Reg.No. \_\_\_\_\_\_\_\_\_\_\_\_



**End Semester Examination – Nov/Dec– 2017**

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| **Code :** | **17MA3043** | **Duration :** | **3hrs** |
| **Sub. Name :** | **COMPUTATIONAL METHODS AND APPLICATIONS** | **Max. marks :** | **100** |

**ANSWER ALL QUESTIONS (5 x 20 = 100 Marks)**

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| **Q. No.** | **Sub Div.** | **Questions** | **Course**  **Outcome** | | **Marks** |
| 1. | a. | A lot consists of 10 good articles, 4 with minor defects and 2 with major defects. Two articles are chosen from the lot at random (without replacement). Find the probability that i. both are good ii. both have major defects iii. at least 1 is good. | CO1 | | 5 |
| b. | A discrete Random variable X has the following probability distribution   |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | x | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | P(x) | a | 3a | 5a | 7a | 9a | 11a | 13a | 15a | 17a |   Find the value of a, P(X<3), mean of X and cdf of X. | CO1 | | 10 |
| c. | In a certain factory turning razar blades, there is small chance of 1/500 for any blade to be defective. The blades are in packets of 10. Use Poisson distribution to calculate the approximate number of packets containing i. no defective ii. 1 defective respectively in a consignment of 10000 packets. | CO1 | | 5 |
| **(OR)** | | | | | |
| 2. | a. | Theory predicts that the proportion of beans in four groups A, B, C, D should be 9 : 3 : 3 : 1. In an experiment among 1600 beans, the numbers in the four groups were 882, 313, 287, 118. Does the experiment support the theory? | CO1 | | 8 |
| b. | Each person in a random sample of n = 10 employees was asked about X, the daily time wasted at work doing non-work activities, such as surfing the internet and emailing friends. The resulting data, in minutes, are as follows: **108,  112,   117,  130,  111,  131,  113,  113,  105,  128.** Is it ok to assume that these data come from a normal distribution with mean 120 and standard deviation 10? | CO1 | | 12 |
| 3. | a. | Compute the correlation coefficient between X and Y for the following data:   |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | | X | 65 | 67 | 66 | 71 | 67 | 70 | 68 | 69 | | Y | 67 | 68 | 68 | 70 | 64 | 67 | 72 | 70 | | CO3 | | 10 |
| b. | Obtain the equations of the regression lines from the following data. Also estimate the value of Y when X = 38.   |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | | X | 22 | 26 | 29 | 30 | 31 | 31 | 34 | 35 | | Y | 20 | 20 | 21 | 29 | 27 | 24 | 27 | 31 | | CO3 | | 10 |
| (OR) | | | | | |
| 4. | a. | Following is the distribution of students according to their height and weight.   |  |  |  |  |  | | --- | --- | --- | --- | --- | | Height in inches | Weight in lbs | | | | | 90 - 100 | 100 - 110 | 110 - 120 | 120 - 130 | | 50 – 55 | 4 | 7 | 5 | 2 | | 55 – 60 | 6 | 10 | 7 | 4 | | 60 – 65 | 6 | 12 | 10 | 7 | | 65 - 70 | 3 | 8 | 6 | 3 |   Calculate the i. coefficient of regression and ii. two regression equations. | | CO3 | 12 |
|  | b. | The values of x and y obtained in an experiment are as follows.   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | x | 2.30 | 3.10 | 4 | 4.92 | 5.91 | 7.20 | | y | 33 | 39.1 | 50.3 | 67.2 | 85.6 | 125 |   Test graphically the accuracy of y = aebx and if the law holds, find the best values of a and b. | CO3 | | 8 |
| 5. | a. | Evaluate the values at the interior lattice points of a square region of the harmonic function ‘u’ whose boundary values are as shown in the following figure.  C:\Users\Porselvi\Final Thesis as on 17.03.2015 (K. Porselvi)\Desktop\11.jpg | CO4 | | 15 |
| b | Classify the following partial differential equation uxx + 4uxy + (x2 + 4y2)uyy = sin(x+y) | CO4 | | 5 |
| (OR) | | | | | |
| 6. | a. | Solve the Poisson’s equation uxx + uyy = -10(x2 + y2 +5) in the domain 0≤x,y≤1 subject to the conditions u = 0 at x = 0, x = 1, y = 0 and u = 1 at y = 1 for 0<x<1, using central difference approximation to both the space derivatives with uniform mesh spacing h = 1/3. | CO4 | | 10 |
|  | b. | Solve the parabolic equation  when u(0,t) = 0, u(4,t) = 0, u(x,0) = x(4-x) assuming h = k = 1. Find the values of u upto t = 5. | CO4 | | 10 |
| 7. |  | Explain briefly artificial neural networks with examples and its applications. | CO5 | | 20 |
| (OR) | | | | | |
| 8. |  | Explain briefly fuzzy logic with examples and its applications. | CO5 | | 20 |
|  | |  |  | |  |
|  | | **Compulsory:** |  | |  |
| 9. |  | Explain briefly the applications of factor analysis in data reduction technique. | CO6 | | 20 |

ALL THE BEST