7239

BOARD DIPLOMA EXAMINATION, (C-20)

FEBRUARY/MARCH — 2022

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.

              (3) Answers should be brief and straight to the point and shall not exceed five simple sentences.

1. Evaluate $\int (cosec^2 x + e^x - \cos x)\, dx$

2. Evaluate $\int \cos^2 x\, dx$

3. Evaluate $\int \dfrac{\cos(\tan^{-1} \ )}{1 + x^2}$

4. Evaluate $\int x \sin x\, dx$

5. Evaluate $\int_1^2 \dfrac{x}{1 - x^2}$

6. Find the mean value of $x + x^2$ in the interval $[2,6]$.

7. Find the volume of the solid formed by the curve $y = x^2 + 3$, the x-axis and the lines $x = 1$ and $x = 2$.

8. Find the differential equation of the family of curves $y = A\cos^3 x - B\sin^3 x$ where A and B are arbitrary constants.

9. Solve $\dfrac{dy}{dx} = \dfrac{1+y^2}{1+x^2}$

10. Find the integrating factor of the differential equation $\dfrac{dy}{dx} + 2y\tan x = \sin x$.

PART—B   8×5=40

Instructions : (1) Answer **all** questions.

(2) Each question carries **eight** marks.

(3) Answers should be comprehensive and criterion for valuation is the content but not the length of the answer.

11. Evaluate $\displaystyle\int \dfrac{x+7}{x^2+5x+6}\,dx$

(OR)

Evaluate $\displaystyle\int \sin 5\sin 3x\,dx$

12. Evaluate $\displaystyle\int x^3\cos 3x\,dx$

(OR)

Evaluate $\displaystyle\int x\cot^{-1} x\,dx$

13. Evaluate $\displaystyle\int_0^{\frac{\pi}{2}} \dfrac{\sin x}{\sin x + \cos x}\,dx$

(OR)

Evaluate $\displaystyle\int_0^{\frac{\pi}{4}} \tan^4 x\sec^2 x\,dx$

14. Find the mean value of value of xe^x over the range $x = 1$ to $x = 5$.

(OR)

Find the area enclosed by the curve $y = x^2$ and the line $2x - y + 3 = 0$.

15. Find the approximate value of $\int_4^8 \dfrac{1}{x} dx$ using Simpson rule by dividing the interval $[4,8]$ into four equal parts.

(OR)

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

PART—C $\qquad\qquad\qquad$ 10×1=10

Instructions : (1) Answer the following question.

$\qquad\qquad$ (2) Each question carries **ten** marks.

$\qquad\qquad$ (3) Answers should be comprehensive and criterion for valuation is the content but not the length of the answer.

16. Solve $(x^3 + 3xy^2)dx + (3x^2y + y^3)dy = 0$

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