.Tech. (I Yr.) Total Pages : 4

Roll No. ....

Course No. : BS-211

M-V/170

Second Year B.Tech. of the Four Year Integrated Degree Course Examination, 2014–15

(Common for All Branches)

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SEMESTER-I

MATHEMATICS-III

Time : Three Hours

Maximum Marks : 80

"Do not write anything on question paper except Roll Number otherwise it shall be deemed as an act of indulging in use of unfair means and action shall be taken as per rules."

(i) Attempt **five** questions in all.

(ii) The question paper has **four** Units. Each unit has **two** questions.

(iii) Attempt at least **one** question from each Unit.

(iv) Answer should be to the point.

(v) All questions carry equal marks.

UNIT–I

1. (a) Express $f(x) = x^3 - 2x^2 + x - 1$ into factorial notation and show that $\Delta^4 f(x) = 0$.

   (b) Find a cubic polynomial in x for the following data using Newton's forward difference formula:

x :	0	1	2	3	4	5
Y ;	–3	3	11	27	57	107

2. (a) The function $y = f(x)$ is given in the points (7, 3), (8, 1), (9, 1) and (10, 9). Find the value of y for $x = 9.5$ using Lagrange's interpolation formula.

   (b) Establish the relations

   (i) $\Delta\nabla = \nabla\Delta = \Delta - \nabla = \delta^2$

   (ii) $\mu\delta = \frac{1}{2}(\Delta + \nabla)$

UNIT–II

3. (a) Apply Gauss forward difference formula to obtain f(32) given that

   $f(25) = 0.2707$, $f(35) = 0.3386$

   $f(30) = 0.3027$ and $f(40) = 0.3794$

   (b) Find y' (1.5) from the following data:

x :	0.0	0.5	1.0	1.5	2.0
y :	0.3989	0.3521	0.2420	0.1295	0.0540

4. (a) Use Stirling's formula to compute y at $x = 12.2$ from the following table:

x :	10	11	12	13	14
y :	23967	28060	31788	35209	38368

(b) Evaluate the first derivative at $x = -3$ from the following table:

x :	−3	−2	−1	0	1	2	3
y :	−33	−12	−3	0	3	12	33

UNIT–III

5. (a) Evaluate $\int_0^1 \frac{dx}{1+x^2}$ using Trapezoidal rule, taking $h = \frac{1}{4}$. Also, obtain approximate value of π.

(b) Using Euler modified method, obtain a solution of $\frac{dy}{dx} = x + \left|\sqrt{y}\right|$, $y(0) = 1$ for the range $0 \le x \le 0.4$ in steps of 0.2.

6. (a) Solve the differential equation $y' = x - y^2$, by Taylor series method for $x = 0.2$, under the initial condition $y(0) = 1$, $h = 0.2$.

(b) Apply the fourth order Runge-Kutta method to solve $\frac{dy}{dx} = x^2 + y^2$, $y(0) = 1$. Take the size $h = 0.1$ and determine approximations toy(0.1) correct to four decimal places.

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UNIT–IV

7. (a) Find $L\left(\frac{\sin t}{t}\right)$, and hence find $L\left(\frac{\sin at}{t}\right)$.

(b) Find the inverse Laplace Transform of $\frac{s}{s^4 + 4a^4}$.

8. (a) Obtain the inverse Laplace transform of $\log \frac{s+2}{s+1}$.

(b) Use Laplace transformation technique to solve the following differential equation:

$(D^2 - 3D + 2)\ x = 1 - e^{2t}$, $x(0) = 1$, $x'(0) = 0$.