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B.TECH(CSE),SEM III, 2014
MATHEMATICS III
PAPER CODE: BTAM 302
PAPER ID:[A2143]

Time: 03 Hours

Maximum 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

Q1)

- a) If $f(x) = x^2$ in $-2 < x < 2$, $f(x+4) = f(x)$, then coefficient a_n of the Fourier series expansion is...
- b) Evaluate $L\left\{e^{-t} \int_0^t \frac{\sin t}{t} dt\right\}$
- c) Prove that $L\left\{\frac{f(t)}{t}\right\} = \int_s^\infty \bar{f}(s) ds$, provided the integral exists
- d) Solution of the PDE $p - q = \log(x + y)$ is
- e) Find the particular integral of the differential equation $\frac{\partial^2 z}{\partial x^2} + \frac{\partial^2 z}{\partial x \partial y} - 6 \frac{\partial^2 z}{\partial y^2} = y \cos x$
- f) Write any four differences between Gauss-Jordon and Gauss-Seidel methods.
- g) Formula for the second order Runge-Kutta method is given by.....
- h) The mean and variance of a Poisson distribution are.....
- i) The mean and variance of a binomial variable X are 2 and 1, respectively. Find the probability that X takes a value greater than 1.
- j) The Central Limit Theorem is important in Statistics because.....

Section-B

Q2) Evaluate Using Laplace transform $\int_0^\infty t e^{-2t} \sin 3t dt$.

Q3) Solve the following system of equations using the Gauss-Seidel Method.

$$8x - 3y + 2z = 20; 4x + 11y - z = 33; 6x + 3y + 12z = 35$$

Q4) In a normal distribution 7% of the items are under 35 and 89% are under 63. What are the mean and standard deviation of the distribution?

Q5) Using Runge-Kutta forth order method,

Find y for $x = 0.8$, given that $\frac{dy}{dx} = \sqrt{x+y}$, $y(0.4) = 0.41$

Q6) The nine items of a sample have the following values: 45, 47, 50, 52, 48, 47, 49, 53, 51. Does the mean of these differ significantly from the assumed mean of 47.5?

Section-C

Q7) Obtain the half-range cosine series for $f(x) = \begin{cases} kx, & 0 \leq x \leq \ell/2 \\ k(\ell - x), & \ell/2 \leq x \leq \ell \end{cases}$

Also deduce the sum of the series $\frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \dots \infty$

Q8) Solve the PDE $(D^2 - DD' - 2D'^2)z = (y-1)e^x$

Q9) Prove that

$v(x, y) = \ln(x^2 + y^2) + x - 2y$ is harmonic. Find the conjugate harmonic function $u(x, y)$ and also the corresponding analytic function $f(z)$.

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