C14-IT-401/C14–C–401/C14–CM–401

# 4424

## BOARD DIPLOMA EXAMINATION, (C–14)

## MARCH/APRIL—2016

## 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 $(D^2 \quad 2D \quad 3)y \quad 0$.

**2.** Solve $(D^2 \quad 4D \quad 13)y \quad 0$.

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

**4.** Find the Laplace transform of the function $3t^2 \quad 2\cos 2t \quad e^{\ t}$.

**5.** Find $L(\sin^2 t)$.

**6.** Find $L(te^{\ t})$.

**7.** Find the inverse Laplace transform of $\frac{s^2 \quad 4}{s^3}$.

**8.** Write down the Fourier series expansion of a function $f(x)$ in the interval $(c, c \quad 2\ )$. Give the formulae for finding the Fourier coefficients.

**9.** Calculate the coefficient $a_0$ in Fourier series expansion of $x \sin x$ in the interval ( , ).

**10.** State the addition theorem on probability. If $A$ and $B$ are mutually independent events such that $P(A)$ 3/4 and $P(B)$ 3/5, then find $P(A \quad B)$.

**PART—B** 10×5=50

***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 the differential equation $(D^2 \quad 6D \quad 9)y \quad e^{\ 3x}$.

*(b)* Find the particular integral of $(D^2 \quad 4D \quad 3)y \quad e^{2x} \quad \cos x$.

**12.** *(a)* Find the particular integral of $(D^2 \quad D \quad 3)y \quad x \quad \sin 2x$.

*(b)* Solve $(D^2 \quad 9)y \quad x^4$.

**13.** *(a)* Find $L\,(t(\sin t \quad \cos t))$.

*(b)* Using convolution theorem, find $L^{\ 1}\ \dfrac{1}{(s \quad 1)(s \quad 2)}$.

**14.** *(a)* Find the Laplace transform of $\dfrac{e^{2t} \quad e^{3t}}{t}$.

*(b)* Find $L^{\ 1}\ \dfrac{s \quad 1}{s^2 \quad 6s \quad 7}$.

**15.** Obtain the Fourier series expansion of the function $f(x) \quad x^2$ in the interval ( , ). Hence, deduce that $\dfrac{1}{1^2} \quad \dfrac{1}{2^2} \quad \dfrac{1}{3^2} \quad \dfrac{1}{4^2} \quad \cdots \quad \dfrac{2}{6}$.

**16.** Find the Fourier series expansion for $f(x)$ $\begin{matrix} 2 \quad x & \text{for} & 0 \quad x \quad 1 \\ x & \text{for} & 1 \quad x \quad 2 \end{matrix}$

**17.** *(a)* Four boys and four girls sit in a row at random. Find the probabilities that *(i)* the girls sit together and *(ii)* boys and girls sit alternately.

*(b)* A given problem is solved by three students independently with probabilities 0·4, 0·5, 0·25. What is the probability that a given problem is solved?

**18.** *(a)* For any events $A$, $B$ it is given that $P(A)$ 2/3, $P(B)$ 3/4 and $P(A \quad B)$ 5/6. Find $P(A/B)$ and $P(B/A)$.

*(b)* In a game of dice, the player wins if sum of numbers on dice is 6 or 8. What is the probability of his wining if two dice are thrown at a time?

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