

Standard 12

BUSINESS MATHEMATICS AND STATISTICS

Time: 3.00 Hrs.

Marks: 90

PART - I

Choose the correct answer:

20x1=20

- 1) If $\rho(A) = \rho(A, B) =$ the number of unknowns, then the System is _____.
 a) Consistent and has infinitely many solutions
 b) Consistent and has a unique solution
 c) Consistent d) Inconsistent
- 2) If $|A_{n \times n}| = 3$ and $|\text{adj } A| = 243$ then the value of n is
 a) 4 b) 5 c) 6 d) 7
- 3) $\int_0^1 e^{-2x} dx$ is _____.
 a) 0 b) 1 c) 2 d) 1/2
- 4) $\int_0^{\pi/3} \tan x dx$ is _____.
 a) $\log 2$ b) 0 c) $\log \sqrt{2}$ d) $2 \log 2$
- 5) Area bounded by the curve $y = x(4 - x)$ between the limits 0 and 4 with x-axis is _____.
 a) $\frac{30}{3}$ sq.units b) $\frac{31}{2}$ sq.units c) $\frac{32}{3}$ sq.units d) $\frac{15}{2}$ sq.units
- 6) For a demand function p , if $\int \frac{dp}{p} = k \int \frac{dx}{x}$ then k is equal to _____.
 a) η_d b) $-\eta_d$ c) $\frac{-1}{\eta_d}$ d) $\frac{1}{\eta_d}$
- 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) A homogeneous differential equation of the form $\frac{dx}{dy} = f\left(\frac{y}{x}\right)$ can be solved by making substitution.
 a) $y = Vx$ b) $V = yx$ c) $x = Vy$ d) $x = V$
- 9) If $h = 1$, then $\Delta(x^2) =$ _____.
 a) $2x$ b) $2x-1$ c) $2x+1$ d) 1
- 10) $E f(x) =$ _____.
 a) $f(x - h)$ b) $f(x)$ c) $f(x + h)$ d) $f(x + 2h)$
- 11) If the random variable takes negative values, then the negative values will have
 a) positive probabilities b) negative probabilities
 c) constant probabilities d) difficult to tell
- 12) The height of persons in a country is a random variable of the type _____.
 a) discrete random variable b) continuous random variable
 c) both (a) and (b) d) neither (a) nor (b)
- 13) In a parametric distribution the mean is greater than variance is _____.
 a) binomial b) normal c) poisson d) all the above
- 14) If $P(Z > z) = 0.8508$ what is the value of z (z has a standard normal distribution)?
 a) -0.48 b) 0.48 c) -1.04 d) 1.04
- 15) A finite subset of statistical individuals in a population is called _____.
 a) a sample b) a population c) universe d) census
- 16) Errors in sampling are of _____ types.
 a) 4 b) 3 c) 2 d) 5

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- 35) The time to failure in thousands of hours of an important piece of electronic equipment used in a manufactured DVD player has the density function

$$f(x) = \begin{cases} 3e^{-3x} & ; x > 0 \\ 0 & ; \text{otherwise} \end{cases}$$

find the expected life of the piece of equipment.

- 36) Write down any three chief characteristics of normal probability curve.

- 37) A wholesaler in apples claims that only 4% of the apples supplied by him are defective. A random sample of 600 apples contained 36 defective apples. Calculate the standard error concerning of good apples.

- 38) 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
	2007	2011	
A	350	400	40
B	175	250	35
C	100	115	15
D	75	105	20
E	60	80	25

- 39) Three jobs A, B and C are to be assigned to three machines U, V and W. The processing cost for each job machine combination is shown in the matrix given below. Determine the allocation that minimizes the overall processing cost.

		Machine		
		U	V	W
Job	A	17	25	31
	B	10	25	16
	C	12	14	11

(cost is in ₹ per unit)

- 40) Solve: $(1-x)dy - (1+y)dx = 0$

PART - IV

Answer all questions:

7×5=35

- 41) a) The price of 3 Business Mathematics books, 2 Accountancy books and one Commerce book is ₹ 840. The price of 2 Business Mathematics books, one Accountancy book and one Commerce book is ₹ 570. The price of one Business Mathematics books, one Accountancy book and 2 Commerce books is ₹ 630. Find the cost of each book by using Cramer's Rule.

(OR)

- b) A continuous random variable X has the following probability function.

Value of X = x	0	1	2	3	4	5	6	7
P(x)	0	K	2K	2K	3K	K ²	2K ²	7K ² +K

- (i) Find K (ii) Evaluate $P(X < 6)$, $P(X \geq 6)$ and $P(0 < x < 5)$ (iii) If $P(X \leq x) > \frac{1}{2}$, then find the minimum value of x.

- 42) a) Evaluate: $\int_0^{\pi/2} \frac{\sin^7 x}{\sin^2 x + \cos^2 x} dx$

(OR)

- b) Evaluate the integral as the limit of a sum: $\int_1^2 (2x+1) dx$

- 43) a) Solve $\frac{dy}{dx} - 3y \cot x = \sin 2x$ given that $y = 2$ when $x = \frac{\pi}{2}$.

(OR)

- b) Solve: $(3D^2 + D - 14)y = 4 - 13e^{-7/3x}$

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44) a) Find $f(2.8)$ from the following table:

x	0	1	2	3
$f(x)$	1	2	11	34

(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 then 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 5% level of significance.

45) a) If 5% of the items produced turn out to be defective, then find out the probability that out of 20 items selected at random there are (i) exactly three defectives (ii) atleast two defectives (iii) exactly 4 defectives (iv) find the mean and variance.

(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 2000 individuals. (i) exactly 3 (ii) more than 2 individuals will suffer a bad reaction.

46) a) Construct \bar{X} and R charts for the following data:

Sample number	Observations		
1	32	36	42
2	28	32	40
3	39	52	28
4	50	42	31
5	42	45	34
6	50	29	21
7	44	52	35
8	22	35	44

(Given $A_2 = 0.58$, $D_3 = 0$ and $D_4 = 2.115$)

(OR)

b) Using the following data, construct Fisher's Ideal Index Number and show that it satisfied Factor Reversal Test and Time Reversal Test?

Commodities	Price		Quantity	
	Base year	Current year	Base year	Current year
Wheat	6	10	50	56
Ghee	2	2	100	120
Firewood	4	6	60	60
Sugar	10	12	30	24
Cloth	8	12	40	36

47) a) The demand and supply function if a commodity are $P_d = 18 - 2x - x^2$ and $P_s = 2x - 3$. Find the consumer's surplus and producer's surplus at equilibrium price.

(OR)

b) Find the initial basic feasible solution of the following transportation problem.

	I	II	III	Demand
A	1	2	6	7
B	0	4	2	12
C	3	1	5	11
Supply	10	10	10	

Using (i) North west corner rule (ii) Least cost method (ii) Vogel's approximation method.