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B.Tech. (3D Animation & Graphics) (2012 Onwards)
B.Tech. (CSE)/(IT) (2012 Batch)
(Sem.–3)

MATHEMATICS-III

Subject Code : BTAM-302
Paper ID : [A2143]

Time : 3 Hrs. **Max. Marks : 60**

INSTRUCTION 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 has to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students has to attempt any TWO questions.**

SECTION-A

1. **Write briefly :**

(a) Define periodic function. Give an example of a function which is not periodic.

(b) Write the sufficient conditions for the existence of Laplace transform.

(c) Find the Laplace transform of cos (at).

(d) Obtain a partial differential equation that governs the family of surfaces $z = (x - \alpha)^2 + (y - \beta)^2$.

(e) Define linear partial differential equation and give an example of a partial differential equation which is not linear.

(f) Write the sufficient conditions for a function of complex variable to be analytic.

(g) Gauss elimination method is used to solve which equations?

(h) Write the fourth-order Runge-Kutta method to solve initial value problems of ordinary differential equations.

(i) 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.

(j) Write one application of F-distribution.

SECTION-B

2. Find the Fourier cosine series of the function

$$f(x) = \begin{cases} x^2, & 0 \le x \le 2, \\ 4, & 2 \le x \le 4. \end{cases}$$

3. State and prove linearity property of Laplace transform and use it to find the Laplace transform of $\sinh(3t)$ and $\cosh(4t)$.

4. Solve : $(x^2 - yz)p + (y^2 - zx)q = z^2 - xy$, where $p = \frac{\partial z}{\partial x}; q = \frac{\partial z}{\partial y}$.

5. Two players A and B play tennis games. Their chances of winning a game are in the ratio 3 : 2 respectively. Find A's chance of winning at least two games out of four games played.

6. 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 ?

SECTION-C

7. If $f(z) = u + iv$ is an analytic function of $z = x + iy$ and $u + v = (x + y)(2 - 4xy + x^2 + y^2)$, then find u, v and the corresponding analytic function $f(z)$.

8. Find the solution of the system of equations

$$45x_1 + 2x_2 + 3x_3 = 58$$
$$-3x_1 + 22x_2 + 2x_3 = 47$$
$$5x_1 + x_2 + 20x_3 = 67$$

correct to three decimal places using the Gauss-Seidel iteration method.

9. Solve the initial value problem $\frac{dy}{dx} = -2xy^2$; $y(0) = 1$ with the step size $h = 0.2$ on the interval [0, 0.6] using the classical fourth-order Runge-Kutta method. The exact solution of the problem is $y(x) = \frac{1}{1+x^2}$. Find the absolute errors at each step.