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



**UNIVERSITY**

(Karunya Institute of Technology & Sciences)

(Declared as Deemed-to-be University under Sec.3 of the UGC Act, 1956)

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| **End semester Examination - April/May 2017** | | | |
| **Code :** | **16MA3003** | **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. | In a shooting test, the probability of hitting the target is ½ for A, 2/3 for B and ¾ for C. If all of them fire at the target, find the probability that (i) none of them hits the target and (ii) at least one of them hits the target. | CO1 | 5 |
| b. | A random variable X has the following probability distribution.   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | x | -2 | -1 | 0 | 1 | 2 | 3 | | p(x) | 0.1 | K | 0.2 | 2K | 0.3 | 3K |   Evaluate the value of (i) K, (ii) mean of X, (iii) cdf of X and (iv) P(X<1). | CO1 | 8 |
| c. | The weekly wages of 1000 workmen are normally distributed around a mean of Rs.70 with a standard deviation of Rs.5. Estimate the number of workers whose weekly wages will be (i) between Rs.69 and Rs.72 (ii) less than Rs.69 and (iii) more than Rs.72. | CO1 | 7 |
| (OR) | | | | |
| 2. | a. | The following table shows the distribution of digits in the numbers chosen at random from a telephone directory.   |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | Digit | 0 | 1 | | 2 | | 3 | | 4 | | 5 | 6 | | freq | 1026 | 1107 | | 997 | | 966 | | 1075 | | 933 | 1107 | | Digit | 7 | | 8 | | 9 | | Total | | | freq | 972 | | 964 | | 853 | | 10000 | |   Test whether the digits may be taken to occur equally frequently in the directory. | CO1 | 10 |
| b. | A random sample of n = 8 whose data points are given by **1.41,  0.26,  1.97,  0.33,  0.55,   0.77,   1.46,   1.18.** Is there any evidence to suggest that these datas were not randomly sampled from a Uniform(0, 2) distribution?. | CO1 | 10 |
| 3. | a. | Compute the correlation coefficient for the following heights (in inches) of fathers (X) and their sons (Y).   |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | | X | 65 | 66 | 67 | 67 | 68 | 69 | 70 | 72 | | Y | 67 | 68 | 65 | 68 | 72 | 72 | 69 | 71 | | CO1 | 8 |
| b. | From the following data, evaluate (i) the two regression equations, (ii) coefficient of correlation between the marks in economics and statistics and (iii) the most likely mark in statistics when the economics mark is 30.   |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | Marks in economics | 25 | 28 | 35 | 32 | 31 | 36 | 29 | 38 | 34 | 32 | | Marks in Statistics | 43 | 46 | 49 | 41 | 36 | 32 | 31 | 30 | 33 | 39 | | CO1 | 12 |
| (OR) | | | | |
| 4. | a. | Evaluate the regression equation of Y on X and correlation of coefficient from the following table giving the marks in Accountancy(X) and Statistics(Y).   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | Y  X | 5-15 | 15-25 | 25-35 | 35-45 | Total | | 0-10 | 1 | 1 | - | - | 2 | | 10-20 | 3 | 6 | 5 | 1 | 15 | | 20-30 | 1 | 8 | 9 | 2 | 20 | | 30-40 | - | 3 | 9 | 3 | 15 | | 40-50 | - | - | 4 | 4 | 8 | | Total | 5 | 18 | 27 | 10 | 60 | | CO1 | 12 |
|  | b. | R is the resistance to maintain a train at speed V, find a law of the type R = a+bV2 conneccting R and V, using the following data:   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | V (miles/hr) | 10 | 20 | 30 | 40 | 50 | | R (lb/ton) | 8 | 10 | 15 | 21 | 30 | | CO1 | 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 | CO1 | 15 |
| b | Classify the following partial differential equation  uxx + 4uxy + (x2 + 4y2)uyy = sin(x+y) | CO1 | 5 |
| (OR) | | | | |
| 6. | a. | Solve the laplace equation uxx + uyy = 0 by employing five point formulae, which satisfy the Dirichlet boundary conditions u(x,0) = 0, u(0,y) = 0, u(x,1) = 100x, u(1,y) = 100y. | CO1 | 10 |
|  | b. | Solve the parabolic equation  when u(0,t) = 0, u(4,t) = 0, u(x,0) = x(4-x) assuming h = 1. Find the values of u upto t = 5. | CO1 | 10 |
| 7. |  | Explain briefly artificial neural networks with examples and its applications. | CO2 | 20 |
| (OR) | | | | |
| 8. |  | Explain briefly fuzzy logic with examples and its applications. | CO2 | 20 |
|  | | **Compulsory:** |  |  |
| 9. |  | Explain briefly the applications of factor analysis in data reduction technique. | CO3 | 20 |

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