**POORNIMA UNIVERSITY, JAIPUR**

**END SEMESTER EXAMINATION, April 2023**

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|  | **2BC2147** | Roll No. | Total Printed Pages: 2 |
| **2BC2147** |  |
| BCA II Year IV-Semester (Back) End Semester Examination, April 2023  **(AI&PA)** | |
| **BAP04104 : Computer Based Numerical Techniques** | | | |

# Max. Time: **3** Hours. Max. Marks: **60**

Min. Passing Marks: **21**

Attempt **five** questions selecting one question from each Unit. There is internal choice from Unit I to Unit V. Marks of each question or its parts are indicated against each question / parts. Draw neat sketches wherever necessary to illustrate the answer. Assume missing data suitably (if any) and clearly indicate the same in the answer.

Use of following supporting material is permitted during examination for this subject.

# **1.----------------------------------------------** **2.-----------------------------------------**

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|  |  | **UNIT-I (CO1)** | **Marks** | **Bloom Level** |
| **Q.1** | **(a)** | Find the real root of the equation by Newton-Raphson method correct to three places of decimal. | **(6)** | **Evaluate** |
|  |  |  |  |  |
|  | **(b)** | Compute the real roots of correct to three decimal places. | **(6)** | **Evaluate** |
|  |  | **OR** |  |  |
| **Q.2** | **(a)** | Find the real root of the equation by Regula Falsi method, correct to three decimal places. | **(6)** | **Evaluate** |
|  |  |  |  |  |
|  | **(b)** | Find the real root of the equation by Newton-Raphson method correct to three places of decimal. | **(6)** | **Evaluate** |
|  |  | **UNIT-II (CO2)** |  |  |
| **Q.3** | **(a)** | Interpolate by means of striling formula the sales of a concern for the year 1976 given that   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | year | 1940 | 1950 | 1960 | 1970 | 1980 | 1990 | | sale | 17 | 20 | 27 | 32 | 36 | 38 | | **(6)** | **analysis** |
|  | **(b)** | Use Lagrange's interpolation formula and find y when at x = 5 with the following data   |  |  |  |  |  | | --- | --- | --- | --- | --- | | x | 0 | 1 | 3 | 8 | | y | 1 | 3 | 13 | 123 | | **(6)** | **Evaluate** |
|  |  | **OR** |  |  |
| **Q.4** | **(a)** | Given the table   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | x | 0 | 0.1 | 0.2 | 0.3 | 0.4 | |  | 1 | 1.1052 | 1.2214 | 1.3499 | 1.4918 |   Find the value of y = when x= 0.38 | **(6)** | **analysis** |
|  |  |  |  |  |
|  | **(b)** | Find by interpolation the missing value in the following data   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | X | 0 | 5 | 10 | 15 | 20 | 25 | | y | 6 | 10 | ? | 17 | ? | 31 | | **(6)** | **Evaluate** |
|  |  | **UNIT-III (CO3)** |  |  |
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| **Q.5** | **(a)** | Using Trapezoidal rule to find the value of ****  and find the error | **(6)** | **analysis** |
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|  | **(b)** | Evaluate  Using Simpson’s 3/8 and 1/3 rules and Trapezoidal rule | **(6)** | **analysis** |
|  |  | **OR** |  |  |
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| **Q.6** | **(a)** | Using Simpson’s 1/3 rule to find the value of log(3/2) | **(6)** | **Evaluate** |
|  |  |  |  |  |
|  | **(b)** | Using Simpson’s 1/3 rule to find the value of log(3/2) | **(6)** |  |
|  |  | **UNIT-IV (CO4)** |  |  |
| **Q.7** |  | Using Runga kutta 4th order to find y when x = 1.2 step 0.1 given that ; y(1)=1.5 | **(12)** | **Evaluate** |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  | **OR** |  |  |
| **Q.8** |  | Obtain approximate value of of y at x = 0.1 from y(0)=1 taking step h = 0.025 for the differential equation | **(12)** | **Evaluate** |
|  |  | Using Milina Predicter Method |  |  |
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|  |  | **UNIT V (CO5)** |  |  |
| **Q.9** | **(a)** | A cottage industry manufactures pedestal lamps and wooden shades, each requiring the use of a grinding/cutting machine and a sprayer. It takes 2 hours on grinding/cutting machine and 3 hours on the sprayer to manufacture a pedestal lamp. It takes 1 hour on the grinding/cutting machine and 2 hours on the sprayer to manufacture a shade. On any day, the sprayer is available for at the most 20 hours and the grinding/cutting machine for at the most 12 hours. The profit from the sale of a lamp is Rs 5 and that from a shade is Rs 3. Assuming that the manufacturer can sell all the lamps and shades that he produces, how should he schedule his daily production in order to maximise his profit? | **(6)** | **Evaluate** |
|  |  |  |  |  |
|  | **(b)** | A company manufactures two types of novelty souvenirs made of plywood. Souvenirs of type A require 5 minutes each for cutting and 10 minutes each for assembling. Souvenirs of type B require 8 minutes each for cutting and 8 minutes each for assembling. There are 3 hours 20 minutes available for cutting and 4 hours for assembling. The profit is Rs 5 each for type A and Rs 6 each for type B souvenirs. How many souvenirs of each type should the company manufacture in order to maximise the profit? | **(6)** | **Explaining** |
|  |  | **OR** |  |  |
| **Q.10** | **(a)** | A merchant plans to sell two types of personal computers – a desktop model and a portable model that will cost Rs 25000 and Rs 40000 respectively. He estimates that the total monthly demand of computers will not exceed 250 units. Determine the number of units of each type of computers which the merchant should stock to get maximum profit if he does not want to invest more than Rs 70 lakhs and if his profit on the desktop model is Rs 4500 and on portable model is Rs 5000. | **(6)** | **Explaining** |
|  | **(b)** | A diet is to contain at least 80 units of vitamin A and 100 units of minerals. Two foods F1 and F2 are available. Food F1 costs Rs 4 per unit food and F2 costs Rs 6 per unit. One unit of food F1 contains 3 units of vitamin A and 4 units of minerals. One unit of food F2 contains 6 units of vitamin A and 3 units of minerals. Formulate this as a linear programming problem. Find the minimum cost for diet that consists of mixture of these two foods and also meets the minimal nutritional requirements. | **(6)** | **Explaining** |