

**DR. BABASAHEB AMBEDKAR TECHNOLOGICAL  
UNIVERSITY, LONERE – RAIGAD -402 103**

**Supplementary Winter Semester Examinations: Dec- 2019**

**Branch: Electronics and Telecommunication Engg.**

**Sem.: -IV**

**Subject:- Numerical Methods and Computer Programming (BTBSC406)**

**Marks: 60**

**Date: 04/12/2019**

**Time:- 3 Hr.**

**Instructions to the Students**

1. Each question carries 20 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

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**(Marks)**

**Q.1. Solve the following questions (Any 3)**

- a) Define errors. How many different types of errors occur while doing numerical computations? How they can be avoided? (4)
- b) Explain in short about error propagation & error estimation. (4)
- c) Round off the number 865250 & 37.46235 correct up to four Significant figures and find absolute error, relative error and percentage error in each case. (4)
- d) Find absolute error if the number  $X = 0.00599826$  is
  - i) Truncated to 4 decimal digits
  - ii) Rounded off to 4 decimal digits. (4)

**Q.2. Solve the following questions (Any 2)**

- a) i) Apply False-position method to find the smallest positive root of the equation correct to three decimal places.  $x - e^{-x} = 0$  (3)  
ii) Find a positive root of  $xe^x = 2$  by the method of false position. (3)
- b) Using Newton-Raphson method, find the real root of the equation  $3x = \cos x + 1$  correct to four decimal places. (6)
- c) Apply the Jacobi method to solve: Continue iterations until two successive approximations are identical when rounded to three significant digits. (6)

$$5x_1 - 2x_2 + 3x_3 = -1$$

$$-3x_1 + 9x_2 + x_3 = 2$$

$$2x_1 - x_2 - 7x_3 = 3$$

**Q.3. Solve the following questions (Any 2)**

- a) The following table gives the scores secured by 100 students in the Numerical Analysis subject: (6)

Range of scores:	30-40	40-50	50-60	60-70	70-80
Number of students:	25	35	22	11	7

Use Newton's forward difference interpolation formula to find.

- (i) the number of students who got scores more than 55.  
(ii) the number of students who secured scores in the range between 36 and 45.

- b) Find the cubic spline approximation for  $y = f(x)$  polynomial which takes the following values. Also  $y_0'' = y_3'' = 0$  (6)

x	-1	0	1	2
y=f(x)	-1	1	3	35

- c) Fit the curve of type  $y = a + bx^2$  that fits the following data (6)

x	0	1	2	3
y	2	4	10	15

**Q.4 Solve the following questions (Any 2)**

- a) Evaluate  $\int_0^6 dx/(1+x^2)$  by using (6)

- i) Simpson's 1/3 rd Rule  
ii) Simpson's 3/8 th Rule  
iii) Trapezoidal rule

- b) Given that  $dy/dx = \log_{10}(x+y)$  with the initial condition that  $y = 1$  when  $x = 0$ . Find  $y$  for  $x = 0.2$  and  $x = 0.5$  using Euler's modified formula (6)

- c) Given  $dy/dx = y - x$ ,  $y(0) = 2$ . Find  $y(0.1)$  and  $y(0.2)$  correct to four decimal places (use both II and IV order methods). (6)

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**Q.5 Solve the following questions (Any 2)**

- a) Explain all operators in C++ with examples. (6)
- b) Explain basic concept of object oriented programming.  
Also write benefits & applications of OOP. (6)
- c) Explain the concept of Function prototyping and function overloading with the help of C++ example (6)

**Q.6 Solve the following questions (Any 2)**

- a) Explain classes in C++? What does a class in C++ holds? (6)  
Explain in brief derived classes , Virtual base classes, Abstract classes, Member classes
- b) What is inheritance? What are the different types of inheritance? (6)  
Draw the block diagram of each type of inheritance?  
Explain any one type of inheritance in detail.
- c) Write and explain a program for overloading of unary operator to overload minus(-) operator. (6)

**Paper End**