

Day & Date	Semester	Subject Name	Time	Code	Marks
Monday 02/04/2018	III (Repeater)	Numerical Methods and Algorithms	02.30 PM to 05.00 PM	3102	75

Instruction:

- I) Question. 1 is compulsory
- II) Attempt any 4 from Q.2 to Q.8
- III) Use of Scientific calculator is allowed
- IV) Figures to the right indicate full marks

- Q.1 a) Solve the following system of equations using Matrix Inversion method 07
- $$3x + 2y + 4z = 7$$
- $$2x + y + z = 7$$
- $$x + 3y + 5z = 2$$
- b) Given data 08
- |        |       |       |       |       |
|--------|-------|-------|-------|-------|
| $x$    | 1.2   | 1.3   | 1.4   | 1.5   |
| $f(x)$ | 1.063 | 1.091 | 1.119 | 1.145 |
- Calculate  $f(1.35)$  by using Newton – Gregory forward interpolation formula
- Q.2 a) Estimate the missing term 07
- |        |   |    |    |    |    |
|--------|---|----|----|----|----|
| $x$    | 1 | 2  | 3  | 4  | 5  |
| $f(x)$ | 7 | -- | 13 | 21 | 37 |
- b) Using Taylor's Series method find  $y(0.1)$  correct upto 4 decimal places 08
- from the differential equation  $\frac{dy}{dx} - 1 = xy$  and  $y(0) = 1$
- Q.3 a) From the following table of values of  $x$  &  $y$  obtain  $\frac{dy}{dx}$  &  $\frac{d^2y}{dx^2}$  for  $x = 1.2$  08
- |     |        |        |        |        |        |        |       |
|-----|--------|--------|--------|--------|--------|--------|-------|
| $x$ | 1.0    | 1.2    | 1.4    | 1.6    | 1.8    | 2.0    | 2.2   |
| $y$ | 2.7138 | 3.3201 | 4.0552 | 4.9530 | 6.0496 | 7.3891 | 9.025 |
- b) Write algorithm of Bisection method 07
- Q.4 a) Derive Simpson's 1/3<sup>rd</sup> Rule. 08
- b) Solve  $\frac{dy}{dx} = 1 + y^2$  where initial condition is  $y(0) = 0$ . Find  $y(0.1)$ ,  $y(0.2)$ ,  $y(0.3)$  using Euler's method 07

- Q.5 a) Find the square root of 24 correct to 2 places of decimal using Newton – Raphson method 07
- b) Find a root of the equation  $xe^x = 1$  using Ramanujan's method 08
- Q.6 a) Fit a polynomial of second degree for the points (0,1),(1,6) and (2,17) 07
- b) Given  $\frac{dy}{dx} = y - x$  where  $y(0) = 2$ , find  $y(0.1)$  and  $y(0.2)$  correct to four decimal places by using Runge – Kutta fourth order 08
- Q.7 a) Using Lagrange's interpolation formula find  $f(2)$  given that 08
- |        |     |   |   |    |
|--------|-----|---|---|----|
| $x$    | 0   | 1 | 3 | 4  |
| $f(x)$ | -12 | 0 | 6 | 12 |
- b) Evaluate  $\int_0^6 \frac{1}{(1+x^2)} dx$  using simpson's 3/8<sup>th</sup> rule. 07
- Q.8 a) Solve  $x + 3y + z = 10$ ,  $2x + 4y - 6z = -8$ ,  $2x - 4y - 2z = -12$  by Gauss Elimination method 07
- b) Solve the equation,  $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 0$  in the domain of fig. 08
- using Jacobi Method upto 5 iterations

