# CMR TECHNICAL CAMPUS
## UGC AUTONOMOUS
### BTech.IV Semester Supply End Examinations, Feb-2023
### Computer Oriented Statistical Methods
### Common to CSM &CSD

**Time: 3 Hours**                                          **Max. Marks: 70**

### Note
i.   This Question paper contains Part- A and Part- B.
ii.  All the Questions in Part A are to be answered compulsorily.
iii. All Questions from Part B are to be answered with internal choice among them.

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## PART-A

10 X 02 = 20 Marks

| | | | Marks | CO | BL |
|---|---|---|---|---|---|
| 1. | a | Let X denotes the number of heads in a single toss of 4 fair coins. Determine $P(1<X<3)$ | 2M | CO1 | L2 |
| | b | A fair coin is tossed until a head or consecutive five tails occurs. Find the discrete probability distribution | 2M | CO1 | L2 |
| | c | Find the value of finite population correction factor for n=10 and N=1000. | 2M | CO2 | L2 |
| | d | A random sample of size 100 has a standard deviation of 5. What can you say about maximum error with 95% confidence? | 2M | CO2 | L1 |
| | e | Discuss Testing of hypothesis | 2M | CO3 | L1 |
| | f | Define Type I and Type II errors | 2M | CO3 | L1 |
| | g | Construct normal equations for fit a straight line by method of least squares | 2M | CO4 | L1 |
| | h | Find the Newton-Raphson iterative formula to find the reciprocal of a number N, N>0. | 2M | CO4 | L1 |
| | i | Evaluate $\int_2^7 \frac{1}{x} dx$ using Trapezoidal rule taking n=5 | 2M | CO5 | L1 |
| | j | What are the limitations of Taylor's series method | 2M | CO5 | L1 |

## PART- B

5 X 10 = 50 Marks

| | | | Marks | CO | BL |
|---|---|---|---|---|---|
| 2. | a | Find the mean and standard deviation of a normal distribution in which 7% of items are under 35 and 89% are under 63 | 5M | CO1 | L3 |
| | b | Two dice are thrown 5 times. Find the probability of getting 7 as sum i) at least once and ii) exactly two times | 5M | CO1 | L2 |

OR

| 3 | a | A discrete random variable X has the mean 6 and variance 2. If it is assumed that the distribution is Binomial. Find $P(5 \leq x \leq 7)$. | 5M | CO1 | L3 |
|---|---|---|---|---|---|
| | b | The mean and standard deviation of the marks obtained by 1000 students in an examination are respectively 34.5 and 16.5. Assuming the normality of the distribution, find the approximate number of students expected to obtain marks between 30 and 60 | 5M | CO1 | L2 |
| 4 | a | A population consists of five numbers 3, 6, 9, 15, 27. Consider all possible samples of size 3 that can be drawn without replacement from this population. Find a) the population mean b) the population standard deviation c) the mean of the sampling distribution of mean and the standard deviation of the sampling distribution of means | 10M | CO2 | L2 |

OR

| 5 | a | A machine manufacturing bolts is known to produce 5% defective in a random sample of 10 bolts, compute the probability that there are (i) exactly 3 defective bolts (ii) not more than 3 defective bolts. | 5M | CO2 | L3 |
|---|---|---|---|---|---|
| | b | Two dice are thrown 4 times. If getting a sum of 7 is a success, find the probability that getting the success (i) twice (ii) only once | 5M | CO2 | L2 |
| 6 | a | The means of two large sample of sizes 1000 and 2000 members are 67.5 inches and 68.0 inches respectively. Can the samples be regarded as drawn from the same population of S.D. 2.5 inches. | 5M | CO3 | L3 |
| | b | Discuss critical region and level of significance with example | 5M | CO3 | L1 |

OR

| 7 | a | A random sample of size 81 is taken whose variance is 20.25 and mean is 32. Construct 98% confidence interval. | 5M | CO3 | L2 |
|---|---|---|---|---|---|
| | b | Explain the terms i) one-tailed and ii)two-tailed tests | 5M | CO3 | L1 |
| 8 | a | Find a root of the equation $xe^x = 1$ using the method of false position correct to two decimal places. | 10M | CO4 | L3 |

OR

| 9 | a | Fit the parabola y=a+bx+cx² to the following data | 10M | CO4 | L3 |
|---|---|---|---|---|---|

| x | 0 | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|
| y | 1 | 0 | 3 | 10 | 21 |

| 10 | a | Using Runge – Kutta Second order formula, solve the equation $y^1 = 2 + \sqrt{xy}$ with y(1)=1 for x=1.2,1.4. | 10M | CO5 | L3 |
|---|---|---|---|---|---|

OR

| 11 | a | Solve the equation $y^1 = x + y^2$ subject to the condition y(0)=1 by Picard's method. | 5M | CO5 | L3 |
|---|---|---|---|---|---|
| | b | Using Euler's method solve for y (2) from y¹=3x²+1, y(1)=2 taking step size h = 0.25 | 5M | CO5 | L3 |

# CMR TECHNICAL CAMPUS
## UGC AUTONOMOUS

### B.Tech - IV Semester, Regular End Examinations, July-2022
### COMPUTER ORIENTED STATISTICAL METHODS [20MA403BS]
### (Common to CSM & CSD)

Time: 3 Hours

Max. Marks: 70

### Answer Any Five Questions
### All Questions Carry Equal Marks.

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5 X 14 = 70 Marks

1. a. If X is a random variable and a, b are constants, then prove that    **5 Marks**

    (i) $E(ax + b) = a.E(x) + b$    (ii) $V(y) = a^2.V(x)$, where $y = ax + b$

    b. Two dies are thrown, let X assigns to each point (a, b) in 's' the maximum    **9 Marks** of its numbers i.e. X (a, b) = max (a, b). Find the pdf, X is a random variable X(s) = {1,2,3,4,5,6}. Also find the mean and variance of the distribution.

2. a. A continuous random variable has the pdf $f(x) = \begin{cases} kxe^{-\omega x}, & x \ge 0, \omega > 0 \\ 0, & otherwise \end{cases}$    **7 Marks**

    Determine (i) k    (ii) Mean    (iii) variance

    b. Fit a Binomial distribution to the following data.    **7 Marks**

| X | 0 | 1 | 2 | 3 | 4 | 5 |
|------|---|----|----|----|----|---|
| f(X) | 2 | 14 | 20 | 34 | 22 | 8 |

3. a. A sample of size 300 was taken whose variance is 225 and mean is 54.    **7 Marks** Construct 95% confidence interval for the mean.

    b. A random sample of 500 items has mean 20 and another sample of size    **7 Marks** 400 has mean 15. Can you conclude that the two samples are taken from same Population with 4 as S.D.?

4. a. Explain the terms Type I, Type II errors and critical region.    **5 Marks**

    b. A die was thrown 9000 times and of these 3220 yielded a 3 or 4. Is this consistent with the hypothesis that the die was unbiased.    **9 Marks**

5. a. Define $\chi^2$ distribution and write its properties.    **5 Marks**

    b. Two horses A and B were tested according to the time (in sec) to run a particular track with the following results.    **9 Marks**

# CMR TECHNICAL CAMPUS
## UGC AUTONOMOUS
### B.Tech. IV Sem Supply End Examinations, February-2024
### Computer Oriented Statistical Methods
### Common to CSM, CSD, AIML, CSG

Time: 3 Hours                            Max. Marks: 70

### Note
i. This Question paper contains Part- A and Part- B.
ii. All the Questions in Part A are to be answered compulsorily.
iii. All Questions from Part B are to be answered with internal choice among them.

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## PART-A

**10 X 02 = 20 Marks**

| | | | Marks | CO | BL |
|---|---|---|---|---|---|
| 1. | a | Define Continuous random variable with example. | 2M | CO1 | I |
| | b | Find the standard deviation of a binomial distribution with $n = 12$ and $p = 0.6$. | 2M | CO1 | II |
| | c | Define point estimation and interval estimation | 2M | CO2 | I |
| | d | Define Type I and Type II errors. | 2M | CO2 | I |
| | e | Define Small Sample with example | 2M | CO3 | I |
| | f | Define degrees of freedom. | 2M | CO3 | I |
| | g | Write the NORMAL EQUATIONS of Straight line $y = a + bx$ | 2M | CO4 | II |
| | h | Write the iteration formula of square root of a number by Newton-Raphson Method | 2M | CO4 | I |
| | i | Explain Runge-Kutta 2$^{nd}$ order method. | 2M | CO5 | I |
| | j | Write the formulae for Simpson's 3/8$^{th}$ rule. | 2M | CO5 | I |

## PART- B

**5 X 10 = 50 Marks**

| | | | Marks | CO | BL |
|---|---|---|---|---|---|
| 2. | a | Find Mean, Median, Mode of a continuous random variable $X$ having the density function $$f(x) = \begin{cases} \frac{1}{2} \sin x & if\ 0 \leq x \leq \pi \\ 0 & elsewhere \end{cases}$$ and also find the probability between 0 and $\pi/2$. | 5M | CO1 | II |
| | b | Let X denote the minimum of the two numbers that appear when a pair of fair dice is thrown once. Determine the (i) Discrete probability distribution (ii) Expectation (Mean) (iii) Variance | 5M | CO1 | III |

### OR

| | | | Marks | CO | BL |
|---|---|---|---|---|---|
| 3 | a | Derive the mean of a Binomial distribution. | 5M | CO1 | II |
| | b | If the probability that an individual suffers a bad reaction from a certain injection is 0.001, determine the probability that out of | 5M | CO1 | II |

2000 individuals (i) exactly 3 (ii) more than 2 individuals (iii) none (iv) more than one individual suffers a bad reaction

| | | | | | |
|---|---|---|---|---|---|
| 4 | a | A sample of 64 students have a mean weight of 70 kgs. Can this be regarded as a sample from a population with mean weight 56 kgs and standard deviation 25 kgs. | 5M | CO2 | II |
| | b | In two large populations, there are 30%, and 25% respectively of fair-haired people. Is this difference likely to be hidden in samples of 1200 and 900 respectively from the two populations. | 5M | CO2 | II |

OR

| | | | | | |
|---|---|---|---|---|---|
| 5 | | Samples of size 2 are taken from the population 1, 2, 3, 4, 5, 6 with replacement Find (i) Mean of the population (ii) Standard deviation of the population (iii)Mean of the sampling distributions of means (iv) Standard deviation of the sampling distributions of means | 10M | CO2 | III |

| | | | | | |
|---|---|---|---|---|---|
| 6 | a | A sample of 26 bulbs gives a mean life of 900 hours with a S.D. of 20 hours. The manufacturer claims that the mean life of bulbs is 1000 hours. Is the sample not up to the standard. | 5M | CO3 | II |
| | b | The number of automobile accidents per week in a certain community are as follows: 12, 8, 20, 2, 14, 10, 15, 6, 9, 4. Are these frequencies in agreement with the belief that accident conditions were the same during this 10 week period. | 5M | CO3 | II |

OR

| | | | | | |
|---|---|---|---|---|---|
| 7 | a | The time taken by workers in performing a job by Method I and Method II is given below. | 10M | CO3 | III |

| Method I | 20 | 16 | 26 | 27 | 23 | 22 | - |
|---|---|---|---|---|---|---|---|
| Method II | 27 | 33 | 42 | 35 | 32 | 34 | 38 |

Do the data show that the variances of time distribution from population from which these samples are drawn do not differ significantly?

| | | | | | |
|---|---|---|---|---|---|
| 8 | a | Find a real root of $e^x \sin x = 1$ using Newton Rap son's Method. | 5M | CO4 | II |
| | b | Fit a curve of the form $y = ae^{bx}$ to the data | 5M | CO4 | III |

| X | 0 | 1 | 2 | 3 |
|---|---|---|---|---|
| Y | 1.05 | 2.10 | 3.85 | 8.30 |

OR

| | | | | | |
|---|---|---|---|---|---|
| 9 | | Fit a parabola of the form $y = a+bx+cx^2$ to the following data | 10M | CO4 | III |

| X | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|
| Y | 2.3 | 5.2 | 9.7 | 16.5 | 29.4 | 35.5 | 54.4 |

| | | | | | |
|---|---|---|---|---|---|
| 10 | a | Evaluate $\int_0^1 \dfrac{dx}{1+x^2}$ Using i) Trapezoidal rule ii) Simpson's $\dfrac{3}{8}^{th}$ rule | 5M | CO5 | II |
| | b | Find y (0.1) & y (0.2) using Eulers method given that $y' = y^2 + x$ , $y(0) = 1$ | 5M | CO5 | III |

OR

| | | | | | |
|---|---|---|---|---|---|
| 11 | a | Find y (0.1) & y (0.2) using Taylor's Series method given that $y' = x - y^2$ , $y(0) = 1$ | 10M | CO5 | III |

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