DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY,
LONERE – RAIGAD – 402 103
Winter Semester Examination – Dec -2019

Branch: M. Tech. (Electronics Engineering)   **Semester : I**
Subject :- Computational Methods (MTEEC101)   **Marks : 60**
Date :- 10/12/2019   **Time : 3 Hrs.**

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Instructions to the Students
1. Each question carries 12 marks.
2. Attempt any five questions of the following.
3. Illustrate your answers with neat sketches, diagram etc., wherever necessary.
4. If some part or parameter is noticed to be missing, you may appropriately assume it and should mention it clearly.

(Marks)

Q.1. Answer the following   **(12)**
  a) Explain the types of error with suitable examples.
  b) Find the relative error if the number X=0.0012397 is i) truncated to three decimal digits, ii) rounded off to three decimal digits

Q.2. Answer the following   **(12)**
  a) Show that $f(x) = x^3 + 4x^2 - 10 = 0$ has a root in [1, 2] and use the regula-falsi method to determine an approximation to the root that is accurate to 5 iteration.
  b) Using Newton Raphson method, find a real root of the equation, $\cos(x) = xe^x$, correct to four decimal places.

Q.3. Answer the following   **(12)**
  a) Find the positive root of $x^4-x=10$ correct to three decimal places, using Bisection Method method with suitable lower and upper guess.
  b) Use least square regression to fit straight line using following data

x	1	2	3	4	5	6	7
y	0.5	2.4	2.8	4.1	3.5	6.1	5.5

Compute the standard deviation of data points, standard error of the estimate, and correlation coefficient

Q.4. Answer the following   **(12)**
  a) Find the value of sin(1.76) from the following table

x	1.7	1.74	1.78	1.82	1.86
Sin(x)	0.9916	0.9857	0.9781	0.9691	0.9584

  b) Evaluate the integral $\int_0^1 \dfrac{x^2}{1+x^3} dx$ using Simpson's $1/3^{rd}$ rule. Compare the error with the exact value.

Q.5. Answer the following   **(12)**
  a) Apply Runge-Kutta method to find approximate value of y for x=0.2, in steps of 0.1, if $dy/dx=2x+3y^2$, given that y=1 where x=0.

b) For the equation y'(x)=2y/x, with y(1) =2.5. estimate y(2) by Euler's method using h=0.25 and compare the results with exact answer.

Q.6. Answer the following (12)

a) Using shooting method, solve the equation $\frac{d^2 y}{dx^2} = 36x$ y(1)=2, y(2)=9 in the interval (1,2).

b) For $\frac{d^2 y}{dx^2} = e^{x^2}$ with y(0)=0,y(1)=0.5 estimate the y(x) at x=0.25,0.5,0.75 using finite difference method.

_____**Paper End**_____