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



**End Semester Examination – Nov / Dec – 2019**

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |
| **Code :** | **18MA2003** | **Duration :** | **3hrs** |
| **Sub. Name :** | **PARTIAL DIFFERENTIAL EQUATIONS, PROBABILITY AND STATISTICS** | **Max. Marks :** | **100** |

|  |  |  |  |
| --- | --- | --- | --- |
| **Q. No.** | **Questions** | **Course Outcome** | **Marks** |
| **PART – A (10X1=10 MARKS)** | | | |
| 1. | Solve | CO1 | 1 |
| 2. | Solve | CO1 | 1 |
| 3. | One dimensional wave equation is --------- | CO2 | 1 |
| 4. | Write two dimensional heat equation. | CO2 | 1 |
| 5. | If A and B are 2 mutually exclusive events such that *P(A)=1/2* and *P(B)=1/3*, find | CO4 | 1 |
| 6. | Mean of Binomial distribution is -------- | CO4 | 1 |
| 7. | State any one property of the cdf of a two-dimensional random variable (X, Y). | CO4 | 1 |
| 8. | Variance of exponential distribution is ------ | CO4 | 1 |
| 9. | The mode of the numbers 7, 7, 7, 9, 11, 11, 12, 15 | CO3 | 1 |
| 10. | A frequency curve is said to be Platykurtic when  is -------. | CO3 | 1 |

|  |  |  |  |
| --- | --- | --- | --- |
| **PART – B (6 X 3 = 18 MARKS)** | | | |
| 11. | Solve | CO1 | 3 |
| 12. | Write all the possible solutions of one-dimensional heat equation. | CO2 | 3 |
| 13. | A box contains 4 bad and 6 good tubes. Two are drawn out from the box at a time. One of them is tested and found to be good. What is the probability that the other one is also good? | CO4 | 3 |
| 14. | A continuous random variable X that can assume any value between *x=2* and *x=5* has a density function given by *f(x)= k(1+x).*Find the value of k. | CO4 | 3 |
| 15. | Find the rank correlation co-efficient for the following data:   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | Rank in x | 3 | 2 | 4 | 1 | 5 | | Rank in y | 2 | 5 | 3 | 4 | 1 | | CO3 | 3 |
| 16. | Define Type I and Type II error. | CO5 | 3 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q.no 17 to 23. Q.No 24 is a Compulsory Question)** | | | |
| 17. | a. | Solve | CO1 | 6 |
| b. | Solve | CO1 | 6 |
|  |  |  |  |  |
| 18. | a. | An insulated rod of length l has its ends A and B maintained at C and  respectively until steady state conditions prevail. If B is suddenly reduced to C and maintained at C, find the temperature at a distance *x* from *A* at time *t*. | CO2 | 12 |
|  |  |  |  |  |
| 19. | a. | The chances of A, B and C becoming the general manager of a certain company are in the ratio 4:2:3. The probabilities that the bonus scheme will be introduced in the company if A, B and C become general manager are 0.3, 0.7 and 0.8 respectively. If the bonus scheme has been introduced, what is the probability that A has been appointed as general manager? | CO4 | 6 |
| 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 |  1. Find K (b) Evaluate *P(X<2)* (c) Evaluate *P(-2<X<2)* | CO4 | 6 |
|  |  |  |  |  |
| 20. | a. | The joint probability mass function of (X, Y) is given by *p(x, y)=k(2x+3y), x= 0, 1, 2; y=1, 2,3*. Find all the marginal and conditional probability distributions. Also find the probability distribution of (X+Y). | CO4 | 12 |
| 21. | a. | Calculate mean, median, mode, upper quartile and lower quartile of the following data:   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | Class | 0-10 | 10–20 | 20–30 | 30 –40 | 40 – 50 | 50 – 60 | | Freq. | 14 | 17 | 22 | 26 | 23 | 18 | | CO3 | 12 |
|  |  |  |  |  |
| 22. | 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) atleast 1 is good (iv) atmost 1 is good (v) exactly 1 is good (vi) neither has mojor defects and (vii) neither is good. | CO4 | 12 |
|  |  |  |  |  |
| 23. | a. | Compute the correlation co-efficient for the following data:   |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | | *x* | 78 | 89 | 97 | 69 | 59 | 79 | 68 | 57 | | *y* | 125 | 137 | 156 | 112 | 107 | 138 | 123 | 108 | | CO4 | 6 |
| b. | If *y* is the pull required to lift a load *x* by means of a pulley block, find a linear law of the form *y=ax+b* connecting *x* and *y*, using the following data:   |  |  |  |  |  | | --- | --- | --- | --- | --- | | *y* | 12 | 15 | 21 | 25 | | *x* | 50 | 70 | 100 | 120 |   Compute *y* when *x*=150kg.wt. | CO3 | 6 |
|  | **Compulsory:** | | | |
| 24. | a. | A sample of size 13 gave an estimated population variance of 3 while another sample of size 15 gave an estimate of 2.5. Could both samples be from population with same variance? | CO5 | 6 |
| b. | Find if there is any association between extravagance in fathers and extravagance in sons from the following data.  Question No.24 from Module 6   |  |  |  | | --- | --- | --- | |  | Extravagance father | Miserly father | | Extravagance son | 327 | 741 | | Miserly son | 545 | 234 | | CO6 | 6 |