Roll No. Total No. of Pages : 02

Total No. of Questions : 18

B.Tech.(CSE) (2011 Batch) (Sem.–4)

MATHEMATICS – III

Subject Code : BTCS-402

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

Answer briefly :

1. Find the Fourier series expansion of the periodic function $f(x) = x, -2 < x < 2$.

2. Find inverse Laplace transform of $\dfrac{(s+1)^2}{(s-2)^4}$.

3. Find Laplace transform of $(t-2)^2 e^{3t}$.

4. Eliminate the arbitrary constants a and b from $z = ax + by + a^2b^2$, to obtain the partial differential equation governing it.

5. Find general solution of linear partial differential equation $2yz\, p + zx\, q = 3xy$

6. Show that the function $f(z) = \bar{z}$ is a continuous at the point $z = 0$ but differentiable at $z = 0$.

7. Define Eigen Values and Eigen vectors of a square matrix.

8. The number of emergency admissions each day to a hospital is found to have Poisson distribution with mean 4. Find the probability that on a particular day there will be no emergency admissions.

9. Obtain the approximate value of y (1.2) for the initial value problem $y' = -2xy^2, y(1) = 1$ using Euler's method.

10. Derive the expression of moment generating function about origin of a normal distribution.

SECTION–B

11. Obtain the Fourier series expansion of the function $f(x) = 4 - x^2$, $-2 \le x \le 2$ and hence show that $\frac{\pi^2}{12} = 1 - \frac{1}{2^2} + \frac{1}{3^2} - \frac{1}{4^2} + ...$

12. Using Laplace transform, solve the initial value problem

$$y'' + y = t, y(0) = 1, y'(0) = 0.$$

13. Find the solution of the given homogeneous partial differential equation

$$(D^4 - 2D^2D'^2 + D'^4)z = 0.$$

14. Using Gauss Seidel iteration method, solve $4x + 2z = 6$, $5y + 2z = -3$, $5x + 4y + 10z = 11$.

15. Find the approximate values of $y(x)$ at the given points using Runge-Kutta method of fourth order for the initial value problem $y' = \sqrt{x+y}, y(0.4) = 0.41$ and given is $h = 0.2$ and $x \in [0.4, 0.8]$.

SECTION–C

16. i) State and prove second shifting property of Laplace transformation.

ii) Show that the function $u(x, y) = 2x + y^3 - 3x^2y$ is harmonic. Find its conjugate harmonic function $v(x, y)$ and the corresponding analytic function $f(z)$.

17. i) Solve $5x\frac{dy}{dx} + y^2 - 2 = 0$ given is $y(4) = 1$ for $y(4.1)$ and $y(4.2)$, taking $h = 0.1$ using Modify Euler methods.

ii) A continuous random variable X is normally distributed with mean 16 and standard deviation 5. Find the probability that $X \le 25$ and $0 \le X \le 16$.

18. i) The heights of 8 males participating in an athletic event are found to be 175cm, 168cm, 165cm, 170cm, 167cm, 160cm, 173cm and 168cm. Can we conclude that the average height is greater than 165cm? Test at 5% level of significance.

ii) Two random samples of sizes 9 and 7 gave the sum of squares of deviations from their respective means as 175 and 95 respectively. Can they be regarded as drawn from normal populations with the same variance?

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.