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B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

January / February 2025 Semester End Main Examinations

Programme: B.E. **Semester: V**

Branch: CSE(DS)/AI & DS/CSE(IoT) **Duration: 3 hrs.**

Course Code: 23DC5AERMI **Max Marks: 100**

Course: Research Methodologies & IPR

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

Important Note: Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.

			UNIT - I	*CO*	*PO*	Marks
1	a)		Analyze how research functions as a systematic process and discuss its primary goals in generating knowledge or addressing problems.	*CO2*	*PO2, PO4*	**5**
	b)		Differentiate between basic research and applied research with examples	*CO2*	*PO2*	**5**
	c)		A public health organization is studying the increasing cases of obesity among teenagers in a metropolitan city to understand lifestyle patterns and identify risk factors associated with the condition. I. Identify the type of research design that best suits this study with appropriate justification. II. What key steps or aspects should be included in the research design?	*CO2*	*PO2*	**10**
			OR			
2	a)		With a neat diagram explain the procedural guidelines followed in the research process.	*CO2*	*PO1*	**10**
	b)		A researcher intends to investigate the impact of rising social media usage on teenagers' mental health. Using this scenario: I. Based on the scenario provided, formulate a specific research question and its key components. II. Outline the key steps involved that should be followed to define the research problem.	*CO2*	*PO2*	**10**
			UNIT - II			
3	a)		A wildlife conservation organization wants to estimate the population of a rare bird species in a large national park. The park covers over 500 square miles, and tracking every bird individually is impractical. Instead, researchers divide the park into smaller zones and observe bird sightings in a few randomly selected zones. The data from these zones will be used to estimate the total bird population in the entire park.	*CO1*	*PO2*	**5**

			I. When researchers choose specific zones or groups to study rather than the entire population, what is this process called? How does it help make large-scale studies more manageable? II. In studies where observing every individual is impractical, why is it important to carefully select a smaller, representative group for analysis? What benefits does this bring to the research process?			
		b)	Discuss the important sampling distributions commonly used in statistical analysis	*CO1*	*PO2*	**5**
		c)	Consider a population divided into three strata: - $N_1 = 5000$, $\sigma_1 = 15$, $N_2 = 2000$, $\sigma_2 = 18$, $N_3 = 3000$, $\sigma_3 = 5$ use disproportionate sampling to allocate a sample of size n = 84. Also, elaborate on Proportional Allocation.	*CO2*	*PO2*	**10**
			OR			
	4	a)	Discuss Characteristics of the $\chi 2$ Test and Cautions Regarding when to use the $\chi 2$ Test.	*CO1*	*PO2*	**10**
		b)	Analyze and interpret the following statistics concerning the output of wheat per field obtained as a result of an experiment conducted to test four varieties of wheat viz., A, B, C, and D under a Latin- square design. Given F= (3,6) at 5% Level of Significance is 4.76. C 25 | B 23 | A 20 | D 20 A 19 | D 19 | C 21 | B 18 B 19 | A 14 | D 17 | C 20 D 17 | C 20 | B 21 | A 15	*CO2*	*PO2, PO4*	**10**
			UNIT - III			
	5	a)	Differentiate between invention and creativity in the context of Intellectual Property Rights (IPR). Apply your understanding to outline the stages of both processes with suitable examples.	*CO2*	*PO2*	**5**
		b)	Analyze the different types of patents and their specific protections by examining the following inventions. Identify the type of patent each invention would fall under, providing justification for your choices: I. A new software application that automatically adjusts the brightness and color temperature of a smartphone display based on the time of day, reducing eye strain. II. A newly designed ergonomic chair with a unique and aesthetically appealing shape that enhances comfort and posture. Further, discuss the Patent Cooperation Treaty (PCT) and at least 2 key features.	*CO2*	*PO2, PO4*	**5**

		c)	Intellectual Property (IP) is a broad concept that includes various forms of intangible creations. I. Define the constituents of Intellectual Property with examples. II. Explain how different forms of IP protect various aspects of the creation.	*CO1*	*PO1*	**10**
			OR			
	6	a)	A tech startup, "InnoTech Solutions," developed a unique mobile app for real-time language translation. Shortly after launching, the company discovered a similar app with almost identical features and user interface being sold at a lower price by a competitor. InnoTech suspects their idea was stolen during an early pitch meeting with potential investors but struggles to prove it legally due to incomplete documentation of their concept's development timeline. I. Identify the challenges InnoTech Solutions is facing in protecting its Intellectual Property Rights (IPRs). II. What immediate and long-term measures can the startup take to safeguard its innovations?	*CO2*	*PO2*	**5**
		b)	Below are descriptions of various intellectual creations. Analyze the context and identify which type of Intellectual Property (IP) is most applicable in each case. Provide proper justification for your answers: I. A technology company develops a new software algorithm that improves data processing speed and efficiency, and files for legal protection to prevent unauthorized use. II. A famous photographer creates a series of unique, high-quality landscape photographs and wants to prevent others from reproducing or selling them without permission. III. A sports apparel brand creates a distinct logo and slogan to differentiate its products in the marketplace and build brand recognition. IV. A food company introduces a new, original recipe for a snack, and wants to ensure no competitor can use the recipe without authorization. V. A region in Italy is known for producing a special kind of wine with unique production methods, and the wine is legally protected to ensure only wines produced in that region can be marketed with its name.	*CO2*	*PO2*	**5**
		c)	Filing a patent application requires a detailed understanding of the procedural framework: I. Elaborate on the complete process of filing a patent application, from drafting to examination with a neat diagram.	*CO2*	*PO2*	**10**
			UNIT - IV			
	7	a)	Describe acts considered as copyright infringement under the Copyright Act, including examples of such acts.	*CO1*	*PO1*	**5**
		b)	**Case Study:** An author discovers that portions of their book have been reproduced in a blog without permission, leading to revenue loss. I. Explain whether this constitutes copyright infringement.	*CO2*	*PO2*	**5**

			II. Propose steps the author can take to protect their intellectual property rights.			
		c)	Elaborate on the stages involved in Technology Transfer with appropriate examples in each stage with a neat diagram.	*CO1*	*PO1*	**10**
			OR			
	8	a)	Explain the process of filing and obtaining a copyright registration. Provide a clear and detailed description of the key steps involved, supported by a diagram.	*CO1*	*PO1*	**10**
		b)	Case Study: A technology company transfers a patented AI algorithm to a manufacturing firm as part of a licensing agreement. Later, the manufacturing firm modifies the algorithm and sells it as their product. I. Assess whether the modification violates the licensing agreement. II. Explain the importance of patent mapping in avoiding disputes during technology transfer.	*CO2*	*PO2*	**5**
		c)	**Case Study:** A regional wine producer registers a Geographical Indication (GI) for their wine. Another producer in a nearby region starts labeling their wine with a name similar to the registered GI. I. Analyze the legal implications of the second producer's actions. II. Discuss the process the regional wine producer must follow to safeguard their GI rights.	*CO2*	*PO2, PO4*	**5**
			UNIT - V			
	9	a)	What precautions should a researcher take to ensure clarity and precision while interpreting data? Provide at least three key points.	*CO1*	*PO1*	**5**
		b)	Identify and explain *three precautions* researchers must take when writing the conclusion of a research report to avoid misrepresentation of data.	*CO2*	*PO2, PO3*	**5**
		c)	A pharmaceutical company wants to present its research findings on a new drug to a panel of stakeholders. I. Propose a *layout* for the research report suitable for the audience. II. Identify the *mechanics* of writing a research report they should follow.	*CO2*	*PO2, PO3*	**10**
			OR			
	10	a)	A startup is preparing to release a detailed report about their innovative AI-driven product for a potential investor presentation. I. Suggest the *significance* of report writing in this context and its impact on decision-making. II. Justify how a well-structured and detailed report can enhance the investors' understanding and trust in the product.	*CO2*	*PO2*	**10**
		b)	A postgraduate student is writing a thesis on the impact of remote learning on university-level education. I. Outline the steps involved in writing a research report for their thesis. II. Elaborate on *precautions* the researcher should consider to ensure clarity, engagement, and accuracy?	*CO2*	*PO2*	**10**

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