Height of father (in inches)	Height of Son (in inches)
65	68
63	66
67	68
64	65
68	69
62	66
70	68
66	65
68	71
67	67
69	68
71	70

(i) Calculate Spearman's rank correlation co-efficient between heights of fathers & son. 6

(ii) Use Spearman's rank correlation tables to test for association of heights between fathers and sons. 3

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PG EVEN SEMESTER EXAMINATION, 2024

ECONOMICS

2nd Semester

Course No. : ECOCC - 553

(Statistics for Economics)

Full Marks : 70

Pass Marks : 28

Time : 3 hours

The figures in the margin indicate full marks for the questions

(Answer five questions taking one from each unit)

UNIT-I

1. (a) Distinguish between Population Regression Function and Sample Regression Function. 4

(b) Prove that the correlation co-efficient is the Geometric mean of the regression co-efficients. 3

(c) The following results were obtained in the analysis of data on yield of tea leaves (in kgs) (y) and age in years (x) of 200 tea plants.

	X	Y
Average	9.2	16.5
Standardviation	2.1	4.2
Correlation coefficient =		+ 0.84

Construct the two lines of regression and estimate the yield of tea leaves of a plant of age 8 years. 3+3+1=7

2. (a) Consider the following data and comment on the nature of correlation. 2

X	2	7	10
Y	- 6	- 21	- 30

(b) Show that Karl Pearson's correlation co-efficient is independent of the change of origin and scale. 6

(c) Using the above property, obtain the Karl Pearson's correlation for the following set of data: 6

X	65	66	67	67	68	69	70	72
Y	67	68	65	68	72	72	69	71

UNIT-II

3. (a) A continuous random variable is distributed between the calues 0 and 4 and its p.d.f is given by

$$f(x) = k\, n^3 (4 - x)^2$$

Find the value of k, the mean and standard deviation of the distribution. 2+2+2=6

(b) Show that for a normal distribution mean is equal to the mode. 6

(c) If X ~ N (12, 16) find P (X < 20) 2

(b) In a random sample of 500 mean from a particular district A of a state, 300 are found to be smokers. In another sample taken from district B, 550 mean out of 1000 men were found to be smokers. Do the data indicate that prevalence of smoking is higher in district A than in district B? 4

UNIT-V

9. (a) Explain what is meant by 'Between Group Sum of Squares' and 'Within Group Sum of Squares' in ANOVA. 3+3=6

(b) The following table show the weight (in gms) of a product produced by 3 different machines. Use ANOVA to test if trere is significant difference in the average weight of the product among the machines. 8

	Weight of product (in gms)		
	Machine 1	Machine 2	Marchine 3
	20	18	30
	22	22	28
	17	20	32
Total	59	60	90

10. (a) Out line the differences between parametric and non-parametric tests. 5

(b) The following table shows the height of a sample of 12 fathers and their oldest adult sons.

(Turn Over)

probability that the mean of a sample of 49 from the distribution will be negative. 3

(c) What do you mean by Stratified Random Sampling? A population of size 1000 consists of four ethnic groups. The distribution of the ethnic population is as follows

Group	A	B	C	D
Population	200	100	300	400

Draw a Stratified Random Sample of size 60 from this population. 2+3=5

UNIT-IV

7. (a) What do you mean by Type I and Type II error? Why are they referred to as Producer's risk and Consumer's risk respectively. 2+2+1+1=6

(b) A sample of size 100 is drawn from a population with standard deviation 4. The sample mean is observed to be 25. Obtain 95% confidence interval for the sample mean under the null hypothesis that population mean is 28. Hence, thest the significance of the stated population mean. 3+2=5

(c) Write a note on the application of t distribution. 3

8. (a) What do you mean by statistical inference? Write down the steps involved in statistical inference using the test of significance approach. 2+5=7

4. Derive Poisson distribution as a limiting case of Binomial distribution. Hence find the mean and variance of a variable under Poisson distribution. 6+4+4=14

UNIT-III

5. (a) Distinguish beween parameter and statistic. What do you mean by sampling distribution of a statistic? 2+3=5

(b) A population consists of four members

$$3, 7, 11, 15$$

Obtain all possible ordered samples of size two which can be drawn without replacement from this population. Hence, find

i) Sampling distribution of $\overline{x}$

ii) Population mean μ and population standard deviation σ

iii) E ($\overline{x}$) and SE ($\overline{x}$) 3+2+2+2=9

6. (a) Show that in Sample Random Sampling with replacement sample mean is an unbiased estimator of population mean but sampling variance is not an unbiased estimator of population variance. 2+4=6

(b) The mean of a certain normal distribution is equal to the standard error of the mean of samples of 2.5 from the distribution. Find the