

Time : 1½ Hours

SECOND TERMMATHEMATICS AND
STATISTICS

Subject Code

H	4	6	0	6
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Total No. of Questions : 16

(Printed Pages : 4)

Maximum Marks : 40

- INSTRUCTIONS :** (i) Questions 1 and 2 are MCQ type and carry *one* mark each.
Questions 3 and 4 are VSA type and carry *one* mark each.
- (ii) Questions 5 to 8 are SAI type and carry *two* marks each.
Questions 9 to 12 are SAII type and carry *3* marks each.
Questions 13 to 16 are LA type and carry *4* marks each.

Section A

Questions 1 to 4 carry *one* mark each. In questions 1 and 2, *four* options are provided. Select and write the correct option :

1. The degree of the differential equation $\left(\frac{d^2y}{dx^2}\right)^3 + 4\frac{dy}{dx} + y = 0$ is
- (i) 1
- (ii) 2
- (iii) 3
- (iv) 4

2. $\int \cot x \cdot dx = \dots\dots\dots$

(i) $-\operatorname{cosec}^2 x + c$

(ii) $\log |\sin x| + c$

(iii) $-\operatorname{cosec} x \cdot \cot x + c$

(iv) $\log |\sec x| + c$

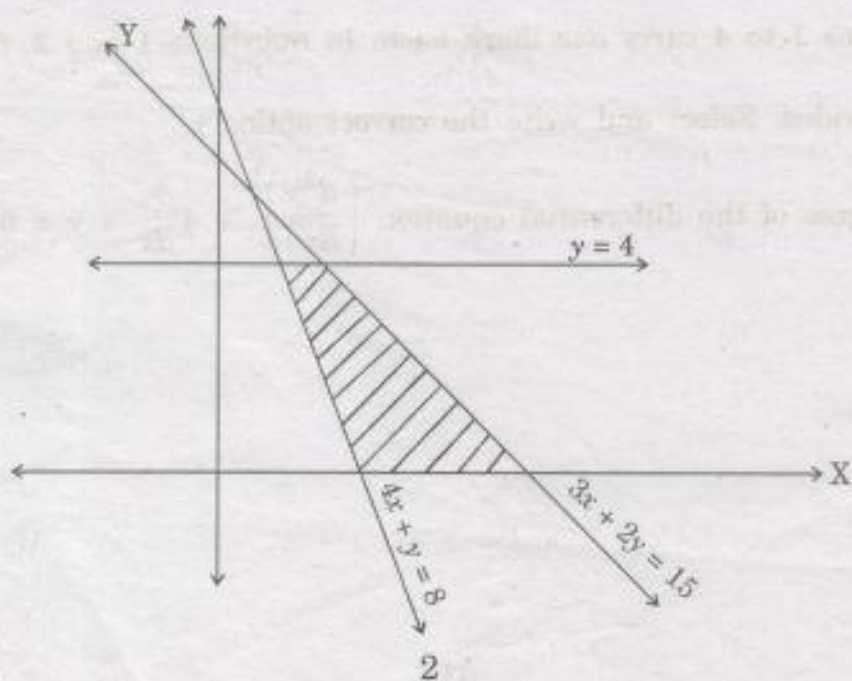
3. A and B are two independent events such that $P(A) = 0.3$ and $P(B) = 0.25$. Find $P(A \cap B)$.

4. Evaluate $\int_1^2 3x^2 \cdot dx$.

Section B

Questions 5 to 8 carry *two* marks each :

5. Write the constraints of the linear programming problem whose graphical solution is given below :



6. Integrate with respect to x :

$$\int \frac{2 - 3 \sin x}{\cos^2 x} \cdot dx$$

7. From a well shuffled pack of 52 cards, two cards are drawn at random one after the other without replacement. Find the probability that both the cards are spade cards.

$= \frac{13}{52} \times \frac{12}{51}$
 $= \frac{1}{17}$

8. Integrate the following with respect to x :

$$\int \frac{e^{2x}}{e^{2x} + 3} \cdot dx$$

Section C

Questions 9 to 12 carry 3 marks each :

9. A factory has two machines A and B. Machine A produces 60% of the output and machine B produces 40% of the items at the output. 2% of the items produced by machine A and 3% of the items produced by machine B are defective. One item is chosen at random from the output and is found to be defective. What is the probability that it was produced by machine B ?

10. Evaluate $\int_0^{\pi/2} x \cdot \sin 2x \cdot dx$.

11. Solve the differential equation $(xy + x) dy + (xy + y) dx = 0$. Also find the particular solution when $x = y = 0$.

12. Integrate with respect to x :

$$\int \frac{2x+3}{(x-3)(x+1)} dx$$

Or

$$\int \frac{1}{5x^2 - 4x - 1} dx$$

Section D

Questions 13 to 16 carry 4 marks each.

13. Solve the following linear programming problem graphically.

$$\text{Maximize } Z = 7x + 4y$$

$$\text{Subject to the constraints } 2x + y \leq 8; \quad 2x + 3y \leq 12$$

$$4x + y \geq 4; \quad x, y \geq 0.$$

14. Find the present value of an annuity of ₹ 1,200 payable at the end of each 4 months for 5 years, if money is worth 6% p.a. converted semiannually (use log tables).

Or

How much amount should a company set aside at the end of each year if it has to buy a machine expected to cost ₹ 2,00,000 at the end of 6 yrs, when the rate of interest is 8% p.a. compounded annually. (use log tables).

15. Solve the following differential equation :

$$(x^2 + y^2) \frac{dy}{dx} = xy$$

16. A sum of ₹ 5,000 is deposited into an account at the beginning of each year over a period of 4 years. If the rate of interest is 8% p.a. compounded annually, find the future value of the annuity. (use log tables).