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Reg No   :   ....

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B.Sc DEGREE (CBCS) REGULAR / REAPPEARANCE / MERCY CHANCE EXAMINATIONS, FEBRUARY 2025

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

3AE9AC0E

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.

$$5^9 - 98^3 + \frac{6812(38^5 - 13^6)}{769^4 - 317^2} - 1011934$$

2. Write the outcome of the following R command **c(12,24,34,45)^c(2,3,1,2)/c(3,6,2,5)**

3. If x, y and z are three matrices given by the R commands x <- matrix(nrow = 2, ncol = 4, data = c(1,2,3,4,11,12,13,14), 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:- **68.6 ,78.0 , 69.8, 69.8 ,73.8, 70.0 , 75.1, 78.7 , 68.8, 65.1, 66.9 ,75.0** 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 simple bar diagram

Sources	Excise	Customs	Corporate Tax	Income Tax	Others
Tax Revenue	6535	7223	2550	580	790

6. Compute the pmf of random variable following binomial distribution with parameters n = 5 and p= 0.43 .Also write R commands used. Round the probabilities to 3 decimal places.

7. Compute the expected frequency for x = 3 of a random variable following Poisson distribution with lamda = 2.1 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	37	37	38	40	42	44	45
Y	11	16	15	17	19	21	23

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

X	1	2	3	4	5	6
Y	24	30	36	51	70	80

11. Construct the 95 percent and 99 percent confidence interval of the population mean of the following random sample

117, 128, 120, 122, 125, 117, 141, 127, 133, 123, 123, 151, 138, 115, 134

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	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100
Frequency	8	15	23	35	40	33	18	8

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

20, 14, 21, 43, 17, 15, 26, 8, 14, 39, 23, 16, 46, 28, 11, 26, 35, 26, 28, 30, 22, 23, 7, 32, 19, 18, 27, 9

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

272, 284, 270, 267, 266, 287, 227, 312, 272, 243, 244, 282, 248, 281, 329, 254, 303, 267, 230, 237

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

Class	0-50	50-100	100-150	150-200	200-250	250-300	300-350	350-400
Frequency	6	10	16	25	10	7	4	2

17. If X follows Exponential distribution with rate =.0125 , find the unknown values a,b,c,d ,if
$1) P[X < 90] = a,$ $2) P[75 < X < 95] = b,$
$3) P[X < c] = .65$ $4) P[X > d] = .78$

18. If X follows Normal distribution with mean 60 and standard deviation 6, find the unknown values a,b,c,d
$1) P[X < 66] = a,$ $2) P[54 < X < 67] = b,$
$3) P[X < c] = .38$ $4) P[d < X < 75] = .5$

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

Group I : 5.2, 13.2, 11.7, 17.5, 17.7, 7.0, 11.1, 14.7, 14.2, 16.1

Group II : 8.6, 9.5, 7.6, 14.5, 11.0, 7.0, 15.2, 7.4

Also, construct 95% 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

Father's 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   35,   29,   24,   28,   36 ,   38,   30,   37

Method   II   37,   33,   39,   36,   25,   27,   36,   35,   38,   33

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 measure of skewness and kurtosis. Also write the R commands used,

Class	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80
Frequency	6	11	16	20	12	8	4	3

23. . a) If X follows binomial distribution with n= 25 and p= 0.45, find the unknown values a,b,c,d

$1) P[X = 9] = a,$ $2) P[X < 12] = b,$

$3) P[5 \leq X \leq 14] = c,$ $4) P[X \geq 16] = d$

b) If X follows Poisson distribution with mean = 4 , find the unknown values p,q,r,s

$1) P[X = 3] = p,$ $2) P[X < 5] = q,$

$3) P[4 \leq X < 8] = r, 4) P[X \geq 7] = s$

c)Find k such that P[x<k] = 0.89, where x follows Student t distribution with degree of freedom = 8

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

X	37	29	29	23	20	22	21	32	32	39
y	50	37	42	30	24	30	32	42	42	53

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	8	10	12	12	15	17	19	23	26	29

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

| Treatment | | | | Yield | | | |

Treatment: 1   3.3,   1.1,   4.5,   3.2,   2.4

Treatment: 2   6.6,   3.6,   4.8,   4.8,   3.4,   2.0

Treatment: 3   1.8,   4.3,   5.3,   3.7,   3.3

Treatment: 4   4.5,   5.5,   3.7,   4.2,   4.1,   1.7,   3.7

(2×15=30)