BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION)

CLASS: PRE-PHD **SEMESTER : I**
BRANCH: ALL **SESSION : MO/2023**

SUBJECT: MT601 RESEARCH METHODOLOGY

TIME: 3 HOURS **FULL MARKS: 50**

INSTRUCTIONS:
1. The question paper contains 5 questions each of 10 marks and total 50 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
***4*. Before attempting the question paper, be sure that you have got the correct question paper.**
5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.

			CO	BL
Q.1(a)	The process of solving an issue through in-depth investigation and situational analysis is known as research. Provide an appropriate example to illustrate this point.	[5]	1	1
Q.1(b)	Write a crucial component of the Research objectives and explain the various research methodology types with appropriate examples.	[5]	1	2
Q.2(a)	Calculate the standard deviation of the first 10 natural numbers (1 to 10). Explain the interpretation of a high standard deviation versus a low standard deviation.	[5]	3	3
Q.2(b)	Discuss the concept of sampling bias. How might various types of bias (e.g., selection bias, response bias) impact the validity of research findings? Provide strategies to minimize or control for bias in different sampling scenarios.	[5]	3	3
Q.3(a)	Calculate a Spearman rank-order correlation coefficient on data given below:	[5]	2&3	5

Marks										
Physics	56	75	45	71	61	64	58	80	76	61
Chemistry	66	70	40	60	65	56	59	77	67	63

Q.3(b)	A sample of 32 money market mutual funds was chosen on January 1,1996 and the average annual rate of return over the past 30 days was found to be 3.23% and sample standard deviation was 0.51%. A year earlier a sample of 38 money-market funds showed an average rate of return of 4.36 % and the sample standard deviation was 0.84%. Calculate the hypothesis test for comparing two population means and reasonable to conclude that money market interest rate declining during 1995 or not. (Note: The 'α' value is 0.05).	[5]	3	3
Q.4(a)	Differentiate between the measurement model and the structural model in structural Equation Modelling (SEM). Why is it important to distinguish between these two components, and how do they contribute to the overall SEM analysis?	[5]	4	4
Q.4(b)	How do exploratory, descriptive, and causal research differ from one another? Is there relationship among them? Discuss.	[5]	3	3
Q.5(a)	Compare and contrast probability and non-probability sampling methods, highlighting the strengths and limitations of each. Provide examples of situations where each type of sampling method would be most appropriate.	[5]	5	3
Q.5(b)	The following are some short descriptions of research studies. For each, identify the variables that are being used, describe the level of measurement of each variable, and determine whether each variable is being used as an independent or a dependent variable: i. A researcher is interested in understanding why some students earn higher grades than others. One possible explanation is that performance in college is a continuation of earlier academic performance. The researcher collects information on a sample of students, measuring their current GPAs and their high school GPAs. ii. Some communities have higher rates of crime than others. Our researcher thinks that high average income and high average education of the families in communities may decrease the rates of some crimes (e.g., family violence), but increase rates of other crimes (simple theft).	[5]	5	3

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