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C20-EE-CHPP-PET-401

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BOARD DIPLOMA EXAMINATION, (C-20)

JUNE/JULY—2022

DEEE – FOURTH SEMESTER EXAMINATION

ENGINEERING MATHEMATICS-III

Time : 3 hours]

[Total Marks : 80

PART—A

3×10=30

Instructions : (1) Answer all questions.

(2) Each question carries three marks.

1. Solve $\frac{d^2y}{dx^2} - 3\frac{dy}{dx} - 4y = 0$

2. Solve $(D^2 + 4D + 13)y = 0$, where $D \equiv \frac{d}{dx}$.

3. Find the particular integral of $(D^2 + 1)y = 1$, where $D \equiv \frac{d}{dx}$.

4. Find the particular integral of $\frac{d^2y}{dx^2} + y = \sin x$.

5. Find $L\{\sin 2t \cos t\}$

6. Find $L\{te^{-t}\}$

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7. Find $L^{-1} \left\{ \frac{1}{s^2} - \frac{9}{s^2+9} + \frac{2s}{s^2-4} \right\}$
8. Find the value of a_0 in the Fourier series expansion of $f(x) = e^{-x}$ in the interval $(-1,1)$.
9. Write the formulae for finding the Fourier coefficients of $f(x)$ in the interval $(-\pi, \pi)$.
10. Expand $f(x) = 1(0 < x < \pi)$ in half-range Fourier Sine series.

PART—B

8×5=40

Instructions : (1) Answer either (a) or (b) from each questions from part-B.
 (2) Each question carries eight marks.

11. (a) Solve $\frac{d^3y}{dx^3} - 2\frac{d^2y}{dx^2} - \frac{dy}{dx} + 2y = 0$

(OR)

(b) Solve $(D^4 + 8D^2 + 16)y = 0$, where $D \equiv \frac{d}{dx}$.

12. (a) Solve $(D^2 + 6D + 5)y = \cos x$, where $D \equiv \frac{d}{dx}$.

(OR)

(b) Solve $(D^2 - 4D + 4)y = x^2$, where $D \equiv \frac{d}{dx}$.

13. (a) Find the Laplace transform of $f(t) = \cos t \cos 2t \cos 3t$.

(OR)

(b) Find $L\{t^2 e^t \sin 4t\}$.

14. (a) Find $L\left\{\frac{e^{2t} - e^{3t}}{t}\right\}$.

(OR)

(b) Using Laplace transforms, evaluate $\int_0^{\infty} e^{-t} \frac{\sin t}{t} dt$

15. (a) Find $L^{-1}\left\{\frac{3s+13}{s^2+4s+3}\right\}$.

(OR)

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

PART—C

10×1=10

Instructions : (1) Answer the following question.

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(2) The question carries ten marks.

16. Find the Fourier series for $f(x) = x^2$ in the interval $(0, 2\pi)$ and hence

deduce that $\frac{1}{1^2} - \frac{1}{2^2} + \frac{1}{3^2} - \frac{1}{4^2} + \dots = \frac{\pi^2}{12}$.

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