

STELLA MARIS COLLEGE (AUTONOMOUS) CHENNAI – 86
(For candidates admitted from the academic year 2015-16 and thereafter)
SUBJECT CODE: 15EC/PC/RM24

M. A. DEGREE EXAMINATION, APRIL 2019
BRANCH III – ECONOMICS
SECOND SEMESTER

COURSE : MAJOR – CORE
PAPER : RESEARCH METHODS AND ANALYSIS–II (THEORY)
TIME : 2 HOURS **MAX. MARKS: 60**

ANSWER ANY SIX QUESTIONS. EACH ANSWER NOT TO EXCEED 300 WORDS.

(6 X 10 = 60)

Answer any 6 questions

1. (a) The average number of days to complete recovery from a particular type of knee operation is 123.7 days. From his experience a physician suspects that use of a topical pain medication might be lengthening the recovery time. He randomly selects the records of seven knee surgery patients who used the topical medication. The times to total recovery were:
128 135 121 142 126 151 123 128 135 121 142 126 151
123
Assuming a normal distribution of recovery times, perform the relevant test of hypotheses at the 5% level of significance. Would the decision be the same at the 1% level of significance?
(b) A large group of students took a test in Physics and the final grades have a mean of 70 and a standard deviation of 10. If we can approximate the distribution of these grades by a normal distribution, what percent of the students
i) scored higher than 80?
ii) should pass the test ($\text{grades} \geq 60$)?
iii) should fail the test ($\text{grades} < 60$)? [$P(z > 1) = 0.1586$]
2. (a) Explain the significance of multiple regression analysis using any economic illustration.
(b) What is the significance of standard error?
3. (a) You are drawing inferences about the mean of one population. When should you use the t distributions as the theoretical model rather than the normal curve model? Why is there a different critical t value for the different degrees of freedom?
(b) An education psychologist obtains scores on a third grade math test from 41 girls and 31 boys, with the following results: girls, mean=48.75 (sd=9.0); boys, mean=46.07 (sd=10). Test the difference for significance at both the 0.05 and the 0.01 levels (two-tailed).
4. (a) Two classes of pre-calculus students took an exam to place them into either Advance Placement or regular calculus the following year. Given the following data, can you reject the null hypothesis that, as groups these classes are equally prepared (or not) for AP calculus? Use u Test.

Class 1	Class 2
62	46
54	53
59	50
56	52
59	54

(b) Distinguish between parametric and nonparametric tests.

5. (a) A mail order company receives a steady supply of orders by telephone. The manager wants to investigate the pattern of calls received so he records the number of calls received per day over a period of 40 days as follows.

Number of calls per day	0	1	2	3	4	5	> 5
Frequency of calls	8	13	10	6	2	1	0

- (i) Calculate the mean and variance of the data. Comment on your answers.
(ii) State whether the conditions for using the Poisson distribution as a model apply.
(iii) Use the Poisson distribution to predict the frequencies of 0, 1, 2, 3... calls per hour.
(b) State the properties of a normal distribution.

6. What is a time series data? What are the various components of time series data?

7. Following table gives the gross national product (X) and demand for food (Y) measured in arbitrary units. Estimate the linear function:

X:	6	7	8	10	8	9	10	9	11	10
Y:	50	52	55	59	57	58	62	65	78	70

Test the significance with R^2 , F and t values. Also test the hypothesis that $b=0$ using confidence interval and tests of significance approach.

8. (a) A company makes three types of high-performance CRTs. A random sample finds lifetimes shown in the table at right. At the 0.05 level, is there a difference in the average lifetimes of the three types?

	Lifetime, hr			
Type A	407	411	409	
Type B	404	406	408	405 402
Type C	410	408	406	408

(b) State the properties of a t distribution.

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TIME : 1 HOUR

MAX. MARKS: 40

SECTION B

Answer any 4 Questions:

(4 x 10 Marks = 40 Marks)

1. The following are the marks obtained by 50 students in a college,
21, 3, 47, 42, 24, 0, 27, 59, 68, 37, 78, 11, 33, 79, 41, 29, 39, 54, 46, 82, 44, 30, 49, 51, 84, 54,
47, 51, 30, 56, 61, 66, 51, 32, 67, 71, 57, 50, 37, 61, 76, 81, 71, 58, 68, 87, 99, 77, 70.
(i) Construct an inclusive type frequency distribution table.
(ii) Calculate the mean and test if it is statistically different from 45.
(iii) Comment on the various parameters of the distribution.
2. A study of the effect of caffeine on muscle metabolism used eighteen male volunteers who each underwent arm exercise tests. Nine of the men were randomly selected to take a capsule containing pure caffeine one hour before the test. The other men received a placebo capsule. During each exercise the subject's respiratory exchange ratio (RER) was measured. (RER is the ratio of CO₂ produced to O₂ consumed and is an indicator of whether energy is being obtained from carbohydrates or fats).

Check, whether, on average, caffeine changes RER.

RER with Placebo	RER with Caffeine
105	96
119	99
100	94
97	89
96	96
101	93
94	88
95	105
98	88

3. the weights (in gm) of a number of copper wires, each of length 1 metre are obtained. These are shown below classified according to the dies from which the wires come:

Die no.				
I	II	III	IV	V
1.30	1.28	1.32	1.31	1.30
1.32	1.35	1.29	1.29	1.32
1.36	1.33	1.31	1.33	1.30
1.35	1.34	1.28	1.31	1.33
1.32		1.33	1.32	
1.37		1.30		

Test the hypothesis that there is no difference between the mean weights of the wires coming from the different dies.

4. the following table is based on a random sample of persons attending the preview of a motion picture:

	Age below 40	Age 40 or above
Liked the picture	32	8
Did not like the picture	4	6

Judge whether the picture had equal appeal to the young and the old.

5. Use an appropriate diagram to represent the following data:

Item	Area (mn hectares)
1. Total Geographical Area	329
2. Total reporting area	305
3. Barren land	41
4. Area under forest	67
5. Permanent grazing land	12
6. Cultural waste land	19
7. Fallow land	30
8. Net area sown	136

6. The following table shows the data on salaries, gender, and work experience (in years) of some employees of a company. Check if gender and work experience significantly affect salary in the said company.

Sl. No.	Gender	Work Experience	Salary
1	F	9	21
2	F	1	96
3	F	4	47
4	F	1	128
5	F	4	64
6	F	1	52
7	F	4	73
8	F	7	19
9	M	6	128
10	M	3	474
11	M	3	342
12	M	2	330
13	M	7	185
14	M	7	331
15	M	1	267
16	M	6	517
17	M	8	390
