

Roll No .....

## MCADD-302

### M.C.A. (Dual Degree/Integrated Course), III Semester

Examination, May 2018

### Computer Oriented Numerical Methods

Time : Three Hours

Maximum Marks : 70

- Note:* i) Attempt any five questions out of eight questions.  
ii) All questions carry equal marks.

1. a) Apply false position method to solve  $3x - \cos x - 1 = 0$ .  
b) Evaluate  $\sqrt{12}$  to four places of decimal by using Newton-Raphson method.

2. a) Prove that  $e^x = \left( \frac{D^2}{E} \right) e^x \cdot \frac{Ee^x}{D^2 e^x}$ ; the interval of differencing being  $h$ .  
b) A third degree polynomial passes through the points  $(0, -1), (1, 1), (2, 1)$  and  $(3, -2)$ . Find the polynomial.

3. a) The following values of the function  $f(x)$  are given  
 $f(1) = 4, f(2) = 5, f(7) = 5, f(8) = 4$

Use Newton's divided difference formula to find  $f(6)$   
 and also find the values of  $x$  for which  $f(x)$  is maximum  
 or minimum.

- b) Calculate by Simpson's 1/3 rule an approximate value of  
 $\int_3^3 x^4 dx$ . Compare it with the exact value.

4. a) Evaluate  $\int_0^6 \frac{1}{1+x^2} dx$  by using Weddle's rule.

- b) Solve  $27x + 6y - z = 85, 6x + 15y + 2z = 72,$   
 $x + y + 54z = 110$  by Gauss Seidel iteration method.

5. a) Solve the following system by Gauss-elimination method

$$6x + 3y + 2z = 6$$

$$6x + 4y + 3z = 0$$

$$20x + 15y + 12z = 0$$

- b) Solve the equation  $\frac{dy}{dx} = -yx^2$  with  $y(0) = 2$ .

6. a) Use Picard's method to approximate  $y$  when  $x = 0.2$  given that  $y = 1$  when  $x = 0$  and  $\frac{dy}{dx} = x - y$ .
- b) Apply Runge-Kutta method to approximate  $y$ , when  $x = 0.1$ , given that  $x = 0$  when  $y = 1$  and  $\frac{dy}{dx} = x + y$ .
7. a) The mean and variance of a binomial distribution  $p(x, n, p)$  are 4 and  $4/3$  respectively. Find  $p(x \geq 2)$  and the probability of two successes.
- b) A Car-hire firm has two cars, which it hires out day by day. The number of demands for a car on each day is distributed as a Poisson distribution with mean 1.5. Calculate the proportion of days on which neither car is used and the proportion of days on which some demand is refused (given that  $e^{-1.5} = 0.2231$ )
8. a) 5 dice were thrown 96 times and the numbers 4, 5 or 6 were thrown as given below:
- |                              |    |     |     |     |    |   |
|------------------------------|----|-----|-----|-----|----|---|
| No. dice showing 4, 5 or 6 : | 5, | 4,  | 3,  | 2,  | 1, | 0 |
| frequency :                  | 7, | 19, | 35, | 24, | 8, | 3 |
- calculate  $\chi^2$ .
- b) Find the student's 't' for the following variable values in a sample of eight:
- 4, -2, -2, 0, 2, 2, 3, 3.
- taking the mean of the universe to be zero.

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