7239

BOARD DIPLOMA EXAMINATION, (C-20)

NOVEMBER/DECEMBER—2022

DECE – THIRD SEMESTER EXAMINATION

ENGINEERING MATHEMATICS—II

Time : 3 hours] [*Total Marks* : 80

PART—A 3×10=30

Instruction : (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 $\int (x^2 + 2^x)\, dx$

2. Evaluate $\int (1 + \sin x) \cos x\, dx$

3. Evaluate $\int \frac{\cos \sqrt{x}}{2\sqrt{x}}\, dx$

4. Evaluate $\int e^x (\tan x + \sec^2 x)\, dx$

5. Evaluate $\int_0^1 \frac{1}{\sqrt{1 - x^2}}\, dx$

6. Evaluate $\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} \sin x\, dx$

7. Find the mean value of the function $f(x) = \frac{1}{1 + x^2}$ in the interval [0,1].

8. Find the order and degree of the differential equation $\frac{d^2y}{dx^2} + \left(\frac{dy}{dx}\right)^2 + 2y = 0$.

9. Solve $\frac{dy}{dx} = \frac{y}{x}$

10. Find the integrating factor of the linear differential equation $\frac{dy}{dx} + \frac{2y}{x} = \frac{1}{x^2}$.

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. *(a)* Evaluate $\int \sin^3 x \cos^4 x \, dx$

(OR)

(b) Evaluate $\int \frac{x+7}{x^2+5x+6} dx$

12. *(a)* Evaluate $\int \frac{1}{4+5\cos x} dx$

(OR)

(b) Evaluate $\int x^4 e^{4x} \, dx$

13. *(a)* Evaluate $\int_0^1 \frac{(\tan^{-1} x)^2}{1+x^2} dx$

(OR)

(b) Evaluate $\int_0^{\frac{\pi}{2}} \frac{\cos x}{\sin x + \cos x} dx$

14. *(a)* Find the area enclosed by the circle $x^2 + y^2 = r^2$ using the method of integration.

(OR)

(b) Find the RMS value of $f(x) = \sqrt{8 - 4x^2}$ in the interval [0,1].

15. *(a)* Find the volume of the solid generated by revolving the ellipse $\frac{x^2}{25} + \frac{y^2}{9} = 1$ about the x-axis.

(OR)

(b) Evaluate $\int_1^3 \frac{1}{x} dx$ using Simpson's $\frac{1}{3}$rd rule by dividing the interval [1,3] into 8 equal parts.

PART—C

10×1=10

Instructions : (1) Answer the following question.

(2) The question carries **ten** marks.

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

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

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