

M.E. (Water Resources & Hydraulic Engineering) (6-Semester) Exam., 2025
(2nd Semester)

RESEARCH METHODOLOGY, ETHICS AND IPR

Time : Three Hours

Full Marks : 100

Answer any *five* questions.

1. a) Describe the key elements of effective technical writing. How do these elements contribute to preparing a clear and concise research report?
b) List and explain the essential components of a research proposal. Mention the significance of each component in the context of the research process.
c) Define the scope of patent rights. Briefly describe the processes of licensing and technology transfer in the context of intellectual property.

8+7+5 = 20

2. a) Define Research and its Significance. What do you mean by Research Methodology?
b) Explain the process of research. Explain the steps to develop a research Plan to Address the problem?
c) A company has the head office at Kolkata and a branch at Mumbai. The personnel director wanted to know if the workers at the two places would like the introduction of a new plan of work and a survey was conducted for this purpose. Out of a sample of 500 workers at Kolkata 62% favoured the new plan. At Mumbai out of a sample of 400 workers 41% were against the new plan. Is there any significant difference between the two groups in their attitude towards the new plan at 5% level?

2+1+3+2+4+8 = 20

3. a) Briefly explain about the importance of the research problem scope and write down the factors influencing it.
b) 4 In random samples of 600 and 1000 men from two cities, 400 and 600 men are found to be literate. Do the data indicate (at 5% level of significance) that the populations are significantly different in the percentage of literacy?
c) Briefly describe how to review and refine the research scope and objectives. Also write down the approaches of investigation of particular research.

3+3+6+5+3 = 20

4. a) Explain the data collection techniques in a particular research methodology.
b) Write a short note on parametric tests and chi-square test.

- c) A manufacturer claimed that at least 95% of the equipment which he supplied to a factory conformed to specifications. An examination of a sample of 200 pieces of equipment revealed that 18 were faulty. Test his claim at a significance level of a) 0.05, b) 0.01.

$$4+4+4+8 = 20$$

5. a) What do you mean by Intellectual Property?
 b) What are the effects of new developments in IPR on the industry?
 c) Explain the terms "Utility patent", "Design patent", and "Plant patent".
 d) Differentiate between Tangible and Intangible properties.

$$3+6+6+5 = 20$$

6. a) To what purposes shall intellectual property include the rights relating?
 b) How can the changes in IPR regulations influence the incentives for innovation within industries?
 c) What will happen if the right to the invention is sold by the owner to a third party?
 d) What are the basic features of patent infringement?
 e) What will happen if a patent expires?

$$4+3+3+5+5=20$$

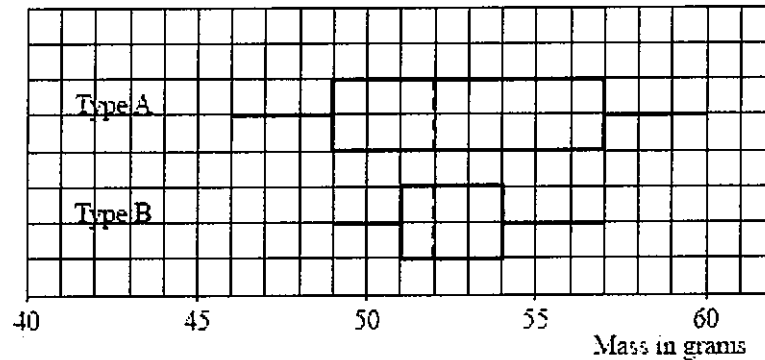
7. a) Explain the criteria of patentability.
 b) What are the basic features of patent infringement?
 c) Explain different types of protection for traditional knowledge.
 d) Let A and B be events of an experiment such that $P(A) = 3/10$, $P(B) = 1/2$, and $P(B|A) = 2/5$. Find the value of (i) $P(A \cap B)$, (ii) $P(A \cup B)$, and (iii) $P(A|B)$.

$$4+5+6+5= 20$$

8. a) Given the following pairs of values:

Capital employed (Rs. In crore)	1	2	3	4	5	7	8	9	11	12
Profit (Rs. in Lakhs)	3	5	4	7	9	8	10	11	12	14

- (i) Draw a scatter diagram.
 (ii) Do you think that there is any correlation between profits and capital employed? Is it positive or negative? Is it high or low?
 b) A gardener collected data on two types of tomato. The box and whisker plot below shows data for the masses in grams of the tomatoes in the two samples. Compare and contrast the two types and advise the gardener which type of tomato she should grow in the future.



- c) The average number of errors on a page of a certain magazine is 0.2. What is the probability that the next page (or a randomly selected page) you read contains:
- 0 (zero) error?
 - 2 or more errors?
 - What is the average error per page?
 - Also, find the standard deviation of the number of errors.

$$6+6+8=20$$

9. a) Given a normal distribution with $x = 100$, $\mu = 110$ and $\sigma = 4$, find the corresponding z-score.
- b) Draw a histogram for the following data distribution:

Data interval	0-10	10-20	20-30	30-40	40-50
Frequency	5	15	22	10	5

- c) The coin is flipped ten times. Find the probability of 7 heads occurring.
- d) A baseball player comes to bat four times. Find the probability of him getting at least 1 hit given $p = 0.300$.
- e) One card is drawn at random from the pack of 52 cards. Find the probability that (i) it is an honor card and (ii) it is a face card.

$$2+6+4+4+4=20$$