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12TH BM MODEL PAPER 8 Date : 29-Nov-19

12th Standard

Business Maths Reg.No. : | | | | | | |

Instructions : (1) check the question paper for fairness of printing. if there is any lack of fairness, inform the hall supervisor immediately.(2) use blue or black ink to write and underline and pencil to draw diagrams.

Exam Time : 03:00:00 Hrs Total Marks : 90

PART – I 20 x 1 = 20

ANSWER ALL THE QUESTIONS

1) If the rank of the matrix $\begin{pmatrix} \lambda & -1 & 0 \\ 0 & \lambda & -1 \\ -1 & 0 & \lambda \end{pmatrix}$ is 2. Then λ is

(a) 1 (b) 2 (c) 3 (d) only real number

2) For the system of equations x+2y+3z=1, 2x+y+3z=25x+5y+9z =4

(a) there is only one solution (b) there exists infinitely many solutions (c) there is no solution (d) None of these

3) $\int \frac{sin5x - sinx}{cos3x}\, dx$

(a) $-\cos 2x + c$ (b) $-\cos 2x + c$ (c) $-\frac{1}{4}\cos 2x\ c$ (d) $-4\cos 2x + c$

4) $\int_0^1 (2x + 1)dx$ is

(a) 1 (b) 2 (c) 3 (d) 4

5) If the marginal revenue function of a firm is MR = $e^{\frac{-x}{10}}$, then revenue is

(a) $-10e^{\frac{-x}{10}}$ (b) $1 - e^{\frac{-x}{10}}$ (c) $10\left(1 - e^{\frac{-x}{10}}\right)$ (d) $e^{\frac{-x}{10}} + 10$

6) The area bounded by the parabola $y^2 = 4x$ bounded by its latus rectum is

(a) $\frac{16}{3}$ sq.units (b) $\frac{8}{3}$ sq.units (c) $\frac{72}{3}$ sq.units (d) $\frac{1}{3}$ sq.units

7) The differential equation of y = mx + c is (m and c are arbitrary constants)

(a) $\frac{d^2y}{dx^2} = 0$ (b) $y = x\frac{dy}{dx} + c$ (c) xdy + ydx = 0 (d) ydx − xdy = 0

8) The P.I of $(3D^2 + D - 14)y = 13e^{2x}$ is

(a) $\frac{x}{2}e^{2x}$ (b) xe^{2x} (c) $\frac{x^2}{2}e^{2x}$ (d) $13xe^{2x}$

9) If h = 1, then $\Delta(x^2)$ =

(a) 2x (b) 2x −1 (c) 2x +1 (d) 1

10) For the given data find the value of $\Delta^3 y_0$ is

x	5	6	9	11
y	12	13	15	18

(a) 1 (b) 0 (c) 2 (d) -1

11) A discrete probability distribution may be represented by

(a) table (b) graph (c) mathematical equation (d) all of these

12) The distribution function F(x) is equal to

(a) P(X-x) (b) $P(X \leq x)$ (c) $P(X \geq x)$ (d) all of these

13) If for a binomial distribution b(n,p) mean = 4 and variance = 4/3, the probability, $P(X \geq 5)$ is equal to :

(a) $(2/3)^6$ (b) $(2/3)^5(1/3)$ (c) $(1/3)^6$ (d) $4(2/3)^6$

14) Using the standard normal table, the sum of the probabilities to the right of z = 2.18 and to the left of z = -1.75 is:
(a) 0.4854 (b) 0.4599 (c) 0.0146 (d) 0.0547

15) A _____ of statistical individuals in a population is called a sample.
(a) Infinite set (b) finite subset (c) finite set (d) entire set

16) An estimator is a sample statistic used to estimate a
(a) population parameter (b) biased estimate (c) sample size (d) census

17) A time series consists of
(a) Five components (b) Four components (c) Three components (d) Two components

18) $\bar{X}$ chart is a
(a) attribute control chart (b) variable control chart (c) neither Attribute nor variable control chart (d) both Attribute and variable control chart

19) Solution for transportation problem using _____method is nearer to an optimal solution.
(a) NWCM (b) LCM (c) VAM (d) Row Minima

20) A type of decision –making environment is
(a) certainty (b) uncertainty (c) risk (d) all of the above

PART – II

7 x 2 = 14

ANSWER ANY SIX QUESTIONS AND QUESTION NUMBER 30 IS COMPULSORY.

21) For what values of the parameterl , will the following equations fail to have unique solution: 3x−y+lz=1,2x+y+z=2,x+2y−lz = −1 by rank method.

22) Evaluate the following using properties of definite integrals:
$\int_{\theta}^{\frac{\pi}{2}} \frac{sin^7 x}{sin^7 x + cos^7 x} dx$

23) If the marginal revenue function for a commodity is MR = $9 - 4x^2$. Find the demand function.

24) Find the differential equation of the family of parabola with foci at the origin and axis along the x-axis.

25) Find the differential equation of the following
$x^2 + y^2 = a^2$

26) Using graphic method, find the value of y when x = 48 from the following data:

x	40	50	60	70
y	6.2	7.2	9.1	12

27) Let X be a discrete random variable with the following p.m.f
p(x)={0.3 *for* $x = 30$ *for* $x = 50$ *for* $x = 8$
{0.2 *for* $x = 100$ *otherwise*
Find and plot the c.d.f. of X.

28) Write the conditions for which the poisson distribution is a limiting case of binomial distribution.

29) Define parameter

30) Define seasonal index.

PART – III

7 x 3 = 21

ANSWER ANY SIX QUESTIONS AND QUESTION NUMBER 40 IS COMPULSORY.

31) Show that the equations 2x+y=5,4x+2y=10 are consistent and solve them.

32) Evaluate the integral as the limit of a sum: $\int_1^2 x^2$ dx

33)

Using integration find the area of the region bounded between the line x = 4 and the parabola $y^2 = 16x$.

34) Solve: $(D^2 - 2D + 1)y = e^{2x} + e^x$

35) Estimate the production for 1964 and 1966 from the following data

Year	1961	1962	1963	1964	1965	1966	1967
Production	200	220	260	-	350	-	430

36) A player tosses two unbiased coins. He wins Rs.5 if two heads appear, rs.2 if one head appear and Rs.1 if no head appear. Find the expected amount to win.

37) If X is a normal variate with mean 30 and SD 5. Find the probabilities that

(i) $26 \leq X \leq 40$

(ii) $X > 45$

38) Using the following random number table (Kendall-Babington Smith)

23	15	75	48	59	01	83	72	59	93	76	24	97	08	86	95	23	03	67	44
05	54	55	50	43	10	53	74	35	08	90	61	18	37	44	10	96	22	13	43
14	87	16	03	50	32	40	43	62	23	50	05	10	03	22	11	54	36	08	34
38	97	67	49	51	94	05	17	58	53	78	80	59	01	94	32	42	87	16	95
97	31	26	17	18	99	75	53	08	70	94	25	12	58	41	54	88	21	05	13

Draw a random sample of 10 four- figure numbers startingfrom 1550 to 8000.

39) Calculate the seasonal index for the monthly sales of a product using the method of simple averages.

Months / Year	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec
2001	15	41	25	31	29	47	41	19	35	38	40	30
2002	20	21	27	19	17	25	29	31	35	39	30	44
2003	18	16	20	28	24	25	30	34	30	38	37	39

40) Find the initial basic feasible solution for the following transportation problem by VAM

		Distribution Centers				Availability
		D_1	D_2	D_3	D_4	---
origin	S_1	11	13	17	14	250
	S_2	16	18	14	10	300
	S_3	21	24	13	10	400
	Requirement	200	225	275	250	

PART – IV

7 x 5 = 35

ANSWER ALL THE QUESTIONS

41) a) The total cost of 11 pencils and 3 erasers is Rs 64 and the total cost of 8 pencils and 3 erasers is Rs 49. Find the cost of each pencil and each eraser by Cramer's rule.

(OR)

b) The sum of three numbers is 6. If we multiplythe third number by 2 and add the first number to the result we get 7. By adding second and third numbers to three times the first number we get 12. Find the numbers using rank method

42) a) A machine produces a component of a product with a standard deviation of 1.6 cm in length. A random sample of 64 componentsvwas selected from the output and this sample has a mean length of 90 cm. The customer will reject the part if it is either less than 88 cm or more than 92 cm. Does the 95% confidence interval for the true mean length of all the components produced ensure acceptance by the customer?

(OR)

b) Construct the cost of living index number for 2011 on the basis of 2007 from the given data using family budget method.

Commodities	Price	Weights

	20072011		
A	350	400	40
B	175	250	35
C	100	115	15
D	75	105	20
E	60	80	25

43) a) Four coins are tossed simultaneously. What is the probability of getting

a) atleast 2 heads

b) atmost 2 heads.

(OR)

b) Consider the problem of assigning five jobs to five persons. The assignment costs are given as follows. Determine the optimum assignment schedule.

		Job				
		1	2	3	4	5
Person	A	8	4	2	6	1
	B	0	9	5	5	4
	C	3	8	9	2	6
	D	4	3	1	0	3
	E	9	5	8	9	5

44) a) Calculate the value of y when x = 7.5 from the table given below

x	1	2	3	4	5	6	7	8
y	1	8	27	64	125	216	343	512

(OR)

b) Calculate Fisher's ideal index from the following data and verify that it satisfies both time reversal and factor reversal test

Commodity	Price		Quantity	
	1985	1986	1985	1986
A	8	20	50	60
B	2	6	15	10
C	1	2	20	25
D	2	5	10	8
E	1	5	40	30

45) a) Solve $\frac{dy}{dx} + \frac{y}{x} = x^3$

(OR)

b) Solve: $x^2\frac{dy}{dx} = y^2+2xy$ given that y =1, when x=1

46) a) The marginal revenue function (in thousand of rupees) of a commodity is $10 + e^{-0.05x}$ Where x is the number of units sold. Find the total revenue from the sale of 100 units ($e^{-5} = 0.0067$)

(OR)

b) If the probability that an individual suffers a bad reaction from injection of a given serum is 0.001, determines the probability that out of 2,000 individuals (a) exactly 3, and (b) more than 2 individuals will suffer a bad reaction.

47) a) Evaluate $\int \frac{dx}{x\left(x^3+1\right)}$

(OR)

b) Evaluate $\int \frac{xe^x}{(1+x)^2}dx$

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