

**B.TECH. SEM -IV (COMPUTER) 2014 COURSE (CBCS) :
SUMMER - 2018**

SUBJECT : ENGINEERING MATHEMATICS - III

Day : **Saturday**
Date : **02/06/2018**

S-2018-2281

Time : **10.00 AM TO 01.00 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 : $(D^2 - 4D + 3)y = x^3 e^{2x}$. (05)

b) Solve $\frac{dx}{2x} = \frac{dy}{-y} = \frac{dz}{4xy^2 - 2z}$. (05)

OR

a) Solve differential equation by the method of variation of parameters (05)
 $(D^2 - 6D + 9)y = \frac{e^{3x}}{x^2}$.

b) Solve $(3x+2)^2 \frac{d^2y}{dx^2} + 3(3x+2) \frac{dy}{dx} - 36y = 3x^2 + 4x + 1$. (05)

Q.2 a) Evaluate $\int_C \frac{e^{2z}}{(z+1)^4} dz$, where C is the circle $|z|=2$. (05)

b) If $V = 3x^2y - y^3$, find harmonic conjugate u . Find $f(z) = u + iv$ in terms of z . (05)

OR

a) Find the map of the circle $|z - i| = 1$ under the mapping $w = \frac{1}{z}$, into the W-plane. (05)

b) Find the residues of the poles of the function $\frac{1 - e^{2z}}{z^3}$. (05)

Q.3 a) Find the Z-transform of $\cos\left(\frac{n\pi}{2} + \frac{\pi}{4}\right)$. (05)

b) Find $z^{-1}\left(\frac{3z^2 + 2z}{z^2 - 3z + 2}\right)$, $1 < |z| < 2$. (05)

OR

a) Find the Fourier cosine transform of the function (05)
 $f(x) = 2e^{-5x} + 5e^{-2x}$.

b) Find the fourier sine transform of $\frac{e^{-ax}}{x}$. (05)

Q.4 a) Find the Laplace transform of $e^{-3t} \int_0^t t \sin 2t \, dt$. (05)

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

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

OR

a) Solve the differential equation by using Laplace transform (05)
 $y'' + y = 0, y(0) = 1, y'(0) = 2$.

b) Find the Laplace transform of the function $L[\sin t \cdot U(t-2)]$. (05)

Q.5 Solve the equations by LU decomposition method (10)

$$2x_1 + 3x_2 + x_3 = 9,$$

$$x_1 + 2x_2 + 3x_3 = 6,$$

$$3x_1 + x_2 + 2x_3 = 8.$$

OR

a) Evaluate $\int_0^1 \frac{dx}{1+x^2}$ using Simpson's 1/3rd rule taking $h = 1/4$. (05)

b) Using Newton's method, find the real root of the equation $3x = \cos x + 1$ correct to four decimal places. (05)

Q.6 a) A problem in mechanics is given to three students A, B and C whose chances of solving it are 1/2, 1/3 and 1/4 respectively. What is the probability that the problem will be solved. (05)

b) Assume that probability of an individual coal miner being killed in a mine accident during a year is $\frac{1}{2400}$. Calculate the probability that in mine employing 200 miners, there will be atleast one will killed by accident in a year. (05)

OR

Calculate the regression equation of x on y and y on x from the following data and estimate x when $y = 10$ and estimate y when $x = 05$. (10)

| | | | | | |
|-----|---|----|----|---|---|
| x | 6 | 2 | 10 | 4 | 8 |
| y | 9 | 11 | 5 | 8 | 7 |

* * *