

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.

- 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^{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)

