PART A

1. A body of mass m is moving in a circle of radius r with a constant speed v. The force on the body is $\frac{mv^2}{r}$ and is directed towards the centre. What is the work done by this force in moving the body over half the circumference of the circle **[NCERT 1977]**

   (a) $\frac{mv^2}{\pi r^2}$ (b) Zero

   (c) $\frac{mv^2}{r^2}$ (d) $\frac{\pi r^2}{mv^2}$

2. If the unit of force and length each be increased by four times, then the unit of energy is increased by **[CPMT 1987]**

   (a) 16 times (b) 8 times

   (c) 2 times (d) 4 times

3. A man pushes a wall and fails to displace it. He does **[CPMT 1992]**

   (a) Negative work

   (b) Positive but not maximum work

   (c) No work at all

   (d) Maximum work

4. The same retarding force is applied to stop a train. The train stops after 80 m. If the speed is doubled, then the distance will be **[CPMT 1984]**

   (a) The same (b) Doubled

   (c) Halved (d) Four times

5. A body moves a distance of 10 m along a straight line under the action of a force of 5 N. If the work done is 25 *joules*, the angle which the force makes with the direction of motion of the body is **[NCERT 1980; JIPMER 1997; CBSE PMT 1999; BHU 2000; RPMT 2000; Orissa JEE 2002]**

   (a) 0° (b) 30°

   (c) 60° (d) 90°

6. You lift a heavy book from the floor of the room and keep it in the book-shelf having a height 2 m. In this process you take 5 seconds. The work done by you will depend upon **[MP PET 1993]**

   (a) Mass of the book and time taken

   (b) Weight of the book and height of the book-shelf

(c) Height of the book-shelf and time taken

(d) Mass of the book, height of the book-shelf and time taken

7. A body of mass *m kg* is lifted by a man to a height of one metre in 30 *sec*. Another man lifts the same mass to the same height in 60 *sec*. The work done by them are in the ratio **[MP PMT 1993]**

(a) $1:2$ (b) 1 : 1

(c) 2 : 1 (d) 4 : 1

8. A force $\boldsymbol{F} = (5\hat{\boldsymbol{i}} + 3\hat{\boldsymbol{j}})$ *newton* is applied over a particle which displaces it from its origin to the point $\boldsymbol{r} = (2\hat{\boldsymbol{i}} - 1\hat{\boldsymbol{j}})$ *metres*. The work done on the particle is **[MP PMT 1995; RPET 2003]**

(a) – 7 *joules* (b) + 13 *joules*

(c) + 7 *joules* (d) + 11 *joules*

9. A force acts on a 30 *gm* particle in such a way that the position of the particle as a function of time is given by $x = 3t - 4t^2 + t^3$, where *x* is in *metres* and *t* is in seconds. The work done during the first 4 seconds is **[CBSE PMT 1998]**

(a) 5.28 *J* (b) 450 *mJ*

(c) 490 *mJ* (d) 530 *mJ*

10. A body of mass 10 *kg* is dropped to the ground from a height of 10 *metres*. The work done by the gravitational force is $(g = 9.8\ m/\sec^2)$ **[SCRA 1994]**

(a) – 490 *Joules* (b) + 490 *Joules*

(c) – 980 *Joules* (d) + 980 *Joules*

11. Which of the following is a scalar quantity **[AFMC 1998]**

(a) Displacement (b) Electric field

(c) Acceleration (d) Work

12. The work done in pulling up a block of wood weighing 2 *kN* for a length of 10*m* on a smooth plane inclined at an angle of 15° with the horizontal is **[AFMC 1999; Pb PMT 2003]**

(a) 4.36 *kJ* (b) 5.17 *kJ*

(c) 8.91 *kJ* (d) 9.82 *kJ*

13. A force $\vec{F} = 5\hat{i} + 6\hat{j} - 4\hat{k}$ acting on a body, produces a displacement $\vec{S} = 6\vec{i} + 5\vec{k}$. Work done by the force is **[KCET 1999]**

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	UNIT 15 – ELECTROMAGNETIC WAVES	UNIT 15 – HYDROCARBONS

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	UNIT 17 – DUAL NATURE OF MATTER AND RADIATION	UNIT 17 – ORGANIC COMPOUNDS CONTAINING OXYGEN
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- Calculus: Limits, Continuity, Differentiation, Integration, Area under curves.
- Geometry: Coordinate Geometry, Parabola, Ellipse, Hyperbola.
- Vectors and 3D: Vector Algebra, 3D Geometry.

PHYSICS:

- Mechanics: Rotational Motion, Laws of Motion, Work, Energy, Power, Conservation Laws.
- Electromagnetism: Electrostatics, Current Electricity, Magnetism, Electromagnetic Induction.
- Optics: Wave Optics, Ray Optics.
- Modern Physics: Photoelectric Effect, Atomic Physics, Nuclear Physics.
- Thermodynamics and Kinetic Theory: Thermodynamics, Kinetic Theory of Gases.
- Oscillations and Waves: Simple Harmonic Motion, Waves.

CHEMISTRY:

- Physical Chemistry:

Electrochemistry, Thermodynamics, Chemical Kinetics, Equilibrium, Solutions.

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5.	SOUND WAVES	1	3.3%
6.	ELASTICITY	1	3.3%
7.	ERROR IN MEASUREMENT	1	3.3%
8.	CIRCULAR MOTION	1	3.3%
9.	ELECTROMAGNETIC WAVES	1	3.3%
10.	SEMICONDUCTORS	1	3.3%
11.	MAGNETIC EFFECT OF CURRENT AND MAGNETISM	2	6.6%
12.	ALTERNATING CURRENT	2	6.6%
13.	KINETIC THEORY OF GASES & THERMODYNAMICS	2	6.6%
14.	KINEMATICS	2	6.6%
15.	WORK, ENERGY, AND POWER	2	6.6%
16.	LAW OF MOTION	2	6.6%
17.	CENTRE OF MASS	2	6.6%
18.	ROTATIONAL DYNAMICS	2	6.6%
19.	MODERN PHYSICS	2	6.6%
20.	WAVE OPTICS	2	6.6%
21.	CURRENT ELECTRICITY	3	9.9%

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4.	ELECTROCHEMISTRY	1	3.3%
5.	CHEMICAL KINETICS	1	3.3%
6.	SOLUTION & COLLIGATIVE PROPERTIES	1	3.3%
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LIVING WORLD Q	BIOLOGICAL CLASSIFICATION	HUMAN REPRODUCTION
REPRODUCTIVE HEALTH	HUMAN HEALTH AND DISEASES	ECOSYSTEM
GRAVITATION	KINEMATICS	CELL UNIT OF LIFE

JULY SCHEDULE

CELL CYCLE AND CELL DIVISION	EVOLUTION	STRUCTURE OF ATOM
EQUILIBRIUM	ELECTROCHEMISTRY	CHEMICAL KINETICS
REDOX REACTION	d f BLOCK ELEMENTS	LAWS OF MOTION

AUGUST SCHEDULE

STRUCTURAL ORGANISATION IN ANIMALS	MICROBES IN HUMAN WELFARE	BIOTECHNOLOGY PRINCIPLES AND PROCESS
BIOTECHNOLOGY AND ITS	ORGANISMS AND	CHEMICAL BONDING AND

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SEPTEMBER SCHEDULE

MOLECULAR BASIS OF INHERITANCE	BIODIVERSITY AND CONVERSATION	ENVIRONMENTAL ISSUES
BASIC CONCEPTS OF CHEMISTRY	ORGANIC CHEMISTRY SOME BASIC PRINCIPLES AND TECHNIQUES	REDOX REACTION
COORDINATION COMPOUNDS	MAGNETIC EFFECTS AND MAGNETISM	INDUCTION AND ALTERNATING CURRENTS

UNITS MEASUREMENT

OCTOBER SCHEDULE

MORPHOLOGY OF FLOWERING PLANTS	ANATOMY OF FLOWERING PLANTS	SEXUAL REPRODUCTION IN FLOWERING PLANTS
PRINCIPLES OF INHERITANCE AND VARIATION	ALDEHYDES' KETONES CARBOXYLIC ACIDS	ORGANIC COMPOUNDS CONTAING NITROGEN
HALOALKANES' AND HALOARENES	ALCOHOL, PHENOL AND ETHERS	PHYSICAL WORLD AND MEASUREMENT
OPTICS	DUAL NATURE OF MATTER AND RADIATION	SEMICONDUCTOR ELECTRONIC DEVICES

NOVEMBER SCHEDULE

RESPIRATION OF PLANTS	PLANT GROWTH AND DEVELOPMENT	BODY FLUIDS AND CIRCULATION
NEURAL CONTROL AND COORDINATION	STRATIGES FOR ENHANCEMENT IN FOOD PRODUCTION	HYDROCARBONS
BIOMOLECULES	CLASSIFICATION & NOMENCLATURE	ATOMS AND NUCLAI

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MAY SCHEDULE

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4.DETERMINANTS	PHY ELECTRIC CHARGES AND FIELDS	PHY ELECTROSTATIC POTENTIAL AND CAPACITANCE
CHEM SOLUTIONS	CHEM ELECTROCHEMISTRY	BIO SEXUAL REPRODUCTION IN FLOWERING PLANTS
BIO HUMAN REPRODUCTION	CSC REVISION OF THE BASICS OF PYTHON	SOME ENGLISH

JUNE SCHEDULE

5 CONTINUITY AND DIFFERENTIABILITY	6.APPLICATION OF DERIVATIVES	CURRENT ELECTRICITY
MOVING CHARGES AND MAGNETISM	3. CHEMICAL KINETICS	4. D- AND F- BLOCK ELEMENTS
3 REPRODUCTIVE HEALTH	4 PRINCIPLES OF INHERITANCE AND VARIATION	2 FUNCTIONS
3 FILE HANDLING	SOME ENGLISH	

JULY SCHEDULE

7.INTEGRALS	8.APPLICATION OF INTEGRALS	MAGNETISM AND MATTER
ELECTROMAGNETIC INDUCTION	5 COORDINATION COMPOUNDS	6 HALOALKANES AND HALOARENES

5 MOLECULAR BASIS OF INHERITANCE	6 EVOLUTION	4 USING PYTHON LIBRARIES
5 DATA STRUCTURES	SOME ENGLISH	

AUGUST SCHEDULE

9. DIFFERENTIAL EQUATIONS	10.VECTOR ALGEBRA	ALTERNATING CURRENT
ELECTROMAGNETIC WAVES	7 ALCOHOLS PHENOLS AND ETHERS	8 ALDEHYDES , KETONES AND CARBOXYLIC
7 HUMAN HEALTH AND DISEASE	8 MICROBES IN HUMAN WELFARE	6 COMPUTER NETWORKS
7 DATA BASE MANAGEMENT	SOME ENGLISH	

SEPTEMBER SCHEDULE

11.THREE DIMENSIONAL GEOMETRY	12. LINEAR PROGRAMMING	RAY OPTICS AND OPTICAL INSTRUMENTS
WAVE OPTICS	9 AMINES	8 STRUCTURED QUERY LANGUAGE (SQL)
9 INTERFACE OF PYTHON WITH AN SQL DATABASE	SOME ENGLISH	

OCTOBER SCHEDULE

13. PROBABILITY	DUAL NATURE OF RADIATION AND MATTER	ATOMS
10 BIOMOLECULES	9 BIOTECHNOLOGY PRINCIPLES AND PROCESSES	10 BIOTECHNOLOGY AND ITS APPLICATIONS
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6. TRIANGLES	7. COORDINATE GEOMETRY	11 ELECTRICITY
3 METALS AND NON-METALS	3. HIS - THE MAKING OF A GLOBAL WORLD	8. GEO - WATER RESOURCES
15. PS - GENDER, RELIGION AND CASTE	20. ECO - MONEY AND CREDIT	SOME ENGLISH TAMIL HINDI

AUGUST SCHEDULE

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7 HOW DO ORGANISMS REPRODUCE	4. HIS - THE AGE OF INDUSTRIALIZATION	9. GEO - AGRICULTURE
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10 THE HUMAN EYE AND THE COLOURFUL WORLD	5. HIS - PRINT CULTURE AND MODERN WORLD	10. GEO - MINERALS AND ENERGY RESOURCES
17. PS - OUTCOMES OF DEMOCRACY	22. ECO - CONSUMER RIGHTS	SOME ENGLISH TAMIL HINDI

OCTOBER SCHEDULE

12. SURFACE AREAS AND VOLUMES	13. STATISTICS	14. PROBABILITY
12 MAGNETIC EFFECTS OF ELECTRIC CURRENT	12 OUR ENVIRONMENT	11. GEO - MANUFACTURING INDUSTRIES
12. GEO - LIFE LINES OF NATIONAL ECONOMY AND	SOME ENGLISH TAMIL HINDI	

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(a) 18 units (b) 15 units

(c) 12 units (d) 10 units

14. A force of 5 *N* acts on a 15 *kg* body initially at rest. The work done by the force during the first second of motion of the body is **[JIPMER 1999]**

(a) 5 *J* (b) $\frac{5}{6}J$

(c) 6 *J* (d) $75\ J$

15. A force of 5 *N*, making an angle θ with the horizontal, acting on an object displaces it by $0.4m$ along the horizontal direction. If the object gains kinetic energy of 1*J,* the horizontal component of the force is

[EAMCET (Engg.) 2000]

(a) 1.5 *N* (b) 2.5 *N*

(c) 3.5 *N* (d) 4.5 *N*

16. The work done against gravity in taking 10 *kg* mass at 1*m* height in 1*sec* will be **[RPMT 2000]**

(a) 49 *J* (b) 98 *J*

(c) 196 *J* (d) None of these

17. The energy which an e^- acquires when accelerated through a potential difference of 1 volt is called **[UPSEAT 2000]**

(a) 1 *Joule* (b) 1 *Electron volt*

(c) 1 *Erg* (d) 1 *Watt*.

18. A body of mass 6*kg* is under a force which causes displacement in it given by $S = \frac{t^2}{4}$ *metres* where *t* is time. The work done by the force in 2 seconds is

[EAMCET 2001]

(a) 12 *J* (b) 9 *J*

(c) 6 *J* (d) 3 *J*

19. A body of mass 10*kg* at rest is acted upon simultaneously by two forces 4 *N* and 3*N* at right angles to each other. The kinetic energy of the body at the end of 10 *sec* is

[Kerala (Engg.) 2001]

(a) 100 *J* (b) 300 *J*

(c) 50 *J* (d) 125 *J*

20. A cylinder of mass 10*kg* is sliding on a plane with an initial velocity of 10*m*/*s*. If coefficient of friction between surface and cylinder is 0.5, then before stopping it will describe

[Pb. PMT 2001]

(a) 12.5 *m* (b) 5 *m*

(c) 7.5 *m* (d) 10 *m*

21. A force of $(3\hat{i}+4\hat{j})$ *Newton* acts on a body and displaces it by $(3\hat{i}+4\hat{j})m.$ The work done by the force is **[AIIMS 2001]**

(a) 10 *J* (b) 12 *J*

(c) 16 *J* (d) 25 *J*

22. A 50*kg* man with 20*kg* load on his head climbs up 20 steps of 0.25*m* height each. The work done in climbing is **[JIPMER 2002]**

(a) 5 *J* (b) 350 *J*

(c) 100 *J* (d) 3430 *J*

23. A force $\vec{F}=6\hat{i}+2\hat{j}-3\hat{k}$ acts on a particle and produces a displacement of $\vec{s}=2\hat{i}-3\hat{j}+x\hat{k}.$ If the work done is zero, the value of *x* is **[Kerala PMT 2002]**

(a) – 2 (b) 1/2

(c) 6 (d) 2

24. A particle moves from position $\vec{r}_1=3\hat{i}+2\hat{j}-6\hat{k}$ to position $\vec{r}_2=14\hat{i}+13\hat{j}+9\hat{k}$ under the action of force $4\hat{i}+\hat{j}+3\hat{k}\,N.$ The work done will be **[Pb. PMT 2002,03]**

(a) 100 *J* (b) 50 *J*

(c) 200 *J* (d) 75 *J*

25. A force $(\vec{F})=3\hat{i}+c\hat{j}+2\hat{k}$ acting on a particle causes a displacement: $(\vec{s})=-4\hat{i}+2\hat{j}+3\hat{k}$ in its own direction. If the work done is $6\,J,$ then the value of $'c'$ is **[CBSE PMT 2002]**

(a) 0 (b) 1

(c) 6 (d) 12

26. In an explosion a body breaks up into two pieces of unequal masses. In this **[MP PET 2002]**

(a) Both parts will have numerically equal momentum

(b) Lighter part will have more momentum

(c) Heavier part will have more momentum

(d) Both parts will have equal kinetic energy

27. Which of the following is a unit of energy **[AFMC 2002]**

(a) Unit (b) Watt

(c) Horse Power (d) None

28. If force and displacement of particle in direction of force are doubled. Work would be **[AFMC 2002]**

(a) Double (b) 4 times

(c) Half (d) $\frac{1}{4}$ times

29. A body of mass 5 *kg* is placed at the origin, and can move only on the x-axis. A force of 10 *N* is acting on it in a direction making an angle of 60^o with the x-axis and displaces it along the x-axis by 4 *metres*. The work done by the force is **[MP PET 2003]**

(a) 2.5 *J* (b) 7.25 *J*

(c) 40 *J* (d) 20 *J*

30. A force $\vec{F} = (5\hat{i} + 4\hat{j})$ *N* acts on a body and produces a displacement $\vec{S} = (6\hat{i} - 5\hat{j} + 3\hat{k})m$. The work done will be

[CPMT 2003]

(a) 10 *J* (b) 20 *J*

(c) 30 *J* (d) 40 *J*

31. A uniform chain of length 2*m* is kept on a table such that a length of 60*cm* hangs freely from the edge of the table. The total mass of the chain is 4*kg.* What is the work done in pulling the entire chain on the table **[AIEEE 2004]**

(a) 7.2 *J* (b) 3.6 *J*

(c) 120 *J* (d) 1200 *J*

32. A particle is acted upon by a force of constant magnitude which is always perpendicular to the velocity of the particle, the motion of the particle takes place in a plane. It follows that **[AIEEE 2004]**

(a) Its velocity is constant

(b) Its acceleration is constant

(c) Its kinetic energy is constant

(d) It moves in a straight line

33. A ball of mass *m* moves with speed *v* and strikes a wall having infinite mass and it returns with same speed then the work done by the ball on the wall is **[BCECE 2004]**

(a) Zero (b) $mv\ J$

(c) *m/v.J* (d) *v/m J*

34. A force $\overset{\rho}{F} = (5\hat{i} + 3\hat{j} + 2\hat{k})N$ is applied over a particle which displaces it from its origin to the point $\overset{\rho}{r} = (2\hat{i} - \hat{j})m$. The work done on the particle in joules is **[AIEEE 2004]**

(a) – 7 (b) +7

(c) +10 (d) +13

35. The kinetic energy acquired by a body of mass *m* is travelling some distance *s*, starting from rest under the actions of a constant force, is directly proportional to

[Pb. PET 2000]

(a) m^0 (b) m

(c) m^2 (d) $\sqrt{m}$

36. If a force $\vec{F} = 4\hat{i} + 5\hat{j}$ causes a displacement $\vec{s} = 3\hat{i} + 6\hat{k}$, work done is **[Pb. PET 2002]**

(a) 4×6 unit (b) 6×3 unit

(c) 5×6 unit (d) 4×3 unit

37. A man starts walking from a point on the surface of earth (assumed smooth) and reaches diagonally opposite point. What is the work done by him **[DCE 2004]**

(a) Zero (b) Positive

(c) Negative (d) Nothing can be said

38. It is easier to draw up a wooden block along an inclined plane than to haul it vertically, principally because

[CPMT 1977; JIPMER 1997]

(a) The friction is reduced

(b) The mass becomes smaller

(c) Only a part of the weight has to be overcome

(d) '*g*' becomes smaller

39. Two bodies of masses 1 *kg* and 5 *kg* are dropped gently from the top of a tower. At a point 20 *cm* from the ground, both the bodies will have the same **[SCRA 1998]**

(a) Momentum (b) Kinetic energy

(c) Velocity (d) Total energy

40. Due to a force of $(6\hat{i} + 2\hat{j})N$ the displacement of a body is $(3\hat{i} - \hat{j})m$, then the work done is **[Orissa JEE 2005]**

(a) 16 *J* (b) 12 *J*

(c) 8 *J* (d) Zero

41. A ball is released from the top of a tower. The ratio of work done by force of gravity in first, second and third second of the motion of the ball is **[Kerala PET 2005]**

(a) 1 : 2 : 3 (b) 1 : 4 : 9

(c) 1 : 3 : 5 (d) 1 : 5 : 3

PART B

1. A particle moves under the effect of a force $F = Cx$ from $x = 0$ to $x = x_1$. The work done in the process is **[CPMT 1982; DCE 2002;Orissa JEE 2005]**

(a) Cx_1^2 (b) $\frac{1}{2}Cx_1^2$

(c) Cx_1 (d) Zero

2. A cord is used to lower vertically a block of mass M by a distance d with constant downward acceleration $\frac{g}{4}$. Work done by the cord on the block is **[CPMT 1972]**

(a) $Mg\frac{d}{4}$ (b) $3Mg\frac{d}{4}$

(c) $-3Mg\frac{d}{4}$ (d) Mgd

3. Two springs have their force constant as k_1 and $k_2(k_1 > k_2)$. When they are stretched by the same force **[EAMCET 1981]**

(a) No work is done in case of both the springs

(b) Equal work is done in case of both the springs

(c) More work is done in case of second spring

(d) More work is done in case of first spring

4. A spring of force constant 10 N/m has an initial stretch 0.20 m. In changing the stretch to 0.25 m, the increase in potential energy is about **[CPMT 1977]**

(a) 0.1 *joule* (b) 0.2 *joule*

(c) 0.3 *joule* (d) 0.5 *joule*

5. The potential energy of a certain spring when stretched through a distance 'S' is 10 *joule*. The amount of work (in joule) that must be done on this spring to stretch it through an additional distance 'S' will be **[MNR 1991; CPMT 2002; UPSEAT 2000; Pb. PET 2004]**

(a) 30 (b) 40

(c) 10 (d) 20

6. Two springs of spring constants 1500 N/m and 3000 N/m respectively are stretched with the same force. They will have potential energy in the ratio **[MP PMT/PET 1998; Pb. PMT 2002]**

(a) 4 : 1 (b) 1 : 4

(c) 2 : 1 (d) 1 : 2

7. A spring 40 *mm* long is stretched by the application of a force. If 10 N force required to stretch the spring through 1 *mm*, then work done in stretching the spring through 40 *mm* is **[AIIMS 1998; AFMC 2000; JIPMER 2000]**

(a) 84 J (b) 68 J

(c) 23 J (d) 8 J

8. A position dependent force $F = 7 - 2x + 3x^2\ newton$ acts on a small body of mass 2 *kg* and displaces it from $x = 0$ to $x = 5\ m$. The work done in *joules* is **[CBSE PMT 1994]**

(a) 70 (b) 270

(c) 35 (d) 135

9. A body of mass 3 *kg* is under a force, which causes a displacement in it is given by $S = \frac{t^3}{3}$ (in *m*). Find the work done by the force in first 2 seconds **[BHU 1998]**

(a) 2 *J* (b) 3.8 *J*

(c) 5.2 *J* (d) 24 *J*

10. The force constant of a wire is *k* and that of another wire is $2k.$ When both the wires are stretched through same distance, then the work done **[MH CET 2000]**

(a) $W_2 = 2W_1^2$ (b) $W_2 = 2W_1$

(c) $W_2 = W_1$ (d) $W_2 = 0.5W_1$

11. A body of mass 0.1 *kg* moving with a velocity of 10 *m/s* hits a spring (fixed at the other end) of force constant 1000 *N*/*m* and comes to rest after compressing the spring. The compression of the spring is **[MP PMT 2001]**

(a) $0.01\,m$ (b) $0.1\,m$

(c) $0.2\,m$ (d) $0.5\,m$

12. When a 1.0*kg* mass hangs attached to a spring of length 50 *cm*, the spring stretches by 2 *cm*. The mass is pulled down until the length of the spring becomes 60 *cm*. What is the amount of elastic energy stored in the spring in this condition, if g = 10 m/s^2

[MP PET 2001]

(a) 1.5 *Joule* (b) 2.0 *Joule*

(c) 2.5 *Joule* (d) 3.0 *Joule*

13. A spring of force constant 800 *N*/*m* has an extension of 5*cm.* The work done in extending it from 5*cm* to 15 *cm* is

[AIEEE 2002]

(a) 16 *J* (b) 8 *J*

(c) 32 *J* (d) 24 *J*

14. When a spring is stretched by 2 *cm*, it stores 100 *J* of energy. If it is stretched further by 2 *cm*, the stored energy will be increased by **[Orissa JEE 2002]**

(a) 100 *J* (b) 200 *J*

(c) 300 *J* (d) 400 *J*

15. A spring when stretched by 2 mm its potential energy becomes 4 J. If it is stretched by 10 mm, its potential energy is equal to **[BCECE 2003]**

(a) 4 *J* (b) 54 *J*

(c) 415 *J* (d) None

16. A spring of spring constant 5×10^3 *N/m* is stretched initially by 5*cm* from the unstretched position. Then the work required to stretch it further by another $5cm$ is

[AIEEE 2003]

(a) 6.25 *N-m* (b) 12.50 *N-m*

(c) 18.75 *N-m* (d) 25.00 *N-m*

17. A mass of 0.5*kg* moving with a speed of 1.5 *m/s* on a horizontal smooth surface, collides with a nearly weightless spring of force constant $k = 50\ N/m$. The maximum compression of the spring would be **[CBSE PMT 2004]**

(a) 0.15 *m* (b) 0.12 *m*

(c) 1.5 *m* (d) 0.5 *m*

18. A particle moves in a straight line with retardation proportional to its displacement. Its loss of kinetic energy for any displacement *x* is proportional to **[AIEEE 2004]**

(a) x^2 (b) e^x

(c) x (d) $\log_e x$

19. A spring with spring constant *k* when stretched through 1 *cm*, the potential energy is *U*. If it is stretched by 4 *cm*. The potential energy will be **[Orissa PMT 2004]**

(a) 4*U* (b) 8*U*

(c) 16 *U* (d) 2*U*

20. A spring with spring constant *k* is extended from $x = 0$ to $x = x_1$. The work done will be **[Orissa PMT 2004]**

(a) kx_1^2 (b) $\frac{1}{2}kx_1^2$

(c) $2kx_1^2$ (d) $2kx_1$

21. If a long spring is stretched by 0.02 *m*, its potential energy is *U*. If the spring is stretched by 0.1 *m*, then its potential energy will be **[MP PMT 2002; CBSE PMT 2003; UPSEAT 2004]**

(a) $\frac{U}{5}$ (b) U

(c) 5*U* (d) 25*U*

22. Natural length of a spring is 60 *cm*, and its spring constant is 4000 *N/m*. A mass of 20 *kg* is hung from it. The extension produced in the spring is, (Take $g = 9.8\ m/s^2$) **[DCE 2004]**

(a) 4.9 *cm* (b) 0.49 *cm*

(c) 9.4 *cm* (d) 0.94 *cm*

23. The spring extends by *x* on loading, then energy stored by the spring is :
(if *T* is the tension in spring and *k* is spring constant)

[Pb. PMT 2003]

(a) $\frac{T^2}{2k}$ (b) $\frac{T^2}{2k^2}$

(c) $\frac{2k}{T^2}$ (d) $\frac{2T^2}{k}$

24. The potential energy of a body is given by, $U = A - Bx^2$ (Where x is the displacement). The magnitude of force acting on the particle is **[BHU 2002]**

(a) Constant

(b) Proportional to x

(c) Proportional to x^2

(d) Inversely proportional to x

25. The potential energy between two atoms in a molecule is given by $U(x) = \frac{a}{x^{12}} - \frac{b}{x^6}$; where a and b are positive constants and x is the distance between the atoms. The atom is in stable equilibrium when **[CBSE PMT 1995]**

(a) $x = \sqrt[6]{\frac{11a}{5b}}$ (b) $x = \sqrt[6]{\frac{a}{2b}}$

(c) $x = 0$ (d) $x = \sqrt[6]{\frac{2a}{b}}$

26. Which one of the following is not a conservative force **[Kerala PMT 2005]**

(a) Gravitational force

(b) Electrostatic force between two charges

(c) Magnetic force between two magnetic dipoles

(d) Frictional force

PART C

1. Two bodies of masses m_1 and m_2 have equal kinetic energies. If p_1 and p_2 are their respective momentum, then ratio $p_1 : p_2$ is equal to **[MP PMT 1985; CPMT 1990]**

(a) $m_1 : m_2$ (b) $m_2 : m_1$

(c) $\sqrt{m_1} : \sqrt{m_2}$ (d) $m_1^2 : m_2^2$

2. Work done in raising a box depends on

(a) How fast it is raised

(b) The strength of the man

(c) The height by which it is raised

(d) None of the above

3. A light and a heavy body have equal momenta. Which one has greater K.E **[MP PMT 1985; CPMT 1985; Kerala PMT 2004]**

(a) The light body (b) The heavy body

(c) The K.E. are equal (d)Data is incomplete

4. A body at rest may have

(a) Energy (b) Momentum

(c) Speed (d) Velocity

5. The kinetic energy possessed by a body of mass *m* moving with a velocity *v* is equal to $\frac{1}{2}mv^2$, provided

(a) The body moves with velocities comparable to that of light

(b) The body moves with velocities negligible compared to the speed of light

(c) The body moves with velocities greater than that of light

(d) None of the above statement is correcst

6. If the momentum of a body is increased *n* times, its kinetic energy increases

(a) *n* times (b) 2*n* times

(c) $\sqrt{n}$ times (d) n^2 times

7. When work is done on a body by an external force, its

(a) Only kinetic energy increases

(b) Only potential energy increases

(c) Both kinetic and potential energies may increase

(d) Sum of kinetic and potential energies remains constant

8. The bob of a simple pendulum (mass *m* and length *l*) dropped from a horizontal position strikes a block of the same mass elastically placed on a horizontal frictionless table. The K.E. of the block will be

(a) 2 *mgl* (b) *mgl*/2

(c) *mgl* (d) 0

9. From a stationary tank of mass 125000 *pound* a small shell of mass 25 *pound* is fired with a muzzle velocity of 1000 *ft*/*sec*. The tank recoils with a velocity of **[NCERT 1973]**

(a) 0.1 *ft*/*sec* (b) 0.2 *ft*/*sec*

(c) 0.4 *ft*/sec (d) 0.8 *ft*/*sec*

10. A bomb of 12 *kg* explodes into two pieces of masses 4 *kg* and 8 *kg*. The velocity of 8*kg* mass is 6 *m*/*sec*. The kinetic energy of the other mass is

[MNR 1985; CPMT 1991; Manipal MEE 1995; Pb. PET 2004]

(a) 48 *J* (b) 32 *J*

(c) 24 *J* (d) 288 *J*

11. A rifle bullet loses 1/20th of its velocity in passing through a plank. The least number of such planks required just to stop the bullet is **[EAMCET 1987; AFMC 2004]**

(a) 5 (b) 10

(c) 11 (d) 20

12. A body of mass 2 *kg* is thrown up vertically with K.E. of 490 joules. If the acceleration due to gravity is $9.8\, m/s^2$, then the height at which the K.E. of the body becomes half its original value is given by **[EAMCET 1986]**

(a) 50 *m* (b) 12.5 *m*

(c) 25 *m* (d) 10 *m*

13. Two masses of 1 *gm* and 4 *gm* are moving with equal kinetic energies. The ratio of the magnitudes of their linear momenta is

[AIIMS 1987; NCERT 1983; MP PMT 1993; IIT 1980; RPET 1996; CBSE PMT 1997; Orissa JEE 2003; KCET 1999; DCE 2004]

(a) 4 : 1 (b) $\sqrt{2}:1$

(c) 1 : 2 (d) 1 : 16

14. If the *K.E.* of a body is increased by 300%, its momentum will increase by **[JIPMER 1978; AFMC 1993; RPET 1999; CBSE PMT 2002]**

(a) 100% (b) 150%

(c) $\sqrt{300}\%$ (d) 175%

15. A light and a heavy body have equal kinetic energy. Which one has a greater momentum ? **[NCERT 1974; CPMT 1997; DPMT 2001]**

(a) The light body

(b) The heavy body

(c) Both have equal momentum

(d) It is not possible to say anything without additional information

16. If the linear momentum is increased by 50%, the kinetic energy will increase by **[CPMT 1983; MP PMT 1994; MP PET 1996, 99; UPSEAT 2001]**

(a) 50% (b) 100%

(c) 125% (d) 25%

17. A free body of mass 8 *kg* is travelling at 2 *meter* per second in a straight line. At a certain instant, the body splits into two equal parts due to internal explosion which releases 16 *joules* of energy. Neither part leaves the original line of motion finally **[NCERT 1979]**

(a) Both parts continue to move in the same direction as that of the original body

(b) One part comes to rest and the other moves in the same direction as that of the original body

(c) One part comes to rest and the other moves in the direction opposite to that of the original body

(d) One part moves in the same direction and the other in the direction opposite to that of the original body

18. If the K.E. of a particle is doubled, then its momentum will **[EAMCET 1979; CPMT 2003: Kerala PMT 2005]**

(a) Remain unchanged (b) Be doubled

(c) Be quadrupled (d) Increase $\sqrt{2}$ times

19. If the stone is thrown up vertically and return to ground, its potential energy is maximum **[EAMCET 1979]**

(a) During the upward journey

(b) At the maximum height

(c) During the return journey

(d) At the bottom

20. A body of mass 2 *kg* is projected vertically upwards with a velocity of $2\,m\,\sec^{-1}$. The K.E. of the body just before striking the ground is **[EAMCET 1980]**

(a) 2 *J* (b) 1 *J*

(c) 4 *J* (d) 8 *J*

21. The energy stored in wound watch spring is **[EAMCET 1982]**

(a) K.E. (b) P.E.

(c) Heat energy (d) Chemical energy

22. Two bodies of different masses m_1 and m_2 have equal momenta. Their kinetic energies E_1 and E_2 are in the ratio **[EAMCET 1990]**

(a) $\sqrt{m_1} : \sqrt{m_2}$ (b) $m_1 : m_2$

(c) $m_2 : m_1$ (d) $m_1^2 : m_2^2$

23. A car travelling at a speed of 30 *km*/*hour* is brought to a halt in 8 *m* by applying brakes. If the same car is travelling at 60 *km*/*hour*, it can be brought to a halt with the same braking force in **[NCERT 1976]**

(a) 8 *m* (b) 16 *m*

(c) 24 *m* (d) 32 *m*

24. Tripling the speed of the motor car multiplies the distance needed for stopping it by **[NCERT 1978]**

(a) 3 (b) 6

(c) 9 (d) Some other number

25. If the kinetic energy of a body increases by 0.1%, the percent increase of its momentum will be **[MP PMT 1994]**

(a) 0.05% (b) 0.1%

(c) 1.0% (d) 10%

26. If velocity of a body is twice of previous velocity, then kinetic energy will become **[AFMC 1996]**

(a) 2 times (b) $\frac{1}{2}$ times

(c) 4 times (d) 1 times

27. Two bodies *A* and *B* having masses in the ratio of 3 : 1 possess the same kinetic energy. The ratio of their linear momenta is then **[Haryana CEE 1996]**

(a) 3 : 1 (b) 9 : 1

(c) 1 : 1 (d) $\sqrt{3}:1$

28. In which case does the potential energy decrease **[MP PET 1996]**

(a) On compressing a spring

(b) On stretching a spring

(c) On moving a body against gravitational force

(d) On the rising of an air bubble in water

29. A sphere of mass *m*, moving with velocity *V*, enters a hanging bag of sand and stops. If the mass of the bag is *M* and it is raised by height *h*, then the velocity of the sphere was **[MP PET 1997]**

(a) $\frac{M+m}{m}\sqrt{2gh}$ (b) $\frac{M}{m}\sqrt{2gh}$

(c) $\frac{m}{M+m}\sqrt{2gh}$ (d) $\frac{m}{M}\sqrt{2gh}$

30. Two bodies of masses *m* and 2*m* have same momentum. Their respective kinetic energies E_1 and E_2 are in the ratio **[MP PET 1997; KCET 2004]**

(a) 1 : 2 (b) 2 : 1

(c) $1:\sqrt{2}$ (d) 1 : 4

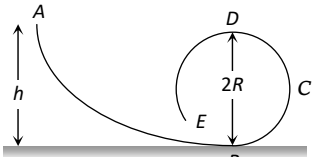
31. If a lighter body (mass M_1 and velocity V_1) and a heavier body (mass M_2 and velocity V_2) have the same kinetic energy, then **[MP PMT 1997]**

(a) $M_2V_2 < M_1V_1$ (b) $M_2V_2 = M_1V_1$

(c) $M_2V_1 = M_1V_2$ (d) $M_2V_2 > M_1V_1$

32. A frictionless track *ABCDE* ends in a circular loop of radius *R*. A body slides down the track from point *A* which is at *a* height *h* = 5 *cm*. Maximum value of *R* for the body to successfully complete the loop is **[MP PMT/PET 1998]**

(a) 5 *cm*



(b) $\frac{15}{4} cm$

(c) $\frac{10}{3} cm$

(d) 2 *cm*

33. The force constant of a weightless spring is 16 *N*/*m*. A body of mass 1.0 *kg* suspended from it is pulled down through 5 cm and then released. The maximum kinetic energy of the system (spring + body) will be **[MP PET 1999; DPMT 2000]**

(a) $2 \times 10^{-2} J$ (b) $4 \times 10^{-2} J$

(c) $8 \times 10^{-2} J$ (d) $16 \times 10^{-2} J$

34. Two bodies with kinetic energies in the ratio of 4 : 1 are moving with equal linear momentum. The ratio of their masses is **[CBSE PMT 1999]**

(a) 1 : 2 (b) 1 : 1

(c) 4 : 1 (d) 1 : 4

35. If the kinetic energy of a body becomes four times of its initial value, then new momentum will

[AIIMS 1998; AIIMS 2002; KCET 2000; J & K CET 2004]

(a) Becomes twice its initial value

(b) Become three times its initial value

(c) Become four times its initial value

(d) Remains constant

36. A bullet is fired from a rifle. If the rifle recoils freely, then the kinetic energy of the rifle is

[AIIMS 1998; JIPMER 2001; UPSEAT 2000]

(a) Less than that of the bullet

(b) More than that of the bullet

(c) Same as that of the bullet

(d) Equal or less than that of the bullet

37. If the water falls from a dam into a turbine wheel 19.6 *m* below, then the velocity of water at the turbine is $(g = 9.8\, m/s^2)$ **[AIIMS 1998]**

(a) 9.8 *m*/*s* (b) 19.6 *m*/*s*

(c) 39.2 *m*/*s* (d) 98.0 *m*/*s*

38. Two bodies of masses 2*m* and *m* have their K.E. in the ratio 8 : 1, then their ratio of momenta is **[EAMCET (Engg.) 1995]**

(a) 1 : 1 (b) 2 : 1

(c) 4 : 1 (d) 8 : 1

39. A bomb of 12 *kg* divides in two parts whose ratio of masses is 1 : 3. If kinetic energy of smaller part is 216 *J*, then momentum of bigger part in *kg-m*/*sec* will be **[RPET 1997]**

(a) 36 (b) 72

(c) 108 (d) Data is incomplete

40. A 4 *kg* mass and a 1 *kg* mass are moving with equal kinetic energies. The ratio of the magnitudes of their linear momenta is **[CBSE PMT 1993; Orissa JEE 2003]**

(a) 1 : 2 (b) 1 : 1

(c) 2 : 1 (d) 4 : 1

41. Two identical cylindrical vessels with their bases at same level each contains a liquid of density ρ. The height of the liquid in one vessel is h_1 and that in the other vessel is h_2. The area of either base is *A*. The work done by gravity in equalizing the levels when the two vessels are connected, is

[SCRA 1996]

(a) $(h_1 - h_2)g\rho$ (b) $(h_1 - h_2)gA\rho$

(c) $\frac{1}{2}(h_1 - h_2)^2 gA\rho$ (d) $\frac{1}{4}(h_1 - h_2)^2 gA\rho$

42. If the increase in the kinetic energy of a body is 22%, then the increase in the momentum will be

[RPET 1996; DPMT 2000]

(a) 22% (b) 44%

(c) 10% (d) 300%

43. If a body of mass 200 *g* falls from a height 200 *m* and its total P.E. is converted into K.E. at the point of contact of the body with earth surface, then what is the decrease in P.E. of the body at the contact $(g = 10\ m/s^2)$ **[AFMC 1997]**

(a) 200 *J* (b) 400 *J*

(c) 600 *J* (d) 900 *J*

44. If momentum is increased by 20%, then K.E. increases by

[AFMC 1997; MP PMT 2004]

(a) 44% (b) 55%

(c) 66% (d) 77%

45. The kinetic energy of a body of mass 2 *kg* and momentum of 2 *Ns* is **[AFMC 1998; DPMT 2000]**

(a) 1 *J* (b) 2 *J*

(c) 3 *J* (d) 4 *J*

46. The decrease in the potential energy of a ball of mass 20 *kg* which falls from a height of 50 *cm* is **[AIIMS 1997]**

(a) 968 *J* (b) 98 *J*

(c) 1980 *J* (d) None of these

47. An object of 1 *kg* mass has a momentum of 10 *kg m*/*sec* then the kinetic energy of the object will be **[RPMT 1999]**

(a) 100 *J* (b) 50 *J*

(c) 1000 *J* (d) 200 *J*

48. A ball is released from certain height. It loses 50% of its kinetic energy on striking the ground. It will attain a height again equal to **[RPMT 2000]**

(a) One fourth the initial height

(b) Half the initial height

(c) Three fourth initial height

(d) None of these

49. A 0.5 *kg* ball is thrown up with an initial speed 14 *m/s* and reaches a maximum height of 8.0*m*. How much energy is dissipated by air drag acting on the ball during the ascent **[AMU (Med.) 2000]**

(a) $19.6\,Joule$ (b) $4.9\,Joule$

(c) $10\,Joule$ (d) $9.8\,Joule$

50. An ice cream has a marked value of 700 *kcal*. How many kilowatt- hour of energy will it deliver to the body as it is digested **[AMU (Med.) 2000]**

(a) $0.81\,kWh$ (b) $0.90\,kWh$

(c) $1.11\,kWh$ (d) $0.71\,kWh$

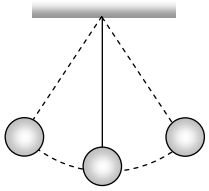
51. What is the velocity of the bob of a simple pendulum at its mean position, if it is able to rise to vertical height of $10\,cm$ (Take $g = 9.8\,m/s^2$) **[BHU 2000]**

(a) 0.6 *m/s*

(b) 1.4 *m/s*

(c) 1.8 *m/s*

(d) 2.2 *m/s*



52. A particle of mass '*m*' and charge '*q*' is accelerated through a potential difference of 'V' volt. Its energy is **[UPSEAT 2001]**

(a) qV (b) $mq\,V$

(c) $\left(\frac{q}{m}\right)V$ (d) $\frac{q}{m\,V}$

53. A running man has half the kinetic energy of that of a boy of half of his mass. The man speeds up by 1*m/s* so as to have same *K.E.* as that of the boy. The original speed of the man will be **[Pb. PMT 2001]**

(a) $\sqrt{2}\,m/s$ (b) $(\sqrt{2}-1)m/s$

(c) $\frac{1}{(\sqrt{2}-1)}m/s$ (d) $\frac{1}{\sqrt{2}}m/s$

54. The mass of two substances are 4*gm* and $9gm$ respectively. If their kinetic energies are same, then the ratio of their momenta will be **[CPMT 2001]**

(a) 4 : 9 (b) 9 : 4

(c) 3 : 2 (d) 2 : 3

55. If the momentum of a body is increased by 100%, then the percentage increase in the kinetic energy is

[BHU 1999; Pb. PMT 1999; CPMT 2000; CBSE PMT 2001; BCECE 2004]

(a) 150% (b) 200%

(c) 225% (d) 300%

56. If a body looses half of its velocity on penetrating 3 *cm* in a wooden block, then how much will it penetrate more before coming to rest **[AIEEE 2002; DCE 2002]**

(a) 1 *cm* (b) 2 *cm*

(c) 3 *cm* (d) 4 *cm*

57. A bomb of mass 9*kg* explodes into 2 pieces of mass 3*kg* and 6*kg*. The velocity of mass 3*kg* is 1.6 *m/s*, the K.E. of mass 6*kg* is **[AIEEE 2002]**

(a) 3.84 *J* (b) 9.6 *J*

(c) 1.92 *J* (d) 2.92 *J*

58. Two masses of 1*kg* and 16*kg* are moving with equal K.E. The ratio of magnitude of the linear momentum is **[AIEEE 2002]**

(a) 1 : 2 (b) 1 : 4

(c) $1:\sqrt{2}$ (d) $\sqrt{2}:1$

59. A machine which is 75 percent efficient, uses 12 joules of energy in lifting up a 1 *kg* mass through a certain distance. The mass is then allowed to fall through that distance. The velocity at the end of its fall is (in ms^{-1}) **[Kerala PMT 2002]**

(a) $\sqrt{24}$ (b) $\sqrt{32}$

(c) $\sqrt{18}$ (d) $\sqrt{9}$

60. Two bodies moving towards each other collide and move away in opposite directions. There is some rise in temperature of bodies because a part of the kinetic energy is converted into **[BHU 2002]**

(a) Heat energy (b) Electrical energy

(c) Nuclear energy (d) Mechanical energy

61. A particle of mass m at rest is acted upon by a force *F* for a time *t*. Its Kinetic energy after an interval *t* is

[Kerala PET 2002]

(a) $\frac{F^2t^2}{m}$ (b) $\frac{F^2t^2}{2m}$

(c) $\frac{F^2t^2}{3m}$ (d) $\frac{Ft}{2m}$

62. The potential energy of a weight less spring compressed by a distance a is proportional to **[MP PET 2003]**

(a) a (b) a^2

(c) a^{-2} (d) a^0

63. Two identical blocks *A* and *B*, each of mass '*m*' resting on smooth floor are connected by a light spring of natural length *L* and spring constant K, with the spring at its natural length. A third identical block '*C*' (mass *m*) moving with a speed *v* along the line joining *A* and *B* collides with *A*. the maximum compression in the spring is **[EAMCET 2003]**

(a) $v\sqrt{\frac{m}{2k}}$ (b) $m\sqrt{\frac{v}{2k}}$

(c) $\sqrt{\frac{mv}{k}}$ (d) $\frac{mv}{2k}$

64. Two bodies of masses *m* and 4 m are moving with equal K.E. The ratio of their linear momentums is

[Orissa JEE 2003; AIIMS 1999]

(a) 4 : 1 (b) 1 : 1

(c) 1 : 2 (d) 1 : 4

65. A stationary particle explodes into two particles of a masses m_1 and m_2 which move in opposite directions with velocities v_1 and v_2. The ratio of their kinetic energies E_1/E_2 is

[CBSE PMT 2003]

(a) m_1/m_2 (b) 1

(c) m_1v_2/m_2v_1 (d) m_2/m_1

66. The kinetic energy of a body of mass 3 *kg* and momentum 2 *Ns* is **[MP PET 2004]**

(a) 1 *J* (b) $\frac{2}{3}J$

(c) $\frac{3}{2}J$ (d) 4 *J*

67. A bomb of mass 3.0 *Kg* explodes in air into two pieces of masses 2.0 *kg* and 1.0 *kg*. The smaller mass goes at a speed of 80 *m/s*.The total energy imparted to the two fragments is **[AIIMS 2004]**

(a) 1.07 *kJ* (b) 2.14 *kJ*

(c) 2.4 *kJ* (d) 4.8 *kJ*

68. A bullet moving with a speed of 100 ms^{-1} can just penetrate two planks of equal thickness. Then the number of such planks penetrated by the same bullet when the speed is doubled will be **[KCET 2004]**

(a) 4 (b) 8

(c) 6 (d) 10

69. A particle of mass m_1 is moving with a velocity v_1 and another particle of mass m_2 is moving with a velocity v_2. Both of them have the same momentum but their different kinetic energies are E_1 and E_2 respectively. If $m_1 > m_2$ then **[CBSE PMT 2004]**

(a) $E_1 < E_2$ (b) $\frac{E_1}{E_2} = \frac{m_1}{m_2}$

(c) $E_1 > E_2$ (d) $E_1 = E_2$

70. A ball of mass 2*kg* and another of mass 4*kg* are dropped together from a 60 *feet* tall building. After a fall of 30 *feet* each towards earth, their respective kinetic energies will be in the ratio of **[CBSE PMT 2004]**

(a) $\sqrt{2} : 1$ (b) $1 : 4$

(c) $1 : 2$ (d) $1 : \sqrt{2}$

71. Four particles given, have same momentum which has maximum kinetic energy **[Orissa PMT 2004]**

(a) Proton (b) Electron

(c) Deutron (d) α -particles

72. A body moving with velocity *v* has momentum and kinetic energy numerically equal. What is the value of *v*

[Pb. PMT 2002; J&K CET 2004]

(a) 2*m/s* (b) $\sqrt{2} m/s$

(c) 1*m/s* (d) $0.2\ m/s$

73. If a man increase his speed by 2 *m/s* , his K.E. is doubled, the original speed of the man is **[Pb. PET 2002]**

(a) $(1 + 2\sqrt{2})\ m/s$ (b) 4 *m/s*

(c) $(2 + 2\sqrt{2}) m/s$ (d) $(2 + \sqrt{2})\ m/s$

74. An object of mass 3*m* splits into three equal fragments. Two fragments have velocities $v\hat{j}$ and $v\hat{i}$. The velocity of the third fragment is **[UPSEAT 2004]**

(a) $v(\hat{j}-\hat{i})$ (b) $v(\hat{i}-\hat{j})$

(c) $-v(\hat{i}+\hat{j})$ (d) $\frac{v(\hat{i}+\hat{j})}{\sqrt{2}}$

75. A bomb is kept stationary at a point. It suddenly explodes into two fragments of masses 1 *g* and $3\ g$. The total K.E. of the fragments is $6.4\times10^{4}\ J$. What is the K.E. of the smaller fragment **[DCE 2004]**

(a) $2.5\times10^{4}\ J$ (b) $3.5\times10^{4}\ J$

(c) $4.8\times10^{4}\ J$ (d) $5.2\times10^{4}\ J$

76. Which among the following, is a form of energy **[DCE 2004]**

(a) Light (b) Pressure

(c) Momentum (d) Power

77. A body is moving with a velocity *v*, breaks up into two equal parts. One of the part retraces back with velocity *v*. Then the velocity of the other part is **[DCE 2004]**

(a) *v* in forward direction (b) 3*v* in forward direction

(c) *v* in backward direction (d) 3*v* in backward direction

78. If a shell fired from a cannon, explodes in mid air, then **[Pb. PET 2004]**

(a) Its total kinetic energy increases

(b) Its total momentum increases

(c) Its total momentum decreases

(d) None of these

79. A particle of mass *m* moving with velocity V_0 strikes a simple pendulum of mass m and sticks to it. The maximum height attained by the pendulum will be **[RPET 2002]**

(a) $h=\frac{V_0^2}{8g}$ (b) $\sqrt{V_0 g}$

(c) $2\sqrt{\frac{V_0}{g}}$ (d) $\frac{V_0^2}{4g}$

80. Masses of two substances are 1 *g* and 9 *g* respectively. If their kinetic energies are same, then the ratio of their momentum will be **[BHU 2004]**

(a) 1 : 9 (b) 9 : 1

(c) 3 : 1 (d) 1 : 3

81. A body of mass 5 *kg* is moving with a momentum of 10 *kg-m/s*. A force of 0.2 *N* acts on it in the direction of motion of the body for 10 *seconds*. The increase in its kinetic energy is

[MP PET 1999]

(a) 2.8 *Joule* (b) 3.2 *Joule*

(c) 3.8 *Joule* (d) 4.4 *Joule*

82. If the momentum of a body increases by 0.01%, its kinetic energy will increase by **[MP PET 2001]**

(a) 0.01% (b) 0.02%

(c) 0.04% (d) 0.08%

83. 1 *a.m.u.* is equivalent to **[UPSEAT 2001]**

(a) 1.6×10^{-12} *Joule* (b) 1.6×10^{-19} *Joule*

(c) 1.5×10^{-10} *Joule* (d) 1.5×10^{-19} *Joule*

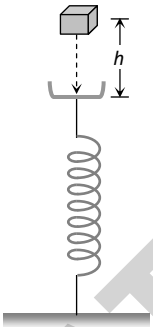
84. A block of mass *m* initially at rest is dropped from a height *h* on to a spring of force constant *k*. the maximum compression in the spring is *x* then **[BCECE 2005]**

(a) $mgh = \frac{1}{2}kx^2$

(b) $mg(h+x) = \frac{1}{2}kx^2$

(c) $mgh = \frac{1}{2}k(x+h)^2$

(d) $mg(h+x) = \frac{1}{2}k(x+h)^2$



85. A spherical ball of mass 20 *kg* is stationary at the top of a hill of height 100 *m*. It slides down a smooth surface to the ground, then climbs up another hill of height 30 *m* and finally slides down to a horizontal base at a height of 20 *m* above the ground. The velocity attained by the ball is **[AIEEE 2005]**

(a) 10 *m/s* (b) $10\sqrt{30}$ *m/s*

(c) 40 *m/s* (d) 20 *m/s*

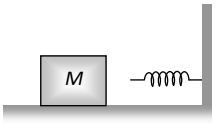
86. The block of mass *M* moving on the frictionless horizontal surface collides with the spring of spring constant *K* and compresses it by length *L*. The maximum momentum of the block after collision is **[AIEEE 2005]**

(a) Zero

(b) $\frac{ML^2}{K}$

(c) $\sqrt{MK}\,L$

(d) $\frac{KL^2}{2M}$



87. A bomb of mass $30\,kg$ at rest explodes into two pieces of masses $18\,kg$ and $12\,kg$. The velocity of $18\,kg$ mass is $6\,ms^{-1}$. The kinetic energy of the other mass is

[CBSE PMT 2005]

(a) 256 *J* (b) 486 *J*

(c) 524 *J* (d) 324 *J*

88. A mass of 100*g* strikes the wall with speed 5*m*/*s* at an angle as shown in figure and it rebounds with the same speed. If the contact time is 2×10^{-3} sec, what is the force applied on the mass by the wall **[Orissa JEE 2005]**

(a) $250\sqrt{3}$ *N* to right

(b) 250 *N* to right

(c) $250\sqrt{3}$ *N* to left

(d) 250 *N* to left