

FIRST REVISION EXAM - 2023
BUSINESS MATHS AND STATISTICS

Class - XII

Time : 3.00 hrs

Marks : 90

PART - A

20X1=20

(i). Answer all the questions

- If the rank of the matrix $\begin{bmatrix} \lambda & - & 0 \\ 0 & \lambda & -1 \\ 1 & 0 & \lambda \end{bmatrix}$ is 2, then the value of λ is
 (a) 1 (b) 2 (c) 3 (d) -1
- The system of equation $4x + 6y = 5, 10x + 15y = 13$ has
 (a) An unique solution (b) No solution
 (c) Infinitely many solutions (d) None of these
- $\int \frac{2x+3}{\sqrt{x^2+3x+2}} dx$ is
 (a) $\sqrt{x^2+3x+2} + c$ (b) $2\sqrt{x^2+3x+2} + c$
 (c) $\text{Log}(x^2+3x+2) + c$ (d) $\frac{2}{3}(x^2+3x+2)^{3/2} + c$
- $\int A\left(\frac{3}{2}\right)$ is
 (a) $\sqrt{\pi}$ (b) $\sqrt{\frac{\pi}{2}}$ (c) $\sqrt{\pi}$ (d) $\sqrt{\frac{3}{2}}$
- The marginal revenue and marginal cost functions of a company are $MR = 10 - 5x$ and $MC = -24 + 2x$ where x is the production output, then the profit function is
 (a) $7x^2 + 34x$ (b) $7x^2 + 34x$ (c) $34x - \frac{7x^2}{2}$ (d) $34x + \frac{-7x^2}{2} + K$
- Area bounded by $y = |x|$ between the limits 0 and 2 is
 (a) 2,1 (b) 1,3 (c) 1,6 (d) 1,9
- The order and degree of D.E. is. $\left(\frac{dx}{dy}\right)^3 + 2y^{1/3} = x$ is
 (a) Silver or platinum (b) Platinum or Zinc
 (c) Silicon or Platinum (d) Gold or Tungsten
- 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) $13xe^{2x}$
- $E \equiv$
 (a) $1 + \Delta$ (b) $1 - \Delta$ (c) $1 + \nabla$ (d) $1 - \nabla$
- For the given data, the value of $\Delta^3 y_0$ is.

$x\Delta$	5	6	9	11
y	13	14	16	19

 (a) 1 (b) 0 (c) 2 (d) -1
- 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
- The probability density function $P(x)$ cannot exceed

- (a) Zero (b) One (c) mean (d) infinity
13. If for a binomial distribution $b(n, p)$ with mean 4 and variance $4/3$, then the probability $P(X \geq 5) =$ _____
 (a) $(2/3)^6$ (b) $(2/3)^5 (1/3)$ (c) $(1/3)^6$ (d) $4 (2/3)^6$
14. If in a binomial distribution, the probability of success is twice as that of failure, then out of 4 trials, the probability of one success is.
 (a) $16/18$ (b) $1/16$ (c) $8/81$ (d) $1/81$
15. Any statistical measure computed from sample data is
 (a) Parameter (b) Statistic (c) Infinite measure (d) uncountable
16. The standard error of sample mean is
 (a) $\frac{\sigma}{\sqrt{2n}}$ (b) $\frac{\sigma}{n}$ (c) $\frac{\sigma}{\sqrt{n}}$ (d) $\frac{\sigma}{\sqrt{n}}$
17. Most commonly used index number is.
 (a) Volume index number (b) Value index number
 (c) Price index number (d) Simple index number
18. The upper control limit for \bar{x} chart is given by.
 (a) $\bar{x} + A_2\bar{R}$ (b) $\bar{x} + A_2R$ (c) $\bar{x} + A_2\bar{R}$ (d) $\bar{x} + A_2\bar{R}$
19. The transportation problem is said to be unbalanced if
 (a) Total supply \neq Total demand (b) Total supply = Total demand
 (c) $m=n$ (d) $m+n-1$
20. Number of basic allocation in any row or column in an assignment problem can be.
 (a) Exactly one (b) at least one (c) At most one (d) None

PART - B

7X2=14

II. Answer any 7 questions. Question no .30 is compulsory.

21. Solve the equations : $2x+3y=5, 3x+5y=9$ by Cramer's rule
22. Evaluate using second fundamental theorem : $\int_1^2 \frac{x dx}{x^2+1}$
23. If $Mr = 2.0 - 5x + 3x^2$, then find total revenue function
24. Find the differential equation of the family of all straight lines passing through the origin
25. Prove that $\nabla \equiv \frac{E-1}{E}$
26. What is the point estimation?
27. Comment the statement : The mean of a Binomial distribution is 12 and its standard deviation is 4.
28. If $P(x) = \begin{cases} \frac{x}{20}, & x = 0,1,2,3,4,5 \\ \frac{x}{20}, & x = 0,1,2,3,4,5 \\ 0, & \text{otherwise} \end{cases}$, then find $P(2 < x < 5)$.
29. Mention the types of causes for variation in a production process.
30. Define: feasible solution to transportation problem

PART - C

7x3=21

Answer any three seven questions. Question No : 40 is compulsory

31. Find the rank of the matrix : $\begin{bmatrix} 1 & 2 & -1 & 3 \\ 2 & 4 & 1 & -2 \\ 3 & 6 & 3 & -7 \end{bmatrix}$

32. Evaluate : $\int (x^2 - 2x - 5) e^{-x} dx$.

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

34. Solve : $\frac{dy}{dx} - \frac{y}{x} = x$

35. Find the missing entry in the following table.

$x \Delta$	0	1	2	3	4
y_x	1	3	9	-	81

36. Select a strategy using the rule minimax for the following pay-off matrix (in rupees)

Strategy	States of nature	
	E1	E2
S1	40	60
S2	10	-20
S3	-40	150

37. Write down any three chief characteristics of normal probability curve.

38. The standard deviation of a sample of size 50 is 6.3. Determine the standard error whose population standard deviation is 6?

39. Explain factor Reversal Test.

40. A person tosses a coin and is to receive Rs.6 for a head and is to pay Rs.2 for a tail. Find expectation and variance of his gain

PART-D

Answer all the questions

7x5=35

41. (a). Two types of soaps A and B are in the market. Their present market shares are 15% for A and 85% for B. Of those who bought A the previous year, 65% continue to buy it again while 35% switch over to B. Of those who bought B the previous year, 55% buy it again and 45% switch over to A. Find their market shares after one year and when is the equilibrium reached?

(OR)

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

42. (a). Under perfect competition for a commodity, the demand and supply laws are $P_d = \frac{8}{x+1} - 2$ and $P_s = \frac{x+3}{2}$. Find the consumer's and producer's surplus under market equilibrium.

(OR)

(b). If the probability that an individual suffers a bad reaction from injection of a given serum is 0.001, determine the probability that out of 2000 individuals.

(i) Exactly 3 individuals (ii) more than 2 individuals will suffer a bad reaction from injection. ($e^{-2} = 0.1353$)

43. (a) $Q_d = 13 - 6p + 2 \frac{dp}{dt^2}$ and $Q_s = 3 + 2p$ respectively, where P is the price. Find the equilibrium price for market clearance.

(OR)

(b). Find the particular solution of the D.E. $x^2 dy + y(x+y).dx = 0$ when $x = 1, y = 2$.

44. (a). The value of $y - f(x)$ for $x = 0, 1, 2, \dots, 6$ are given by,

x	0	1	2	3	4	5	6
y	2	4	10	16	20	24	38

Estimate the value of y (3-2) using forward interpolation formula by choosing the four values that will give the best approximation

(OR)

(b).Using lag ranges interpolation formula. Find the value of $f(x)$ when $x = 15$

x	3	7	11	19
$f(y)$	42	43	47	60

45.(a) The probability density function of a random variable x is $f(x) = ke^{l-xl}, -\alpha < x < \alpha$. Find the value of k and also find mean and variance for the random variable.

(OR)

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

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 $p(x < 6)$ and $p(0 < x < 5)$ (iii) $P(x \leq) > \frac{1}{2}$ then find the minimum value of x

46. Find the initial basic feasible solution for the following transportation problem by Vogel's Approximation method,

Origin	Distribution centres				Availability
	D1	D2	D3	D4	
S1	11	13	17	14	280
S2	16	18	14	10	300
S3	21	24	13	10	400
Requirement	200	225	275	250	

(OR)

(b).A sample of 100 measurements at breaking strength of cotton thread gave a mean of 7.4 gram and a standard deviation of 1.2 gram. Find 95% confidence limits for the mean breaking strength of cotton thread.

47.(a)Fit a straight line by the method of least requires for the following table represents annual production of a commodity.

Year	1995	1996	1997	1998	2000	2001
Production (in tonnes)	155	162	171	182	180	178

(OR)

(b).Construct a Laspeyre's , paache's and Fishers' price index number for the following data and also comment on the result.

Commodities	Base Year	Current year		
	Price	Quantity	Price	Quantity
Rice	15	5	16	8
Wheat	10	6	18	9
Rent	8	7	15	8
Fuel	9	5	12	6
Transport	11	4	11	7
Miscellaneous	16	6	15	10

XII- Business Maths - 4