K. K. Wagh Institute of Engineering Education & Research, Nashik

(An Autonomous Institute From A.Y. 2022-23)

WINTER-2025	
Exam Seat No.:	
Academic Year:2025-2026	Semester:VII
Class:FINAL	Program:B.Tech
Branch Code:CIV	Pattern:2022
Name of Course:Research Methodology	Course Code:CIV224007
Max. Marks:60	Duration:2.30 Hrs.

Instructions: Candidates should read carefully the instructions printed on the Question Paper and on the cover page of the Answer Book, which is provided for their use.

1. This question paper contains 02 page(s).
2. Answer to each new question is to be started on a new page.
3. Assume suitable data wherever required, but justify it.
4. Draw the neat labelled diagrams, wherever necessary.
5. The last columns indicates the Course Outcome and level of Blooms Taxonomy of the Question/sub-question.

		Marks	CO
Question No. 1			
1a)	What are the different steps in the research process?	(6)	CO1
Question No. 2			
2a)	What is the significance of correlation analysis in civil engineering?	(6)	CO2
Question No. 3			
3a)	What is research design? What are the purposes of research design?	(8)	CO3
	OR		
3b)	What is induction and deduction? Compared with suitable example.	(8)	CO3
3c)	A concrete manufacturing company prepared concrete with M65 grade. The company claims that their new concrete has an average compressive strength of 65 MPa. A researcher group tests 25 concrete cubes and finds an average compressive strength of 63.5 MPa. Check if there is enough evidence to support this claim at a 0.05 significance level by Z test. The critical Z-value for alpha = 0.05 is -1.645.	(8)	CO3
	OR		
3d)	A toy manufacturer wants to get batteries for toys. A team collected 41 samples from supplier A and the variance was 110 hours. The team also collected 21 samples from supplier B with a variance of 65 hours. At a 0.05 alpha level determine if there is a difference in the variances by F-test. The critical value of F from a statistical F-distribution table, for $F_{0.025, 40, 20}$= 2.23 and for $F_{0.05, 40, 20}$= 3.23,	(8)	CO3
Question No. 4			
4a)	Why tests are used in research?	(8)	CO4
	OR		
4b)	Test the hypothesis that the median HDL cholesterol level in adult population of city A and city B are the same. Using following observation and the Mann-Whitney test at 5% level of significance by:	(8)	CO4

City A	42	20	51	39	57	60	23
City B	30	42	25	30	35		

Given that, the critical value of 'u' for n1=7; n2=5 at 5% level of significance for two tailed is 5.

4c) Differentiate between parametric and non-parametric test, (8) CO4

OR

4d) A university want to evaluate the effectiveness of 3 different training methods on students' performance by Kruskal Wallis test at significance level of 0.1. A sample of 20 students was divided into three groups based on their training method: video lecture, books and articles and classroom training, students examination score as follows: (8) CO4

video lecture	76	90	84	95	57	72	
books and articles	80	80	67	59	91	94	68
classroom training	70	85	52	93	86	79	80

From the chi-square table: $X_{0.10,2} = 4.605$, $X_{0.05,2} = 5.991$.

Question No. 5

5a) What is patent? What are the requirements for a patent? (8) CO5

OR

5b) Explain in brief design and trademark. (8) CO5

5c) What is intellectual property rights? Why it is important in the current era? (8) CO5

OR

5d) List out various useful tools for effective report writing. (8) CO5

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