

M.E. (Water Resources & Hydraulic Engineering) Examination, 2025
(1st Semester)

RESEARCH METHODOLOGY, ETHICS AND IPR

Time : Three Hours

Full Marks : 100

Answer any *five* questions.

1. a) What are the key elements of effective technical writing, and how do they contribute to writing a clear and concise research report?
b) Describe the essential components of a research proposal and explain the significance of each section in the research process.
c) Explain the scope of patent rights and discuss the process of licensing and technology transfer.
d) What are the essential components of a research proposal and its presentation to effectively convey the objectives, methodology, and expected outcomes to a review committee for assessment?

5+5+6+4 = 20

2. a) Define the research problem by explaining the sources and discuss the characteristics of it in research methodology.
b) Classify in detail the research problem and briefly explain the steps to identify the problem.
c) Explain the steps and discuss thoroughly to compel the research question to develop a research plan for addressing the problem.

(2+4)+(5+3)+6 = 20

3. a) Explain in detail the strategies to identify impactful research problems and the importance of research problem scope.
b) Explain in detail the factors influencing the research problem scope. Explain in detail how to establish research objectives and processes to review the research scopes.
c) Briefly discuss the data collection, different types of analysis, validation, and ethical consideration techniques for the research problem to fulfill the appropriate research methodology.

(3+3)+(4+3)+7 = 20

4. a) What do you mean by Intellectual Property?
b) What are the objectives of Intellectual Property Rights (IPR)?
c) What are the effects of new developments in IPR on the industry?
d) Name the different types of IPR.

3+6+6+5 = 20

[Turn over

5. a) What do you mean by Patent? When can an idea be protected by Patents?
 b) Explain the terms “Utility patent”, “Design patent” and “Plant patent”
 c) Differentiate between Tangible and Intangible properties.
 d) Explain the criteria of patentability.

4.5+6+5+4.5=20

6. a) Name five main patent administrative sections.
 b) What are the basic features of patent infringement?
 c) Explain different types of protection for Traditional Knowledge.
 d) A personal computer has the length of time between charges of the battery is normally distributed with a mean of 60 hours and a standard deviation of 18 hours. What is the probability that the length of time will be between 58 and 75 hours?

3+5+6+6= 20

7. a) A company ships 5000 cell phones. They are expected to last an average of 10,000 hours before needing repair; with a standard deviation of 500 hours. Assume the survival time of the phones is normally distributed. If a phone is randomly selected to be tracked for repairs find the expected number that needs repair after 11,000 hours.
 b) A company estimates the net profit on a new product, it is launching, to be Rs. 3 crore during the first year, if it is ‘successful’, Rs. 1 crore if it is ‘moderately successful’, and a loss of Rs. 1 crore if it is ‘unsuccessful’. The company assigns the following probabilities to first year prospects for the product Successful: 0.25, Moderately successful: 0.40, and Unsuccessful: 0.35 What are the expected value and standard deviation of the first year net profit for the product? Also, find the expected value of net profit if there is a fixed cost of Rs. 0.2 crore, whatever the success status is.
 c) Construct a Box Plot for the following data set: 13, 15, 18, 18, 19, 21, 22, 22, 23, 23, 26.

7+7+6= 20

8. a) Calculate the regression coefficient and obtain the lines of regression for the following data.

X	1	2	3	5	4	6	7
Y	9	8	10	11	12	13	14

- b) Each student in a college has a roll number. The administrator has a computer to generate 203040 random identification numbers and those students are asked to participate in a survey. What Type of Sampling Method Is This? State two merits of the type of sampling.
 c) In a class, 45% of the students like design and 30% of students like operations and 20% like both subjects. One student selects at random, find the probability that he likes operations if it is known that he likes design.
 d) The average time required to repair a machine is 0.5 hours. What is the probability that the next repair will take more than 2 hours?

6+5+6+3= 20