

B.TECH. SEM -IV (COMPUTER) 2014 COURSE (CBCS) :
WINTER - 2017
SUBJECT : ENGINEERING MATHEMATICS - III

Day : **Monday**
Date : **20/11/2017**

W-2017-2073

Time : **02.30 PM TO 05.30 PM**
Max. Marks : 60

N.B.

- 1) All questions are **COMPULSORY**.
- 2) Figures to the right indicate **FULL** marks.
- 3) Use of non-programmable calculator is allowed.
- 4) Assume suitable data if necessary.
- 5) Draw neat and labeled diagrams **WHEREVER** necessary.

Q.1 a) Solve : $(D^2 - 4D + 4)y = e^{2x} \sin 3x$. **(05)**

b) Solve: $(D^2 + 5D + 4)y = x^2 + 7x + 9$. **(05)**

OR

a) Solve differential equation by the method of variation of parameters **(05)**
 $(D^2 + 1)y = \operatorname{cosec} x$.

b) Solve: $x^2 \frac{d^2 y}{dx^2} - 4x \frac{dy}{dx} + 6y = x^5$. **(05)**

Q.2 a) Evaluate $\oint_C \frac{\sin^2 z}{\left(z - \frac{\pi}{6}\right)^3} dz$, where C is $|z|=1$. **(05)**

b) Evaluate $\int_0^{2\pi} \frac{d\theta}{5 + 4\sin \theta}$. **(05)**

OR

a) Find the bilinear transformation which maps the points $-i, 0, 2 + i$ of the z-plane on to the points $0, -2i, 4$ of the w-plane. **(05)**

b) Determine the analytic function whose real part is $u = x^4 - 6x^2 y^2 + y^4$. **(05)**

Q.3 a) Find the Z-transform of $\sin(3n + 5)$. **(05)**

b) Find $z^{-1} \left(\frac{z}{(z-1)(z-2)} \right)$, if $|z| \geq 2$. **(05)**

OR

a) Find the Fourier sine transform of the function **(05)**

$$f(x) = \begin{cases} \sin x, & 0 \leq x \leq a \\ 0, & x > a \end{cases}$$

b) Represent the following functions in the Fourier integral form: **(05)**

$$f(x) = \begin{cases} \frac{\pi}{2} \cos x, & |x| \leq \pi \\ 0, & |x| > \pi \end{cases}$$

P.T.O.

Q.4 a) Find the Laplace transform of $\int_0^{\infty} e^{-t} \left(\frac{1 - \cos 3t}{t} \right) dt$. **(05)**

b) Use the convolution theorem to find inverse Laplace transform of the function **(05)**

$$\frac{1}{(S+1)(S^2+1)}$$

OR

a) Solve the differential equation by using Laplace transform **(05)**
 $y'' + y = t, y(0) = 1, y'(0) = -2$.

b) Find the Laplace transform of the function $(t - \pi)U(t - \pi)$. **(05)**

Q.5 Solve the following system of equation by LU decomposition method. **(10)**

$$2x - 3y + 4z = 7,$$

$$5x - 2y + 2z = 7,$$

$$6x - 3y + 10z = 12.$$

OR

a) Evaluate $\int_0^1 \frac{dx}{1+x^2}$ using Trapezoidal rule taking $h = 1/4$. **(05)**

b) Find a root of the equation $x^3 - 2x - 5 = 0$ using the bisection method correct upto three decimal places. **(05)**

Q.6 a) In 200 sets of 12 tosses of a coin, in how many cases one can expect 8 heads and 4 tails. **(05)**

b) Using Poisson distribution, find the probability that at most five defective items will be in the box of 200 items of 2%, of such items are defective. **(05)**

OR

Calculate the regression equation of x on y and y on x from the following data and estimate x when $y = 25$ and estimate y when $x = 20$. **(10)**

x	10	12	13	17	18	20	24	30
y	5	6	7	9	13	15	20	21