

Enrollment No: \_\_\_\_\_ Exam Seat No: \_\_\_\_\_

# C.U.SHAH UNIVERSITY

## Summer Examination-2018

Subject Name: Engineering Mathematics-III

Subject Code: 4TE03EMT1

Branch: B.Tech (All)

Semester: 3

Date: 20/03/2018

Time: 02:30 To 05:30

Marks: 70

### Instructions:

- (1) Use of Programmable calculator and any other electronic instrument is prohibited.
- (2) Instructions written on main answer book are strictly to be obeyed.
- (3) Draw neat diagrams and figures (if necessary) at right places.
- (4) Assume suitable data if needed.

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- Q-1 Attempt the following questions:** (14)
- a) State Dirichlet's conditions for Fourier series. (02)
  - b) State second shifting theorem. (02)
  - c) Find:  $L(4 - \sin^2 t - \cos^2 t)^3$  (02)
  - d) Solve:  $(D^3 + D)y = 0$  (02)
  - e) Find:  $L(t^4 e^{3t})$  (02)
  - f) Solve:  $r - s - 6t = 0$  (02)
  - g) Derive the iterative formula for finding the reciprocal of positive number N by Newton-Raphson method. (02)

Attempt any four questions from Q-2 to Q-8

- Q-2 Attempt all questions** (14)

- a) Obtain the constant term and the co-efficient of the first sine and cosine terms in the Fourier expansion of y as given in the following table: (07)

x	0	1	2	3	4	5
y	9	18	24	28	26	20

- b) Solve the differential equation  $\frac{\partial u}{\partial x} = 4 \frac{\partial u}{\partial y}$ ;  $u(0, y) = 8e^{-3y}$  by the method of separation of variables. (07)



- Q-3 Attempt all questions** (14)
- a) Obtain Fourier series for  $f(x) = x + x^2$  in  $(-\pi, \pi)$ . (05)
- b) Obtain a formula for finding the  $q^{\text{th}}$  root of a positive integer  $N$  and find the value of  $\sqrt[28]{28}$  by Newton-Raphson method up to four significant digits. (05)
- c) Solve:  $(D+1)^2 y = \sinh x$  (04)
- Q-4 Attempt all questions** (14)
- a) Find the Fourier series of  $f(x) = \begin{cases} x & -1 < x < 0 \\ x+2 & 0 < x < 1 \end{cases}$ . (05)
- b) State convolution theorem and using it find  $L^{-1}\left(\frac{1}{(s-2)(s+2)^2}\right)$ . (05)
- c) Find the general solution of the differential equation  $(y+z)p + (z+x)q = x+y$ . (04)
- Q-5 Attempt all questions** (14)
- a) Solve the differential equation  $(D^3 - 6D^2 + 12D - 8)y = \frac{e^{2x}}{x}$  by the method of variation of parameter. (05)
- b) Solve:  $(D^2 - 1)y = x \sin 3x$  (05)
- c) Evaluate:  $\int_0^{\infty} t e^{-2t} \cos t dt$  (04)
- Q-6 Attempt all questions** (14)
- a) Find Laplace transformation of  $\sin 2t$  and  $\cos 2t$  by using the definition of it. (05)
- b) Find the root of the equation  $x^3 - x + 1 = 0$  by bisection method up to three decimal places. (05)
- c) Obtain a cosine series for the function  $f(x) = e^x$  in the range  $(0,1)$ . (04)
- Q-7 Attempt all questions** (14)
- Solve the differential equation  $(D^2 + 2D + 5)y = e^{-t} \sin t, y(0) = 0, y'(0) = 1$  by using
- a) laplace transformation. (07)
- b) Find the roots of equation  $\cos x - xe^x = 0$  by using secant method correct up to four decimal places. (04)
- c) Find:  $L^{-1}\left(\tan^{-1} \frac{2}{s^2}\right)$  (03)
- Q-8 Attempt all questions** (14)



a) Solve:  $(x^2D^2 + 5xD + 3)y = \frac{\log x}{x^2}$  (05)

b) Solve:  $\frac{\partial^2 z}{\partial x \partial y} = \sin x \sin y$ , given that  $\frac{\partial z}{\partial y} = -2 \sin y$  when  $x = 0$  and  $z = 0$  when  $y$  is an odd multiple of  $\frac{\pi}{2}$ . (05)

c) Form the partial differential equation  $F(x + y + z, xyz) = 0$ . (04)

