

Roll No.

Total No. of Pages : 02

Total No. of Questions : 18

B.Tech. (Computer Science Engineering / Information Technology / ECE)  
(Sem.-4)

**MATHEMATICS –III / ENGINEERING MATHEMATICS –III**

Subject Code : BTCS402

M.Code : 56605

Time : 3 Hrs.

Max. Marks : 60

**INSTRUCTIONS TO CANDIDATES :**

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

**SECTION-A**

**Write briefly :**

- 1) Define periodic functions.
- 2) State the sufficient condition for the existence of Laplace transforms.
- 3) Define analytic and conjugate functions of a complex variable.
- 4) Define Homogeneous linear partial differential equation.
- 5) Define critical region of the testing.
- 6) Define Eigen value and eigen vector of a matrix.
- 7) Define Binomial and Poisson distributions.
- 8) Write the Laplace transform of  $t^2 \sin 2t$ .
- 9) Write the difference between chi-square and  $t$ -distributions.
- 10) Differentiate between Euler's and modified Euler's method for solving the ordinary differential equation.

**SECTION-B**

- 11) Obtain the Fourier series of  $x \sin x$  as a cosine series in  $(0, \pi)$ . Hence show that  $\frac{1}{1.3} - \frac{1}{3.5} + \frac{1}{5.7} - \dots = \frac{\pi^2}{4}$ .

12) Using the Laplace transform, prove that

$$\int_0^{\infty} \frac{e^{-at} - e^{-bt}}{t} dt = \log \frac{b}{a}.$$

13) Solve the following equation by Gauss elimination method :

$$2x + y + z = 10 ; 3x + 2y + 3z = 18 ; x + 4y + 9z = 16$$

14) The theory predicts the proportion of beans, in the four groups A, B, C and D should be 9:3:3:1. In an experiment among 1600 beans, the numbers in the four groups were 882, 313, 287 and 118. Does the experimental result support the theory ? (The table value of  $\chi^2$  for 3 d.f. at 5% level of significance is 7.81).

15) Show that  $f(z) = xy^2(x + iy) + (x^2 + y^4)$ ,  $z \neq 0$  and  $f(z) = 0, z = 0$  is not analytic at  $z = 0$ , although C-R equations are satisfied at the origin.

### SECTION-C

16) a) Marks obtained by a number of students are assumed to be normal distributed with mean 50 and variance 36. If 4 students are taken at random, what is the probability that exactly two of them will have marks over 65? Given that  $\int_0^2 \phi(z) dz = 0.4772$  where  $z$  is  $N(0, 1)$ .

b) The intelligence quotients (IQ) of 16 students from B.Tech. IInd year showed a mean of 107 and a standard deviation of 10, while the IQs of 14 students from B.Tech. Ist year showed a mean of 112 and a standard deviation of 8. Is there a significant difference between the IQs of the two groups at significance levels of 0.05? Given that critical value of 28 degree of freedom with 5% level of significance is 2.05.

17) Find the largest eigen value and the corresponding eigen vector of the matrix

$$\begin{vmatrix} 2 & 1 & 0 \\ 1 & 2 & 1 \\ 0 & 1 & 2 \end{vmatrix}$$

18) Solve the following by Euler's modified method :

$$\frac{dy}{dx} = x + y, y(0) = 1$$

at  $x = 0.3$  with step size 0.1.

**NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.**