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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: Chemical Engineering

Duration: 3 hrs.

Course Code: 23CH5AERMI

Max Marks: 100

Course: Research Methodology and IPR

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

			UNIT - I		CO	PO	Marks
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.	1	a)	What is research? Explain the characteristics of research.		CO1	PO2	08
		b)	Explain the different types of research.		CO1	PO2	12
	OR						
	2	a)	Distinguish between research method and research methodology.		CO1	PO2	08
		b)	Discuss the objectives of research.		CO1	PO2	06
		c)	What are the criteria for good research?		CO1	PO2	06
	UNIT - II						
	3	a)	What are the steps to investigate a research problem? How do you select and define a research problem?		CO1	PO2	10
		b)	How do you analyze and interpret the collected data in research?		CO1	PO2	10
	OR						
	4	a)	Discuss the various ways for data collection required for research.		CO1	PO2	10
		b)	Elaborate on the significance of literature review in defining a research problem.		CO1	PO2	10
			UNIT - III				
	5	a)	Imagine you are a graduate student tasked with writing a research paper on the impact of social media on mental health, specifically focusing on adolescents. You have already conducted surveys, interviews, and collected existing literature on the topic. Now, you need to organize your findings and write the paper.		CO2	PO10	10
		i.	What are the key steps and considerations you should follow to structure and write your research paper effectively?				

		ii. How should you approach the introduction, literature review, methodology, analysis, and conclusion sections to ensure clarity, coherence, and academic rigor?			
	b)	Explain the journal reviewing process in general.	CO2	PO10	10
		OR			
6	a)	Elaborate on research paper writing ethics and the importance to check plagiarism before submitting research papers to journals.	CO2	PO10	10
	b)	<p>Consider you are a chemical engineering researcher who has recently completed a study on the development of a new catalytic process aimed at reducing the environmental impact of industrial waste. Your results show promising improvements in efficiency and sustainability. You now need to select a journal for publication. There are several journals in the field of chemical engineering, but you are unsure whether to submit to a high-impact journal that focuses on fundamental research, or a more specialized journal dedicated to sustainable engineering and environmental technologies. Some journals have longer review processes, while others provide faster publication times. Additionally, some journals are open-access, while others are subscription-based.</p> <p>i. How would you select the most appropriate journal for your research paper in chemical engineering?</p> <p>ii. What key factors should guide your decision, including the journal's scope, audience, impact factor, review process, publication timeline, and accessibility (open-access vs. subscription)?</p>	CO2	PO10	10
		UNIT - IV			
7	a)	Explain the procedure for grant of patents.	CO3	PO8	10
	b)	Explain the innovation process from research to market. Discuss in detail the role of technological research and innovation in society.	CO3	PO8	10
		OR			
8	a)	<p>Imagine two companies, one based in India and the other in Germany collaborate on developing a new renewable energy technology. The Indian company brings expertise in solar energy, while the German company contributes advanced materials for energy storage. Together, they create a groundbreaking system that significantly improves energy efficiency. To protect their joint invention, they decide to file for international patents under the Patent Cooperation Treaty (PCT), ensuring that their technology is protected in multiple countries. However, they face challenges in managing IP rights, ensuring fair use, and navigating different patent laws across the regions where they plan to market the product.</p> <p>i. How does international cooperation on intellectual property help foster innovation between companies from different countries?</p>	CO3	PO8	10

		ii.	What are the key challenges in managing IP rights in such collaborations, and how can tools like the Patent Cooperation Treaty (PCT) assist in overcoming these challenges?			
		b)	Discuss the different types of patents.	CO3	PO8	10
		UNIT - V				
	9	a)	<p>In 2023, an Indian chemical company successfully obtained a patent for a new environmentally friendly process to manufacture a key chemical used in plastics. The company's innovation was aimed at reducing harmful emissions during production. A competing company later challenged the patent, claiming that the process was not novel. The Indian Patent Office ultimately upheld the patent, recognizing the company's contribution to sustainable chemical manufacturing.</p> <ul style="list-style-type: none"> i. Why is intellectual property protection important for chemical companies in India? ii. How can patent help encourage innovation and protect new technologies in industries like chemicals? 	4	12	10
		b)	What is the significance of geographical indications in IPR?	CO4	PO12	10
			OR			
	10	a)	<p>An Indian biotechnology startup has developed an innovative vaccine delivery system that significantly reduces production costs and enhances vaccine stability. The startup has successfully tested the system on a small scale but lacks the resources to scale up production for widespread distribution. A large multinational pharmaceutical company expresses interest in licensing the technology to manufacture and distribute it globally. The two companies enter into negotiations for a licensing agreement, where the multinational will pay royalties for the use of the technology and provide funding for further research. However, the startup is concerned about protecting its intellectual property, ensuring fair compensation, and maintaining control over its innovation during the transfer of technology.</p> <ul style="list-style-type: none"> i. What are the key factors the Indian biotechnology startup should consider when negotiating a licensing agreement for technology transfer? ii. How can the licensing process help the startup scale its innovation while protecting its intellectual property and ensuring fair compensation? 	CO4	PO12	10
		b)	Distinguish between patent, copyrights and trademarks.	4	12	10
