Roll No. | | | | | | | | | | | | | **Total No. of Pages : 03**

Total No. of Questions : 18

B.Tech.(CSE/IT) (2012 to 2017)
(Sem.–3)
MATHEMATICS – III
Subject Code : BTAM-302
M.Code : 70808

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

Answer briefly :

1. Write Euler's formula of Fourier series.
2. Define Laplace transforms.
3. Define the Homogeneous partial differential equations.
4. Define analytic functions and write its Cauchy-Riemann equations.
5. Define Binomial and Poisson distributors.
6. Define Null and Alternative hypothesis.
7. What is the difference between Euler's and Runge-Kutta methods for solving the differential equations?
8. Write the difference between chi-square and t-distributions.
9. Write the Laplace transform of $t^2 \sin 2t$
10. Define eigen value.

SECTION-B

11. Express $f(x) = x$ as a half-range cosine series in $0 < x < 2$.

12. Using the Laplace transform, evaluate

$$\int_0^\infty te^{-3t} \sin t \, dt$$

13. Solve the following equation

$$\frac{\partial^3 z}{\partial x^3} - 4\frac{\partial^3 z}{\partial x^2 \partial y} + 4\frac{\partial^3 z}{\partial x \partial y^2} = 0$$

14. a) Service calls come to a maintenance center, according to a Poisson process and, on the average, 2.7 calls come per minute. Find the probability that (a) no more than 4 calls come in any minute ; (b) fewer than 2 calls came in any minute.

    b) Find the value of c such that P ($|X - 25| < c$) = 0.9544 where X ~ N (25, 36). Given that P ($Z < -2$) = 0.0228 and P ($Z < -1.69$) = 0.0456, Z being a standard normal variate.

15. A survey of 240 families with 4 children each revealed the following distribution :

No. of boys	4	3	2	1	0
No. of families	10	55	105	58	12

Is the result consistent with the hypothesis that male and female births are equally probable? Use chi-square value for 4 & 5 d.f. at 5%level of significance is 9.49 & 11.07 respectively.

SECTION-C

16. Prove that the function $f(z)$ define by $f(z) = \frac{x^3(1+i) - y^3(1-i)}{x^2 + y^2}$, $z \neq 0$ and $f(0) = 0$ is continuous and the Cauchy-Riemann equations are satisfied at the origin, yet $f'(0)$ does not exist.

17. Determine the largest eigen value and the corresponding eigen vector of the matrix $\begin{bmatrix} 2 & -1 & 0 \\ -1 & 2 & -1 \\ 0 & -1 & 2 \end{bmatrix}$ using the power method. Take $[1, 0, 0]^T$ as initial eigen vector.

18. a) Using Euler's method, find an approximate value of y corresponding to $x = 0.5$ given that $\frac{dy}{dx} = x + y$, and $y = 1$, where $x = 0$. Use step size 0.1

b) Apply Gauss elimination method to solve the equations

$$x + 4y - z = -5$$

$$x + y - 6z = -12$$

$$3x - y - z = 4.$$

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.