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## MCADD-302

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

Examination, May 2019

### Computer Oriented Numerical Methods

Time : Three Hours

Maximum Marks : 70

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

1. a) Define following:
    - i) Truncation error
    - ii) Round off error
    - iii) Absolute error
    - iv) Percentage errorwith examples
  - b) Derive the Newton raphson formula. What is the geometrical interpretation of this formula.
  2. a) Find the root of the equation  $xe^x - \sin x = 0$  using False positon method correct to three decimal places.
  - b) Solve by Newton raphson method  $x^3 - 3x - 4 = 0$ .
  3. a) Find by Gauss's backward interpolation formula the sales of a concern for the year 1936. Given that
- |      |      |      |      |      |      |      |
|------|------|------|------|------|------|------|
| Year | 1901 | 1911 | 1921 | 1931 | 1941 | 1951 |
| Sale | 12   | 15   | 20   | 27   | 39   | 52   |

- b) Use Lagrange's interpolation formula to find the value of  $y$  when  $x = 10$ .

$x :$	5	6	9	11
$y :$	12	13	14	16

4. a) Calculate the value of  $\int_0^{\pi/2} \sin x dx$  by Simpson's  $\frac{1}{3}$  rules using 11 ordinates.

- b) Compute the integral  $\int_0^3 x^2 \cos x dx$  using three point Gaussian quadrature formula for given numerical values. If U's and W's are

$$U_{-1} = \sqrt{\frac{3}{5}} \quad U_0 = 0 \quad U_1 = \frac{3}{5}$$

$$W_{-1} = \frac{5}{9} \quad W_0 = \frac{8}{9} \quad W_1 = \frac{5}{9}$$

5. a) Solve the following system of equations using Gauss elimination method.

$$2x + y + z = 10, \quad 3x + 2y + 3z = 18, \quad x + 4y + 9z = 16.$$

- b) Using modified Euler's method find an approximate value of  $y$  when  $x = 0.3$ . Given that

$$\frac{dy}{dx} = x + y, \quad y(0) = 1$$

6. a) Define Poisson distribution and find its mean and variance.

- b) Prove that the mean deviation from the mean of the normal

distribution is  $\frac{4}{5}$  times its standard deviation.

7. a) For a  $2 \times 2$  contingency table  $\frac{a \mid b}{c \mid d}$

Prove that 
$$x^2 = \frac{(a+b+c+d)(ad-bc)^2}{(a+b)(c+d)(b+d)(a+c)}$$

- b) If group of 5 patients treated with medicine A weight 42, 39, 48, 60, 41 (kgs). Second group treated with medicine B weight 38, 42, 56, 64, 68, 69 and 62 (kgs). Do you agree with the claim that medicine B increased weight significantly.
8. 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) A Car-hire firm has two cars, which if 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  $e^{-1.5} = 0.2231$ )

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