

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 Homogenous 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 χ^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

$$\begin{bmatrix} 2 & -1 & 0 \\ -1 & 2 & -1 \\ 0 & -1 & 2 \end{bmatrix}.$$

- 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.