



C14-C-401/C14-CM-401/
C14-IT-401

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**BOARD DIPLOMA EXAMINATION, (C-14)
MARCH/APRIL—2018
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.
(3) Answers should be brief and straight to the point and shall not exceed *five* simple sentences.

1. Solve $\frac{d^2y}{dx^2} - 8\frac{dy}{dx} + 12y = 0$
2. Solve $(D^2 - 2D^2 - 4D + 8)y = 0$
3. Find the particular integral of $\frac{d^2y}{dx^2} - 5\frac{dy}{dx} + 6y = e^{4x}$
4. Find $L\{\cos^2 2t\}$
5. Find $L\{e^{-2t} \sin 4t\}$
6. Find $L^{-1}\left\{\frac{s^2 - 3s + 4}{s^3}\right\}$
7. Find $L^{-1}\left\{\log\left(\frac{s+1}{s-1}\right)\right\}$
8. Write down the formula for finding Euler's constants of Fourier series in $[-\pi, \pi]$.
9. Find the Fourier sine series for $f(x) = e^x$ in $0 < x < \pi$.
10. If a die is thrown, what is the probability of getting an even number?

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- Instructions :** (1) Answer *any five* questions
 (2) Each question carries **ten** marks
 (3) Answers should be comprehensive and the criterion for valuation is the content but not the length of the answer.

11. (a) Solve $(D^2 + D - 6)y = e^{3x} + e^{-3x}$
 (b) Solve $(D^2 + D + 1)y = 2\sin 3x$
12. Solve $(D^2 + 3D + 2)y = e^{-x} + x^2$
13. (a) Evaluate $L\{te^{-t} \sin 3t\}$
 (b) Using convolution theorem, find the inverse Laplace transform of $\frac{1}{(s^2 + 4)(s^2 + 9)}$
14. Solve $\frac{d^2y}{dt^2} + 2\frac{dy}{dt} + 5y = e^{-t} \sin t$, where $y(0) = 0, y'(0) = 1$ using Laplace transforms.
15. Obtain the Fourier series of $f(x) = |x|$ and deduce $\frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \dots = \frac{\pi^2}{8}$ on $(-\pi, \pi)$
16. Obtain half range cosine series for $f(x) = x(2-x)$ in the interval $0 \leq x \leq 2$. Hence show that $\frac{1}{1^2} - \frac{1}{2^2} + \frac{1}{3^2} - \frac{1}{4^2} + \dots = \frac{\pi^2}{12}$.
17. (a) Let A and B be two events with $P(A) = \frac{1}{2}, P(B) = \frac{1}{3}$ and $P(A \cap B) = \frac{1}{4}$
 Find (i) $P(A/B)$ (ii) $P(A \cup B)$
 (b) If $P(A) = \frac{3}{5}$ and $P(B) = \frac{1}{5}$, find $P(A \cap B)$, if A and B are independent events.
18. Three machines A, B and C produce respectively 60%, 30% and 10% of the total number of items of 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 .