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12 TH BM MODEL PAPER 4 Date : 01-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) The rank of m×n matrix whose elements are unity is

(a) 0 (b) 1 (c) m (d) n

2) If A= $\begin{pmatrix} 2 & 0 \\ 0 & 8 \end{pmatrix}$,then $\rho(A)$ is

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

3) $\int \frac{sin2x}{2sinx}dx$ is

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

4) $\int \left[\frac{9}{x-3} - \frac{1}{x+1}\right]$ dx is

(a) $log|x-3| - log|x+1| + c$ (b) $log|x-3| + log|x+1| + c$ (c) $9log|x-3| - log|x+1| + c$ (d) $9log|x-3| + log|x+1| + c$

5) Area bounded by the curve y = $\frac{1}{x}$ between the limits 1 and 2 is

(a) log2 sq.units (b) log5 sq.units (c) log3 sq.units (d) log 4 sq.units

6) The marginal cost function is MC = 100 $\sqrt{x}$. find AC given that TC = 0 when the out put is zero is

(a) $\frac{200}{3}x^{\frac{1}{2}}$ (b) $\frac{200}{3}x^{\frac{3}{2}}$ (c) $\frac{200}{3x^{\frac{3}{2}}}$ (d) $\frac{200}{3x^{\frac{1}{2}}}$

7) The order and degree of the differential equation $\sqrt{\frac{d^2y}{dx^2}} = \sqrt{\frac{dy}{dx} + 5}$ are respectively

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

8) If y=cx + c− c^3 then its differential equation is

(a) $y = \frac{dy}{dx} + \frac{dy}{dx} - \left(\frac{dy}{dx}\right)^3$ (b) $y = \left(\frac{dy}{dx}\right)^3 = x\frac{dy}{dx} - \frac{dy}{dx}$ (c) $\frac{dy}{dx} + y = \left(\frac{dy}{dx}\right)^3 - x\frac{dy}{dx}$ (d) $\frac{d^3y}{dx^3} = 0$

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 variable that can assume any possible value between two points is called

(a) discrete random variable (b) continuous random variable (c) discrete sample space (d) random variable

12) If we have f(x)=2x, 0 ≤ x ≤ 1, then f (x) is a

(a) probability distribution (b) probability density function (c) distribution function (d) continuous random variable

13) If Z is a standard normal variate, the proportion of items lying between Z = –0.5 and Z = –3.0 is

(a) 0.4987 (b) 0.1915 (c) 0.3072 (d) 0.3098

14) 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) $4(2/3)^6$

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) Errors in sampling are of

(a) Two types (b) three types (c) four types (d) five types

17) A time series consists of

(a) Five components (b) Four components (c) Three components (d) Two components

18) The seasonal variation means the variations occurring with in

(a) A number of years (b) within a year (c) within a month (d) within a week

19) In a non – degenerate solution number of allocations is

(a) Equal to m+n–1 (b) Equal to m+n+1 (c) Not equal to m+n–1 (d) Not equal to m+n+1

20) If number of sources is not equal to number of destinations, the assignment problem is called____________

(a) balanced (b) unsymmetric (c) symmetric (d) unbalanced

PART – II 7 x 2 = 14

ANSWER ANY SIX QUESTIONS AND QUESTION NUMBER 30 IS COMPULSORY

21) Solve the following equations by using Cramer's rule

2x + 3y = 7; 3x + 5y = 9

22) Integrate the following with respect to x.

$\frac{x^3}{x+2}$

23) Using integration, find the area of the region bounded by the line y −1 = x ,the x axis and the ordinates x = –2, x = 3.

24) Solve: ydx − xdy = 0

25) Find the missing entry in the following table

x	0	1	2	3	4
y_x	1	3	9	-	81

26) The discrete random variable X has the following probability function

P(X=x)={kx $x = 2, 4, 6$ $k(x-2)$ $x = 8$ 0 *otherwisde* where k is a constant. Show that k=$\frac{1}{18}$

27) Mention the properties of binomial distribution.

28) What is standard error?

29) Define secular trend.

30) Write mathematical form of transportation problem.

PART – III 7 x 3 = 21

ANSWER ANY SIX QUESTIONS AND QUESTION NUMBER 40 IS COMPULSORY

31) Show that the equations 2x+y+z=5,x+y+z=4,x−y+2z = 1 are consistent and hence solve them.

32) Evaluate $\int \frac{2x^2-14x+24}{x-3}dx$

33) Find the area of the region bounded by the parabola $y = 4 - x^2$, x −axis and the lines x = 0, x = 2

34) Solve 9y'' − 12y' + 4y = 0

35) Evaluate $\Delta\left[\frac{5x+12}{x^2+5x+6}\right]$ by taking ‘1’ as the interval of differencing.

36) Two unbiased dice are thrown simultaneously and sum of the upturned faces considered as random variable. Construct a probability mass function.

37) In tossing of a five fair coin, find the chance of getting exactly 3 heads.

38) Using the Kendall-Babington Smith - Random number table,Draw5 random samples.

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

39) Fit a trend line by the method of semi-averages for the given data.

Year	2000	2001	2002	2003	2004	2005	2006
Production	105	115	120	100	110	125	135

40) Determine an initial basic feasible solution to the following transportation problem using North West corner rule.

	D_1	D_2	D_3	D_4	Availability
O_1	6	4	1	5	14
O_2	8	9	2	7	16
O_3	4	3	6	2	5
Requirement	6	10	15	4	35

Here O_i and D_j represent ith origin and jth destination.

PART IV 7 x 5 = 35

ANSWER ALL THE QUESTIONS.

41) a) In year 2000 world gold production was 2547 metric tons and it was growing exponentially at the rate of 0.6% per year. If the growth continues at this rate, how many tons of gold will be produced from 2000 to 2013? [$e^{0.078}$ = 1.0811)

(OR)

b)

Solve the following assignment problem. Cell values represent cost of assigning job A, B, C and D to the machines I, II, III and IV.

machines

		I	II	III	IV
jobs	A	10	12	19	11
	B	5	10	7	8
	C	12	14	13	11
	D	8	15	11	9

42) a) Using graphic method, find the value of y when x = 38 from the following data:

x	10	20	30	40	50	60
y	63	55	44	34	29	22

(OR)

b) Calculate Fisher's price index number and show that it satisfies both Time Reversal Test and Factor Reversal Test for data given below.

Commodities	Price		Quandity	
	2003	2009	2003	2009
Rice	10	13	4	6
Wheat	125	18	7	8
Rent	25	29	5	9
Fuel	2511	14	8	10
Miscellaneous	14	17	6	7

43) a)

Evaluate $\int \left[\frac{1}{\log\ x} - \frac{1}{(\log\ x)^2} \right] dx$

(OR)

b) Consider a random variable X with probability density function f(x)={$4x^2$, *if* $0 < x < 1$0, *otherwise*

Find E(X) and V(X)

44) a) Solve by Cramer's rule x+y+z=4,2x−y+3z=1,3x+2y−z = 1

(OR)

b) The marginal cost function of a commodity in a firm is $2 + e^{3x}$ where X is the output. Find the total cost and average cost function if the fixed cost is Rs. 500.

45) a) Solve $\sec^2 x \tan y\ dx + \sec^2 y \tan x\ dy = 0$

(OR)

b) An ambulance service claims that it takes on the average 8.9 minutes to reach its destination in emergency calls. To check on this claim, the agency which licenses ambulance services has them timed on 50 emergency calls, getting a mean of 9.3 minutes with a standard deviation of 1.6 minutes. What can they conclude at the level of significance

46) a) For what values of k, the system of equations kx+ y+z = 1,x+ ky+z= 1,x+ y+kz= 1 have

(I) Unique solution

(ii) More than one solution

(iii) no solution

(OR)

b) Assuming one in 80 births is a case of twins, calculate the probability of 2 or more sets of twins on a day when 30 births occur.

47) a) Suppose that the quantity needed $Q_d = 42 - 4p - 4\frac{dp}{dt} + \frac{d^2p}{dt^2}$ and quantity supplied $Q_s = -6 + 8p$ where p is the price. Find the s equilibrium price for market clearance.

(OR)

b) Using Lagrange's formula find the value of y when x = 4 from the following table.

x	0	3	5	6	8
y	276	460	414	343	110

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