

**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 2017**  
**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)**

1. A) Define the probability density function, expected value and variance of a random variable 'x'.  
 B) Compare and contrast Binomial and Poisson distributions by highlighting their properties.
2. A) State the properties of Normal Distribution.  
 B) The mean yield for one acre plot is 662 kgs with a standard deviation of 32 kgs. Assuming normal distribution, how many one acre plots in a batch of 10000 plots would expect yield:
  - a) Over 700 kgs.
  - b) Below 650 kgs.
  - c) What is the lowest yield of 1000 plots?

[Hint: Area: 1.19 = 0.3830    0.38=0.1480    1.28=0.3997]

3. The following table gives the per capita household expenditure on food (Y) and per capita household expenditure (X) :

Y:	60	90	110	125	150	170	180	200	220	230	240	250	255	260	260
X:	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800

Estimate the food expenditure equation and test the significance of the parameters.

[Hint:  $t_{\alpha=0.025, 13df} = 2.160$ ]

4. Counseling cell of a college keeps conducting sessions with the problematic students by using different methods. Since the number of visitors keeps increasing every day in the center, they have decided to test whether audiovisual based counseling and personal counseling are equally effective in reducing the stress level. Eighteen women students were randomly chosen among those who visited the center. Nine of them were given the personal counseling, whereas the other nine were given the sessions with the audiovisual presentation. After the session, the students were tested for their stress level. The data so obtained are shown in Table below:

Data on stress level for the students in both the counseling groups:

Personal Counseling:	27	22	28	21	23	22	20	31	26
Audiovisual Counseling:	35	28	24	28	31	32	33	34	30

Test your hypothesis at 1% level, whether any one method of counseling is better than other. It is assumed that population variances are equal and both the populations are normally distributed.

[Hint:  $F_{\alpha=0.05, (8,8)df} = 3.44$ .     $t_{\alpha=0.05, 16df} = 2.12$ ]

5. Examine the procedure of Testing of Hypothesis.

6. A) A professor wishes to know if his statistics class has a good background of basic math. Ten students were randomly chosen from the class and were given a math proficiency test. Based on the previous experience, it was hypothesized that the average class performance on such math proficiency test cannot be less than 75. The professor wishes to know whether this hypothesis may be accepted or not. Test your hypothesis at 5% level assuming that the distribution of the population is normal. The scores obtained by the students are as follows:

[Hint:  $t_{\alpha=0.05, 9df} = 1.833$ ]

Math proficiency score: 71, 60, 80, 73, 82, 65, 90, 87, 74, and 72.

- B) The following are the measurements of breaking strength of a certain kind of 2-inch cotton ribbon in pounds:

163	165	160	189	161	171	158	151	169	162
163	139	172	165	148	166	172	163	187	173

Use the sign tests to test the null hypothesis  $\mu = 160$  against the hypothesis  $\mu > 160$  at the five percent level of significance.

7. A manufacturing company has purchased three new machines of different makes and wishes to determine whether one of is faster than the other in producing a certain output. Five hourly producing figures are observed at random from each machine and the results are given below:

Observations	A1	A2	A3
1	25	31	24
2	30	39	30
3	36	38	28
4	38	42	25
5	31	35	28

Use ANOVA and determine whether the machines are significantly different in their mean speed. [Given at 5% level  $F_{2, 12}=3.89$ ]

8. Elucidate the components of Time Series data.

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**COURSE: MAJOR – CORE**

**PAPER : RESEARCH METHODS AND ANALYSIS–II (PRACTICAL)**

**TIME : 1 HOUR**

**MAX. MARKS: 40**

**ANSWER ANY FOUR QUESTIONS**

**(4 X 10 = 40)**

1. In order to assess the feasibility of a guaranteed annual wage, the Rand Corporation conducted a study to assess the response of labor supply in terms of average hours of work(Y) based on different independent parameters. The data were drawn from a national sample of 6,000 households with male head earnings less than \$15,000 annually. These data are given in Table 1 given below:

S.N.	Hours (X <sub>1</sub> )	Rate (X <sub>2</sub> )	ERSP (X <sub>3</sub> )	ERNO (X <sub>4</sub> )	NEIN (X <sub>5</sub> )	Assets (X <sub>6</sub> )	Age (X <sub>7</sub> )	DEP (X <sub>8</sub> )	School (X <sub>9</sub> )
1	2,157	2.905	1,121	291	380	7,250	38.5	2.340	10.5
2	2,174	2.970	1,128	301	398	7,744	39.3	2.335	10.5
3	2,062	2.350	1,214	326	185	3,068	40.1	2.851	8.9
4	2,111	2.511	1,203	49	117	1,632	22.4	1.159	11.5
5	2,134	2.791	1,013	594	730	12,710	57.7	1.229	8.8
6	2,185	3.040	1,135	287	382	7,706	38.6	2.602	10.7
7	2,210	3.222	1,100	295	474	9,338	39.0	2.187	11.2
8	2,105	2.493	1,180	310	255	4,730	39.9	2.616	9.3
9	2,267	2.838	1,298	252	431	8,317	38.9	2.024	11.1
10	2,205	2.356	885	264	373	6,789	38.8	2.662	9.5

- (i) Apply regression analysis using SPSS to suggest a regression model for estimating the average hours worked during the year based on identified independent parameters.
- (ii) Test the regression coefficients for its significance through t-test by using its significance value (p value) in the output.
2. Using the above example in question 1 and the table given above:
- (i) Test the regression model for its significance through the F-value by looking to its significance value (p value) in the output.
- (ii) Use the value of R<sup>2</sup> in the output to know the amount of variance explained in the dependent variable by the identified independent variables together in the model.
3. A) Using EXCEL generate a pie diagram to represent the following data of investment pattern in the five year plan:

ITEM	INVESTMENT(%)
Agriculture and Community Development	14
Irrigation and Power	16
Industries and Minerals	29
Transport and Communications	17
Social Services	16
Inventories	8
Total	100

B) Using EXCEL generate a multiple bar diagram for the following data:

YEAR	SALES ('000)	GROSS PROFIT ('000)	NET PROFIT ('000)
2000	100	30	10
2001	120	40	15
2002	130	45	25
2003	150	50	25

4. An experiment was conducted to know the impact of new advertisement campaign on sale of television of a particular brand. The number of television units sold on 12 consecutive working days before and after launching the advertisement campaign in a city was recorded. The data obtained are shown in the table given below:

Days	Before advertisement	After advertisement
1	25	28
2	36	42
3	22	38
4	26	40
5	18	35
6	8	12
7	23	29
8	31	52
9	25	26
10	22	26
11	20	25
12	5	7

Test the hypothesis using appropriate test statistic and give your inference.

5. In a study, 90 workers were tested for their job satisfaction. Their job satisfaction level was obtained on the basis of the questionnaire, and the respondents were classified into one of the three categories, namely, low, average, and high. The observed frequencies are shown below:

Table: Summary of responses of the workers about their job satisfaction levels:

JOB SATISFACTION LEVEL		
Low	Average	High
40	30	20

Compute Chi-square testing whether there is any specific trend in their job satisfaction and interpret the results.

6. A human resource department of an organization conducted a study to know the status of occupational stress among their employees in different age categories. A questionnaire was used to assess the stress level of the employees in three different age categories: <40, 40–55, and >55 years. The stress scores so obtained are shown in Table given below:

Group A (<40 years)	Group B (40–55 years)	Group C (>55 years)
54	75	55
48	68	51
47	68	59
54	71	64
56	79	52
62	86	48
56	81	65
45	79	48
51	72	56
54	78	49
48	69	
52		

Apply one-way analysis of variance to test whether mean stress score of the employees in any two age categories are different. Test your hypothesis at 5% level.

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