**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'sconditions for Fourier series. **(02)**

**b)** State second shifting theorem. **(02)**

**c)** Find: $L\left(4-\sin^2 t-\cos^2 t\right)^3$ **(02)**

**d)** Solve: $\left(D^3+D\right)y=0$ **(02)**

**e)** Find: $L\left(t^4e^{3t}\right)$ **(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 $\frac{\partial u}{\partial x}=4\frac{\partial u}{\partial y}$; $u\left(0,y\right)=8e^{-3y}$ 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 $\sqrt{28}$ 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,l). **(04)**

**Q-7 Attempt all questions** **(14)**

**a)** Solve the differential equation $(D^2+2D+5)y=e^{-t}\sin t, y(0)=0, y'(0)=1$ by using 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: $\left(x^2D^2+5xD+3\right)y=\dfrac{\log x}{x^2}$ **(05)**

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

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