Reg. No.										

MANIPAL ACADEMY OF HIGHER EDUCATION

SEVENTH SEMESTER B. ARCH. DEGREE EXAMINATION – NOVEMBER 2019

SUBJECT: RESEARCH TECHNIQUES (ARC 411)

(2010 SCHEME)

Monday, November 25, 2019

Time: 10:00-13:00 Hrs. Max. Marks: 50

- **Answer any FIVE full questions.**
- **Assume suitable data wherever necessary but mention that assumption *explicitly*.**

1. With "Healthcare" and "Built environment" as the variables, Elaborate on the following:

1A. Research Process

1B. Research Hypothesis

1C. Research Objectives

1D. Research Outcomes

(4+2+2+2 = 10 marks)

2. **Explain any FOUR of the following:**

2A. Importance of Ethics in research

2B. Stratified Sampling

2C. Cross Sectional Data

2D. Time Series Data

2E. Multiple Criteria Based Decision Making

(2½ marks × 4 = 10 marks)

Following Data set talks about the Ground Coverage and their Heating & Cooling Load of Building (kwh/m2/yr.)-

Serial No.	Ground Coverage (in Percentage %)	Heating & Cooling Load of Building (kwh/m2/yr)
1	40	150
2	30	120
3	10	80
4	20	110
5	25	150
6	30	125

Use the above-mentioned data for Question 3 and Question 4.

3. Figure out if the Heating & Cooling Load of Building depends upon the Ground Coverage. Also interpret about the nature of dependency.

(5+5 = 10 marks)

4. Assuming there is a linear relation between these two parameters, establish the linear regression model between Ground Coverage and their Heating & Cooling Load of Building (kwh/m2/yr.).

(10 marks)

5. Consider the case of pollution in Delhi and assume that this pollution is only dependent on the transportation (different vehicles). Also consider the fact that neither all of the vehicles running on the streets of Delhi are registered in Road Transport office of Delhi nor all of the vehicles registered in Delhi Road transport Office are running on the streets of Delhi. Now develop an uncertainty analysis model to understand the possible variations in the different types of vehicles running on the streets of Delhi accordingly answer the following:

5A. Objective Function

5B. Variables

5C. Constraints

(4+3+3 = 10 marks)

6. A company has a total of 720 employees in four different categories. Managers – 72; Drivers – 108; Admin staff – 180; production staff – 360. Gender Ratio (M: F) in the office is 1:2. Mention the type of sampling in this case, where all of the given data can be used. How many from each category should be included in a sample of size 80?

(4+6 = 10 marks)