24000590

B.Sc DEGREE (CBCS) REGULAR / REAPPEARANCE EXAMINATIONS, MARCH 2024
Sixth Semester
CORE COURSE - ST6CRT12 - STATISTICAL COMPUTING USING R- SOFTWARE

Common for B.Sc Statistics Model I & B.Sc Computer Applications Model III Triple Main

2017 Admission Onwards

60435A7B

Time: 3 Hours

Max. Marks : 80

Part A

*Answer any **ten** questions.*

*Each question carries **2** marks.*

1. Write the R command used and value of the following calculation.

$$\frac{1^3 + 3^3 + 5^3 + \dots + 51^3}{1 + 3 + 5 + \dots + 51}$$

2. Write the outcome of the following R command

$$sqrt(c(49, 81, 25, 36)) + abs(c(-2, -3, -4, -6))/sqrt(c(4, 9, 16, 36)) - c(7, 9, 5, 6)$$

3. If x, y and z are three matrices given by the R commands x <- matrix(nrow = 4, ncol = 3, data = c(1,2,3,4,12,13,14,15,23,24,25,26), byrow = TRUE); y <- t(x) ; z <- x%*% y what are the outputs matrices x , y and z

4. Store the following data set to the variable x1:- **29.5 ,27.9 ,19.1, 21.1, 23.1, 30.9, 30.1, 28.2, 18.8, 26.1, 18.6, 24.8 ,26.3, 21.8** and find the mean and median of the data. Write the required R commands.

5. Write the R commands used to represent the following data by a pie diagram

Sources	Excise	Customs	Corporate Tax	Income Tax	Others
Tax Revenue	4535	6223	2650	1080	890

6. Compute the pmf of random variable following binomial distribution with parameters n = 4 and p= 0.37 .Also write R commands used. Round the probabilities to 3 decimal places

7. Compute the expected frequency for x = 4 of a random variable following Poisson distribution with lamda = 2.3 with total frequency N= 100.Also write R commands used.

8. Find the value of the probability P[0.23< X <2.64] where X follows exponential distribution with parameter lamda(rate) = 0.45

9. Calculate the cov(X,Y), Pearson's coefficient of correlation and Spearman's rank correlation coefficient of the following data

X	3	5	6	7	10	11
Y	8	12	11	14	16	17

10. Obtain the regression line of y on x and x on y of the following data

X	142	168	156	173	175	176	177
Y	155	160	163	175	178	179	180

11. Construct the 90 percent and 95 percent confidence interval of the population mean of the following random sample

$57, 45, 51, 50, 45, 46, 45, 48, 49, 49, 55, 57, 45, 57, 42$

12. The following are observations of a random sample from a normal population, test, whether the population mean, is a) 30 or not, b) 30 or greater than 30

$33, 20, 34, 33, 30, 28, 29, 22, 31, 31, 27, 34, 29, 31, 25$

(10×2=20)

Part B

*Answer any **six** questions.*

*Each question carries **5** marks.*

13. Find the Geometric mean and harmonic mean of the following grouped frequency table. Also, write R commands used

Class	100-110	110-120	120-130	130-140	140-150	150-160	160-170	170-180
Frequency	6	10	16	25	10	7	4	2

14. Draw a stem and leaf diagram of the following data

$44, 53, 45, 39, 40, 31, 38, 41, 46, 38, 43, 49, 41, 47, 41, 39, 43, 47$

15. Find the range, quartile deviation and mean deviation about median of the following data. Also write R commands used

$203, 178, 149, 172, 212, 238, 171, 126, 170, 165, 206, 180, 191, 186, 181, 212, 215, 179, 216, 183$

16. Find the mean, median and Quartile deviation of the following grouped frequency table. Also, write R commands used

Class	0-25	25-50	50-75	75-100	100-125	125-150	150-175	175-200
Frequency	3	13	19	23	26	22	12	2

17. If X follows Exponential distribution with rate =.0125 , find the unknown values a,b,c,d ,if

$1) P[X < 90] = a, \quad 2) P[75 < X < 95] = b,$

$3) P[X < c] = .65 \quad 4) P[X > d] = .78$

18. If X follows Normal distribution with mean 60 and standard deviation 8, find the unknown values a,b,c,d ,if
$$1) P[X < 65] = a, \qquad 2) P[45 < X < 65] = b,$$
$$3) P[X < c] = .555 \qquad 4) P[-d < X - 60 < d] = .56$$

19. The following are the mark obtained by two groups of students. Assuming that the group standard deviations are different and the marks are normally distributed, test the hypothesis that the group means are equal

    Group I : 54, 55, 50, 53, 54, 56, 56, 50, 55, 53, 52

    Group II : 52, 51, 48, 59, 45, 57, 48, 50, 51, 51, 47, 54

    Also, construct 99% confidence interval for $\mu_1 - \mu_2$

20. Test whether son's eye colour and father's eye colour are associated with the help of the data given below

Fathers eye colour	Eye colour of Son	
	Not light	Light
Not light	230	148
Light	151	471

21. The time taken by workers in performing a job by method I and method II are given below

    Method I   63, 59, 58, 43, 40, 51, 38, 40

    Method II   48, 33, 45, 56, 40, 43, 53, 49, 42, 43

    Does the data show that variances of time distribution by two methods do not differ significantly. Construct 95% confidence interval for variance ratio.

    (6×5=30)

Part C

*Answer any **two** questions.*

*Each question carries **15** marks.*

22. Calculate the first four raw moments and central moments of the following data. Obtain the moment measures of skewness and kurtosis. Also, write the R commands used,

Class	0-30	30-60	60-90	90-120	120-150	150-180	180-210	210-240	240-270
Frequency	6	8	19	45	58	27	24	12	1

23. a) If X follows binomial distribution with n= 20 and p= 0.5, find the unknown values a,b,c,d

$$1) P[X = 10] = a, \qquad 2) P[X < 7] = b$$
$$3) P[6 < X < 12] = c \qquad 4) P[X \geq 13] = d$$

    b) If X follows Poisson distribution with mean = 3.7 , find the unknown values p,q,r,s

$$1) P[X = 2] = p, \qquad 2) P[X < 4] = q$$
$$3) P[5 < X < 10] = r, \qquad 4) P[X \geq 15] = s$$

Turn Over

c) Find k such that P[x<k] = 0.94, where x follows Student t distribution with degree of freedom = 7

24. a) Obtain the 95% confidence interval for the Pearson's coefficient of correlation Also test the hypothesis that $\rho = 0$ or not

X	34	28	38	25	30	31	25	30	37	31	31	27
y	24	22	28	21	22	22	21	22	27	23	22	22

b) Fit a linear model of the form " $y = a + b x$ " and a second degree polynomial of the form " $y = a + b x + c x^2$ " to the following data. Compare the two models

X	1	2	3	4	5	6	7	8	9	10
y	5	6	9	9	12	14	16	20	23	25

25. Perform ANOVA and test whether there is any significant difference between the fertilizers.

Fertilizer	Yield
1 ……..	4.1, 7.5, 4.4, 5.2, 5.6
2 ……..	5.8, 3.5, 4.3, 5.1, 5.5, 7.0
3 ……..	5.3, 7.4, 4.7, 3.6, 6.4
4 ……..	4.7, 4.6, 5.2, 5.8, 5.1, 5.3, 4.8

(2×15=30)