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BOARD DIPLOMA EXAMINATION, (C–14)

MARCH/APRIL—2017

DCE—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 :

$$\frac{d^2y}{dx^2} \quad 6\frac{dy}{dx} \quad 4y \quad 0$$

2. Solve :

$$(D^3 \quad 5D^2 \quad 8D \quad 4)y \quad 0$$

3. Find the particular integral of $(D^2 \quad 2D \quad 1)y \quad \cosh x$.

4. Find the Laplace transform of $\sin 2t \quad \sin 3t$.

5. Find the Laplace transform of $t^3e^{\ 3t}$.

6. Find $L^{\ 1}\ \dfrac{s^2 \quad 3s \quad 4}{s^4}$.

7. Find $L^{-1}\left\{\frac{1}{(s-a)^3}\right\}$.

8. Write down the formulae for finding Euler's constants of Fourier series in the interval $(0, 2\pi)$.

9. Find the value of a_2 in Fourier series expansion of $f(x) = x$ in $(0, 2\pi)$.

10. An urn contains 5 black, 7 red and 3 white balls. A ball is drawn at random. Find the probability that the ball drawn is 'red'.

PART—B

10×5=50

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

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

11. *(a)* Solve :

$$(D^2 - D - 12)y = e^{2x} + e^{3x}$$

(b) Solve :

$$(D^2 + 3D + 2)y = \cos 3x$$

12. *(a)* Find the particular integral of $(D^2 + 5D + 6)y = \sin x + \sin 4x$.

(b) Solve :

$$(D^2 + 3D + 2)y = x$$

13. *(a)* Find $L\{(t+2)^2 e^t\}$.

(b) Find $L\left\{\frac{\cos 2t - \cos 3t}{t}\right\}$.

14. *(a)* Find $L^{-1}\left\{\log\frac{s+3}{s-4}\right\}$.

(b) Find $L^{-1}\left\{\frac{s+12}{s^2+4s}\right\}$.

15. Expand the function $f(x)$ x^2 as a Fourier series in (,). Hence show that

$$\frac{1}{1^2} \quad \frac{1}{2^2} \quad \frac{1}{3^2} \quad \frac{1}{4^2} \quad \cdots \quad \frac{2}{12}$$

16. Obtain the Fourier half-range cosine series and sine series for $f(x)$ x in the interval (0,).

17. *(a)* An integer is chosen at random from the first 200 positive integers. What is the probability that the integer selected is divisible by 6 or 8?

(b) A die is thrown. Let A be the event 'the number appearing is a multiple of 3' and B be the event 'the number appearing is even'. State whether A and B are independent. Support your statement.

18. *(a)* Let A and B be two events with $P(A)$ $\frac{3}{8}$, $P(B)$ $\frac{5}{8}$ and $P(A \quad B)$ $\frac{3}{4}$. Find $P(A|B)$.

(b) Three machines A, B and C produce respectively 60%, 30% and 10% of the total number of items in a factory. The percentages of defective output of these machines are respectively 2%, 3% and 4%. An item is selected at random and is found defective. Find the probability that the item was produced by machine C.

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