

487

REG. NO

OCTOBER 2021

Time: Three hours

Maximum Marks: 75

- Note:
1. Answer ALL the questions in PART-A (1 mark each)
 2. Answer any ONE question from each unit in PART-B (3 marks each)
 3. Answer any ONE question from each unit in PART-C (10 marks each)
 4. The question paper contains TWO Pages

PART-A (1x10=10)

1. If $E(x) = 5$, find $E(5x-7)$.
2. If $f(x)$ is a probability density function then what is the value of $\int_{-\infty}^{\infty} f(x) dx$.
3. If a random variable 'x' follows poisson distribution such that $p(x=1) = p(x=2)$. Find the mean.
4. Write down the mean and standard deviation of the standard normal distribution.
5. If $S = 5t^2 + 6t + 5$, find the initial velocity.
6. Find the slope of normal to the curve $y = x^3$ at $(4, -2)$.
7. Write the condition for minimum of the function $y=f(x)$ at $x = a$.
8. Find the area bounded by the curve $y = \frac{1}{x}$, the x-axis and the ordinates $x = 1$ and $x = 2$.
9. Solve: $(D^2 - 49)y = 0$
10. Write down the auxiliary equation of $4\frac{d^2y}{dx^2} - 12\frac{dy}{dx} + 9y = 0$.

PART-B (3x5=15)

UNIT-I

11. If a random variable 'x' has the following probability distribution, find $E(x)$

X	1	2	3
P(x)	1/2	0	1/2

12. A binomial distribution has mean 4 and variance $8/3$. Find 'p' and 'n'.

UNIT-II

13. Mention any three properties of normal curve.
14. If the variance of a poisson distribution is 0.35, find $P(x=3)$.

UNIT-III

15. If $X = ae^t + be^{-t}$, show that the acceleration is always equal to the distance passed over.
16. Find the minimum value of $y = x^2 - 4x$.

UNIT-IV

17. Find the integrating factor of $\frac{dy}{dx} + \frac{1}{x}y = x$.
18. Find the area bounded by the curve $y = 4x - x^2$ and the x-axes.

UNIT-V

19. Solve: $(D^2 - 5D + 6)y = 0$
20. Find the particular integral of $(D^2 - 10D + 1)y = e^{-x}$.

UNIT-I

21. a) A random variable
- x
- has the following probability distribution.

X	0	1	2	3
P(X=x)	1/3	1/6	1/6	1/3

Find mean and variance

- b) A random variance '
- x
- ' has the following probability distribution.

X	0	1	2	3	4
P(X=x)	a	3a	5a	7a	9a

Find (i) 'a' (ii) $P(X < 3)$ (iii) $P(X \geq 2)$

22. a) Show that
- $f(x) = \begin{cases} \frac{1}{9}x^2, & 0 < x < 3 \\ 0, & \text{otherwise} \end{cases}$
- is a probability density function.

- b) Ten coins are tossed simultaneously. Find the probability of getting atleast seven (7) heads

UNIT-II

23. a) If 3% of the electric bulbs are defective. Find the probability that in a sample of 100 bulbs exactly 5 bulbs are defective. (
- $e^{-3} = 0.0498$
-).

- b) Fit a straight line for the following data

X	0	1	2	3	4
Y	10	14	19	26	31

24. a) If
- X
- is normally distributed with mean 80 and standard deviation 10. Find
- $P(70 \leq x \leq 100)$

Take $P(0 \leq z \leq 1) = 0.3413$, $P(0 \leq z \leq 2) = 0.4772$.

- b) If '
- X
- ' is a poisson variate such that
- $P(X=1) = 0.3$
- and
- $P(X=2) = 0.1$
- , find
- $P(X=0)$
- .

UNIT-III

25. a) Find the velocity when the acceleration is zero, if the distance travelled by a particle '
- S
- ' is given by
- $S = t^3 - 6t^2 + 12t - 8$
- .

- b) Find the equation of the normal curve
- $y^2 = 4x$
- at (4, 4)

26. a) Find the maximum and minimum values of
- $y = 2x^3 + 3x^2 - 36x + 1$
- .

- b) Find the equation to the tangent to the curve
- $y = x^2 + x - 6$
- at the point where it cuts the
- x
- axis.

UNIT-IV

27. a) Find the volume of a right circular cone of base radius '
- r
- ' and height '
- h
- ' by using integration.

- b) Solve:
- $\frac{dy}{dx} - \frac{2y}{x} = x^2 \sin x$
- .

28. a) Find the Fourier transform of
- $f(x) = \begin{cases} x^2, & \text{if } |x| \leq 1 \\ 0, & \text{if } |x| > 1 \end{cases}$

- b) Find the volume got
- \wedge
- rotating the loop
- $y^2 = 6+x-x^2$
- about
- x
- axis.

UNIT-V

29. a) Solve:
- $(D^2 + D + 2)y = 0$

- b) Solve:
- $(D^2 + D - 30)y = 3e^{6x}$

30. a) Solve:
- $(D^2 - 4D + 3)y = 2 \cos 3x$

- b) Solve:
- $(D^2 + 1)y = \sin 2x$
- .
