



C23-AI/AIM/CAI/CCB/CCN/CIOT/CM-301

23102

BOARD DIPLOMA EXAMINATION, (C-23)

OCTOBER/NOVEMBER—2024

THIRD SEMESTER (COMMON) EXAMINATION

ENGINEERING MATHEMATICS – II

Time : 3 Hours]

[Total Marks : 80

PART—A

3×10=30

- Instructions :** (1) Answer **all** questions.
(2) Each question carries **three** marks.

1. Evaluate $\int \left(x^3 + 3^x + \frac{3}{x} \right) dx$

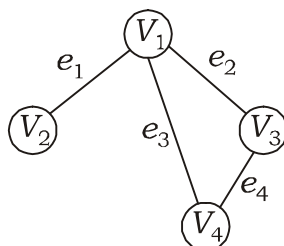
2. Evaluate $\int e^{\cos x} \sin x dx$

3. Evaluate $\int_0^1 \frac{1}{1+x^2} dx$

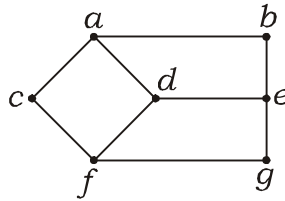
4. Evaluate $\int_0^{\frac{\pi}{2}} \sqrt{1 - \cos 2x} dx$

5. Find the differential equation of the family of curves $y = a \sin 3x + b \cos 3x$ where a, b are arbitrary constants.

6. Find the incidence matrix for the following graph :



7. Find the distance between the vertices a and g of the following graph :



8. Find the probability that leap year contains exactly 52 Sundays.

9. Find $P(A \cup B)$, if $P(A) = \frac{1}{2}$, $P(B) = \frac{1}{4}$, $P(A \cap B) = \frac{1}{8}$.

10. Find Quartile Deviation from the following data :

Central size of item	1	2	3	4	5	6	7	8	9	10
Frequency	2	9	11	14	20	24	20	16	5	2

PART—B

10×5=50

- Instructions :** (1) Answer *any five* questions.
 (2) Each question carries **ten** marks.

11. (a) Evaluate $\int \frac{\operatorname{cosec}^2(\cos^{-1} x)}{\sqrt{1-x^2}} dx$

(b) Evaluate $\int \frac{x}{(x+1)(x+3)} dx$

12. (a) Evaluate $\int (\sin x - \cos x)^2 dx$

(b) Evaluate $\int x^3 e^{2x} dx$

13. Evaluate $\int_0^{\pi/4} \cos 5x \cos 3x dx$

14. Solve the differential equation $\frac{dy}{dx} + y \tan x = \sec x$
15. (a) A problem is given to three students A, B, C whose chances of solving at are $\frac{1}{3}, \frac{1}{4}, \frac{1}{6}$ respectively. If they try independent, what is the probability that the problem will be solved?
- (b) When two dies are rolled simultaneously, find the probability that their sum is prime number.
16. There are three plants in a factory producing the same product independently. Experience shows that 2%, 4% and 5% of the items produced by the respective plants are defective. The daily outputs of the respective plants are 2000, 3000 and 5000 units. If an item is selected at random from day's output of three plants, then what is the probability that defective item was produced by second plant?
17. The marks obtained by 10 students in English and Mathematics are given below :

English	2	1	3	4	5	6	7	10	9	8
Mathematics	1	4	2	5	3	9	7	8	6	10

Calculate Spearson's coefficient of correlation and interpret the result.

18. Calculate the regression coefficients of Y on X and obtain the regression equation for the following data :

X	1	2	3	4	5	6	7
Y	9	8	10	12	11	13	14

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