# 7439

## BOARD DIPLOMA EXAMINATION, (C-20)

## MAY—2023

## 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 $(D^2 - 9)y = 0$

**2.** Solve $(D - 1)^2 y = 0$

**3.** Find the particular integral of the differential equation $(D^2 - 4D - 5)y = e^{2x}$.

**4.** Find the particular integral of the differential equation $(D^2 + 4)y = \sin x$.

**5.** Find $L\{t + \cos t - e^t\}$

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

**7.** Find $L^{-1}\left\{\dfrac{1}{s^2} + \dfrac{1}{s^2 + 4} + \dfrac{s}{s^2 + 1}\right\}$

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

**9.** Write the formulae for Fourier coefficients of $f(x)$ in the interval $[c, c + 2l]$.

**10.** Write the formula for $b_n$ in the Fourier series expansion of $f(x) = x^2$ in the interval $[-\pi, \pi]$.

www.manaresults.co.in                [ *Contd...*

**Instructions :** (1) Answer **all** questions.

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

**11.** *(a)* Solve $(D^3 - 3D + 2)y = 0$, where $D \equiv \dfrac{d}{dx}$

**(OR)**

*(b)* Solve $(D^2 + 2D + 1)y = e^{-3x} + e^{2x}$, where $D \equiv \dfrac{d}{dx}$.

**12.** *(a)* Solve $(D^2 - D - 2)y = \sin 2x$, where $D \equiv \dfrac{d}{dx}$.

**(OR)**

*(b)* Solve $(D^2 + 1)y = x$ where $D \equiv \dfrac{d}{dx}$.

**13.** *(a)* Evaluate $L^{-1}\{e^{-t}(\sin t + \cos 3t)\}$.

**(OR)**

*(b)* Evaluate $L\{t^2 \cos t\}$

**14.** *(a)* Evaluate $L\left\{\dfrac{\cos at - \cos bt}{t}\right\}$

**(OR)**

*(b)* Using Laplace transform, evaluate $\displaystyle\int_0^\infty e^{-2t} \cos t \, dt$.

**15.** *(a)* Find $L^{-1}\left\{\log\left(\dfrac{s+2}{s+1}\right)\right\}$

**(OR)**

*(b)* Using convolution theorem, find $L^{-1}\left\{\dfrac{1}{(s)(s+5)}\right\}$.

**Instructions :** (1) Answer the following question.

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

**16.** Find the Fourier series expansion of $f(x) = x + x^2$ in the interval $(-\pi, \pi)$.

★★★