
W-19	Apr-17	Apr-18	Apr-19	Apr-20	Apr-21	Apr-22	Apr-23		
W-20	Apr-24	Apr-25	Apr-26	Apr-27	Apr-28	Apr-29	Apr-30		
W-21	May-1	May-2	May-3	May-4	May-5	May-6	May-7	May 2022	
W-22	May-8	May-9	May-10	May-11	May-12	May-13	May-14		
W-23	May-15	May-16	May-17	May-18	May-19	May-20	May-21		

APTITUDE SYLLABUS FOR FIRST YEAR

In the first year students will be trained focusing on calculations. It is very important for an engineer to be good with calculations as it helps them in academics and also various competitive exams. Additionally, students will be learning the fundamentals of verbal and logical skills.

Aptitude syllabus:

1. Quantitative Aptitude:

- Speed Math/Vedic Math Topic
- Percentage

2. Reasoning Skills:

- Directions & Distances
- Coded Inequalities/ Mathematical Inequalities

3. Verbal Ability:

- Error Spotting, Phrase Replacement, fill in the Blanks questions

Training Hours:

14 Days/Semester

$14 \times 2 = 28$ Training hours (2 hours per session)

Evaluation Process:

- It will be an online evaluation.
- A Mock test will be provided once every two weeks.
- Practice tests for each topic will be provided.
- The overall marks and the topic wise marks will be recorded.
- Considering the overall marks after every year, the candidate will be assigned the grade between 1-10 (10 being the highest)

Certification course under Skill lab
Course Name: Prototyping

Semester: 1

Year: 2021-22

<i>Course Title:</i> Prototyping	<i>Course Code:</i>
<i>Total Weekly Contact Hours: 2 hrs /Total duration per semester :24 hrs</i>	<i>Duration of SEE: 3 hrs</i>
<i>SEE Marks: 50</i>	<i>CIE Marks: 50</i>

Prototyping Course

In this course students will be introduced to the process of product design and development, using which they will build prototypes for the problems identified. They will learn to use rapid prototyping tools to create prototypes.

Course Outcomes

Participants of this course will be able to

CO 1	Apply the product design and development process to build their prototypes
CO 2	Acquire essential skills such as sketching, CAD Modeling, User interface design & Electronics circuits building to develop a prototype
CO 3	Build prototype using rapid prototyping tools for the ideas that can solve the identified problem

Course Articulation Matrix: Mapping of Course Outcomes (CO's) with Graduate attributes

Course Title: Prototyping

Course code:

Semester: II

Year: 2021-22

Course Outcomes - CO's	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1: Apply the product design and development process to build their prototypes	M	L	L	M	L		L			M	L	M
CO2: Acquire essential skills such as sketching, CAD Modeling, User interface design & Electronics circuits building to develop a prototype	M				M	M						
CO3: Build prototype using rapid prototyping tools for the ideas that can solve the identified problem	M		M		M	M			M			
Degree of Compliance L: Low M: Medium H: High												

Course code:
L-T-P: 0-0-2

Credits: 1

Course Title: Prototyping
Contact Hrs: 2 per week

Week	Session	Key Topics
Week 1	Introduction to the course	• Product Design and Development Cycle • Design Thinking Process • Design Challenge
Week 2	Sketching Part - 1	• Introduction to perspective sketching • One point perspective • Two point perspective • Three point perspective
Week 3	Sketching Part - 2	• Creating arcs, splines, ellipses, and symmetric objects.
Week 4	CAD Part - 1 Sketching	• Introduction to Onshape • Introduction to sketching tools
Week 5	CAD Part - 2 Part modeling	• Introduction to part feature tools
Week 6	CAD Part - 3 Assembly & Exporting for 3D printing, Laser Cutting & Vinyl Cutting	• Introduction to assembly studio • Working of a 3D printer • Creating files for 3D printing • Working of Laser Cutting Machine • Creating files for Laser Cutting • Introduction to RD Works
Week 7	Electronics Part - 1	• Electronic Components • Introduction to Arduino
Week 8	Electronics Part - 2	• Sensors • Actuators • Building a circuit with Arduino
Week 9	User Interface Design	• Introduction to User Interface design • Low fidelity prototype, Medium Fidelity, High Fidelity Prototype • Introducing to Adobe XD • Creating screens in Adobe XD
Week 10	Design, build and assemble	• Create 3D model of the design • 3D print the parts • Laser cut the parts • Assembling the electronics
Week 11	Prototype Pitch Deck	• What is a pitch deck • Introduction to Canva • Creating Pitch decks for the prototypes.

Week 12	Prototype Expo	• Pitch deck presentation • Prototype exhibition
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Evaluation Scheme - CIE

Assignment	Elements	Weightage in marks
1	2 point and 3 point perspective drawing	10 marks
2	3D model of the prototype	10 marks
3	Create a circuit using arduino	10 marks
4	Interface design for your prototype	10 marks
5	Pitch deck creation of the prototype idea	10 marks
Total (A)		50 marks averaged to 25 marks
CIE - 1	Theory Examination	25
CIE - 2	Theory Examination	25
CIE - 3	Theory Examination	25
Total (B)		75 marks averaged to 25 marks
Grand total of CIE (A + B)		50 marks
C - Scheme for Semester End Examination (SEE)		
Assessment		Weightage in marks
Project prototype presentation and Viva-voce		50 marks
Total score for the course (A+B+C)		100 marks

Certification course under Skill lab

Course Name: Social Innovation Program

Semester: 2

Year: 2021-22

<i>Course Title:</i> Social Innovation	<i>Course Code:</i>
<i>Total Weekly Contact Hours:</i> 2 hrs <i>Total duration per semester :24 hrs</i>	<i>Duration of SEE:</i> 3 hrs
<i>SEE Marks:</i> 50	<i>CIE Marks:</i> 50

Introduction

This Social Innovation course blends theory and practice of social innovation from a systems-level, multi-sector and cross-disciplinary perspective. Focused on Human Centered Design (HCD), Design Thinking and Social Research Method, participants are introduced to a variety of practices, processes and tools that community-change agents use to inform, inspire and create lasting, meaningful solutions.

Course Outcomes

Participants of this course will be able to

CO 1	Develop awareness regarding the sector in the regions and the sustainable development goals.
CO 2	Acquire essential skills such as interpersonal skills, communication skill to indulge with different stakeholders of the community to identify the problems
CO 3	Apply research methods to organise, analyse and define the problem.
CO 4	Design solutions to the challenges identified along with the stakeholders of the community
CO 5	Build prototype using rapid prototyping tools for the ideas that can solve the identified problem

Course Articulation Matrix: Mapping of Course Outcomes (CO's) with Graduate attributes

Course Title: Social Innovation Program Course code: Semester: I Year: 2021-22

Course Outcomes - CO's	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1: Develop awareness regarding the sector in the regions and the sustainable development goals.							L		L	L		
CO 2: Acquire essential skills such as interpersonal skills, communication skill to indulge with different stakeholders of the community to identify the problems								L	H	H		
CO 3: Apply research methods to organise, analyse and define the problem.		L		H								
CO 4: Design solutions to the challenges identified along with the stakeholders of the community	L					H			M	M		
CO 5: Build prototype using rapid prototyping tools for the ideas that can solve the identified problem	M		H		H						H	M
Degree of Compliance L: Low M: Medium H: High												

Course code:
L-T-P: 0-0-2

Credits: 1

Course Title: Prototyping
Contact Hrs: 2 per week

Week 1	Session	Key Topics
Week 1	Introduction to Social Innovation Program	• Introduce the Social Innovation Program • Course Outcomes • Deliverables - Journey from Idea to Pre-incubation • Design challenge - design a better commute for partener
Week 2	Introduction to Problem Solving	• What is a problem? • Types of problems and its characteristics • Design Thinking Challenge
Week 3	Introduction to Sustainable Development Goals	• Introduction to the MDGs. • Introduction to the SDGs. • What is required to achieve the SDGs by 2030? • SDG on my Plate
Week 4	Introduction to Product Design and Development	• Product Design and Development Cycle • Design Thinking in product design • Design Challenge
Week 5	Introduction to Research Secondary Research & Primary Research	• How to search effectively using google search engine • Activity- Secondary research on sectors • Field Activity: Identifying an organisation/company/industry for the project and conducting field research (Physically / Online)
Week 6	Data collection	• How to empathise with your users? • Interview Techniques • How to conduct surveys
Week 7	Problem Analysis techniques	• Cause and effect analysis • Stakeholder analysis • Defining the problem brief • Activity - Analysis of the field activity • Silent Ideation using Miro
Week 8	Ideation	• How to ideate? • Methods to generate multiple ideas • Filtering ideas using impact and effort map
Week 9	Pricing Costing Accounting	• How to determine the price and cost of a product? • Understanding the cost factors
Week 10	Business Model Canvas	• What is a Business Model Canvas? • Value Proposition Canvas • Designing a BMC

Week 11	Prototyping	• What is a prototype? • Why build prototypes? • Different types of prototyping methods • Building Prototypes
Week 12	Pitch Deck creation	• What is a pitch deck • Introduction to Canva • Creating Pitch decks for the prototypes

Evaluation:

Activity	Elements	Weightage in marks
SDG on my plate	Presentation of the SDG activity.	10 marks
Field Visit Report	Observations, interviews, problems identified	10 marks
Problem Analysis	Analysis of the problem using fishbone analysis and cause effect analysis	10 marks
Idea Validation	Multiple ideas generated Idea costing Idea validation	10 marks
Prototype development plan and implementation plan	Date of Implementation Place of Implementation Activities Planned & Resource Management	10 marks
Total (A)		50 marks averaged to 25 marks
CIE - 1	Theory Examination	25
CIE - 2	Theory Examination	25
CIE - 3	Theory Examination	25
Total (B)		75 marks averaged to 25 marks
Grand total of CIE (A + B)		50 marks
Scheme for Semester End Examination (SEE)		
Assessment		Weightage in marks
Project prototype presentation and Viva-voce		50 marks

References:

Book:

- Social Entrepreneurship in India: Quarter Idealism and a Pound of Pragmatism (Madhukar Shukla)
- Open Book of Social Innovation (Robin Murray, Julie Caulier-Grice and Geoff Mulgan)

Websites:

- <https://www.ideo.com/>
- <https://dschool.stanford.edu/>
- <https://www.designkit.org/human-centered-design>