

**Pre. Ph.D. Course Work (2017 Course) : (Common for All  
Engineering & Technology Faculty**

**SUMMER - 2019**

**SUBJECT: PAPER-I RESEARCH METHODOLOGY/ CIVIL  
ENGINEERING/CHEMICAL ENGINEERING/ COMPUTER  
ENGINEERING/ELECTRICAL ENGINEERING/ ELECTRONICS ENGINEERING  
MECHANICAL ENGINEERING**

Day : Monday  
Date : 22/04/2019

**S-2019-5315**

Time : 10.00 AM TO 1.00 PM  
Max. Marks: 100

**N.B.**

- 1) All questions are **COMPULSORY**.
- 2) Figures to the right indicate **FULL** Marks.

**Q.1** Distinguish between **(10)**

- i) Conceptual and Empirical research
- ii) Descriptive and Analytical research

**OR**

- a) Describe the following terminologies and explain their significance in research. **(05)**
  - i) Proof
  - ii) Hypothesis
- b) Explain the rationale behind selecting various types of research approaches in engineering. **(05)**

**Q.2** How to carry out extensive literature survey in your desired research area? What is the importance of publications databases, search engine and patent databases? **(10)**

**OR**

Write your research problem statement and mention the gaps identified from the literature review in support of it. **(10)**

**Q.3** What are the limitations and assumptions of your research problem? Justify the basis for the same. **(10)**

**OR**

What are the steps involved in developing a research plan? Explain in brief. **(10)**

**Q.4** What are the various methods of data collection in engineering research? Describe in brief any one method. **(10)**

**OR**

- a) Clearly explain the difference between collection of data through questionnaire and schedules. **(05)**
- b) What factors must be considered while selecting the appropriate method for data collection? **(05)**

**Q.5** What is hypothesis? Describe the Chi-square test for hypothesis testing. **(10)**

**OR**

Draw a flow diagram of hypothesis testing and describe the stepwise procedure for the same. **(10)**

**Q.6** Describe in brief the Hidden Markov Model (HMM). **(10)**

**OR**

Use Least square regression to fit a straight line for the following data **(10)**

x	5	10	15	20	25	30	35	40	45	50
y	16	25	32	33	38	36	39	40	42	42

Along with the slope and intercept, compute the standard error of the estimate and the correlation coefficient. Plot the data and the regression line.

**(P.T.O.)**

- Q.7** a) What are the statistical software tools available in research? Explain in brief. (05)  
b) What is the role of computer in research? (05)

**OR**

What is the role of information and communication technology (ICT) in engineering research? How it will help in maintaining literature data? (10)

- Q.8** Describe in detail the layout of thesis. (10)

**OR**

What is the structure and components of scientific research report? Explain in detail. (10)

- Q.9** a) What are the techniques of writing claims while drafting any patent? (05)  
b) What are the different types of intellectual property rights? (05)

**OR**

- a) What is the significance of technology transfer? (05)  
b) What are the benefits of copyrights? (05)

- Q.10** What should be design of Journal research paper? Describe in detail. (10)

**OR**

- a) Describe the effective way of writing introduction and conclusion of Journal research paper. (05)  
b) What is the difference between structure of review and journal research paper? (05)

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