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C16-M-301/C16-CHOT-301/C16-RAC-301

6242

BOARD DIPLOMA EXAMINATION, (C-16)

JUNE—2019

DME—THIRD SEMESTER 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 :

$$\int \left(e^x + 2 \cos x + \frac{6}{\sqrt{1-x^2}} \right) dx$$

2. Evaluate :

$$\int \frac{\tan^{-1} x}{1+x^2} dx$$

3. Evaluate :

$$\int_0^1 (x^4 + 1) dx$$

4. Find the area bounded by parabola $y = x^2$, the x-axis and the lines $x = 3$ and $x = 5$.

5. Find the Laplace Transform of $t^3 + 2e^{-3t} + 3\sin 4t$.

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6. Find $L^{-1} \left\{ \frac{2s-5}{s^2+4} \right\}$.

7. Find the value of a_0 in the Fourier series expansion of $f(x) = e^{2x}$ in $(0, 2\pi)$.

8. Find the differential equation to the family of curves $y = Ae^{2x} + Be^{-2x}$ where A and B are arbitrary constants.

9. Solve :

$$\frac{dy}{dx} = \sqrt{\frac{1-y^2}{1-x^2}}$$

10. Solve :

$$\frac{d^2y}{dx^2} - 7\frac{dy}{dx} + 6y = 0$$

PART—B

10×5=50

Instructions : (1) Answer **any five** questions.

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

11. (a) Evaluate :

$$\int \sin^6 x \cos^3 x \, dx$$

(b) Evaluate :

$$\int \frac{dx}{5+4\cos x}$$

12. (a) Evaluate :

$$\int x^3 e^{2x} \, dx$$

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(b) Evaluate :

$$\int_0^{\pi/2} \frac{\sin x}{\sin x + \cos x} dx$$

13. (a) Find the RMS (root mean square) value of $\sqrt{\log x}$ over the range $x = 1$ to $x = e$.

(b) Find the value of

$$\int_0^6 \frac{1}{1+x^2} dx$$

using Simpson's $\frac{1}{3}$ rule by dividing the interval (0, 6) into 6 equal parts.

14. (a) If $L[f(t)] = F(s)$ solve—

(i) $L[t^n f(t)]$

(ii) $L\left[\frac{d^n}{dt^n}[f(t)]\right]$

(iii) $L\left[\int_0^t f(u) du\right]$

(iv) $L\left[\frac{f(t)}{t}\right]$

(v) $L[e^{at} f(t)]$

15. (a) Find $L(te^{-t} \sin 3t)$.

(b) Find $L^{-1}\left\{\frac{s}{(s+1)(s+2)}\right\}$.

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16. Expand the function $f(x) = x^2 + x$ as a Fourier series in $(-\pi, \pi)$.

17. (a) Solve $\frac{dy}{dx} + \frac{y}{x} = 3x^2$.

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

18. (a) Solve $(D^2 - 4D + 3)y = e^{2x} + e^{5x}$.

(b) Solve $(D^2 + D + 1)y = 2\sin 3x$.

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