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

Autonomous Institute Affiliated to VTU

May 2024 Semester End Main Examinations

Programme: B.E. **Semester: VIII**
Branch: Institutional Elective **Duration: 3 hrs.**
Course Code: 17CY8OECSE **Max Marks: 100**
Course: Corrosion Science and Engineering

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)	With a suitable example explain electrochemical theory of corrosion by illustrating anodic, cathodic reactions and final corrosion product formed.	*CO1*	*PO1*	**6**
	b)	Justify the influence of the following factors on the rate of corrosion i) Effect of O_2 ii) Velocity iii) Temperature	*CO2*	*PO2*	**8**
	c)	Passivity refers to the loss of chemical reactivity experienced by certain metals and alloys. Appraise the statement with suitable example.	*CO3*	*PO3*	**6**
		UNIT - II			
2	a)	Explain crevice corrosion mechanism with suitable example. Mention any two prevention methods of crevice corrosion.	*CO1*	*PO1*	**6**
	b)	Pitting corrosion is highly localized corrosion occurring on a metal surface. Elaborate the statement with mechanism of pitting corrosion on a metal. List out the methods of prevention of pitting corrosion.	*CO2*	*PO3*	**8**
	c)	Discuss filiform corrosion with its mechanism. Explain the prevention methods of filiform corrosion.	*CO3*	*PO2*	**6**
		OR			
3	a)	Illustrate galvanic corrosion with suitable example.	*CO1*	*PO2*	**6**
	b)	Explain weld decay and knife line attack types of corrosion with suitable example.	*CO2*	*PO1*	**8**
	c)	What is intergranular corrosion? Identify the causes and suggest prevention methods of intergranular corrosion	*CO3*	*PO3*	**6**

			UNIT - III			
	4	a)	What is hydrogen damage? Discuss different types of hydrogen damage on metals.	*CO1*	*PO1*	**6**
		b)	Elucidate erosion-corrosion of metals with suitable example. Suggest any four methods to control erosion-corrosion.	*CO2*	*PO3*	**8**
		c)	Explain cavitation damage corrosion with suitable example.	*CO3*	*PO2*	**6**
			UNIT - IV			
	5	a)	Explain briefly three general categories of corrosion tests.	*CO1*	*PO1*	**6**
		b)	Elucidate Tafel slope method and linear polarization methods of corrosion testing.	*CO2*	*PO2*	**8**
		c)	Periodic corrosion tests on the materials exposed to environment is highly essential. Appraise the statement.	*CO3*	*PO3*	**6**
			OR			
	6	a)	Describe specimen cleaning and specimen preparation for corrosion testing.	*CO1*	*PO3*	**6**
		b)	Describe briefly weight loss method of corrosion testing. Calculate the CPR in both mpy and mmpy for thick steel sheet of area 100 $inch^2$ which experiences a weight loos of 485g after one year (Density of steel=7.9g/cm^3) Given K values are 534 and 87.6	*CO2*	*PO2*	**8**
		c)	How do you distinguish the rate of corrosion of metals in different atmosphere? Explain in detail.	*CO3*	*PO1*	**6**
			UNIT - V			
	7	a)	Explain briefly metallic and other inorganic coatings in corrosion control.	*CO1*	*PO1*	**6**
		b)	Discuss sacrificial anode method and impressed current method of cathodic protection in corrosion control.	*CO2*	*PO2*	**8**
		c)	Describe the role of corrosion inhibitors in corrosion control.	*CO3*	*PO2*	**6**

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May 2024 Semester End Main Examinations

Programme: B.E. **Semester: VIII**
Branch: Institutional Elective **Duration: 3 hrs.**
Course Code: 19CH8OEISO **Max Marks: 100**
Course: Industrial Safety and Occupational Health

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	Explain the ISO 45001- 2018 OH&S Management System approach employed on the concept of Plan-Do-Check-Act (PDCA).	*CO1*	*PO6*	**10**
	b	Elucidate the health, safety, and working conditions of employees under OSH policy in India.	*CO1*	*PO6*	**10**
		UNIT -II			
2	a	Explain the Indian Boilers Act and rules.	*CO1*	*PO6*	**10**
	b	A team of workers have to work in a confined area which has an opening of 1.5-meter diameter. A test was conducted before the commencement of work. The result indicated that the environment was safe for work. An air blower was provided at the top of the opening of the confined area to blow fresh air. When the work was close to completion, the workers removed the air blower. When returning back from the confined area, a worker fell unconscious and died due to lack of oxygen. Other workers who took part in this maintenance work were not wearing the necessary personal protective equipment (PPE). i. Identify the causes of this accidental death. ii. As an engineer supervisor, how do you ensure that such incidents do not take place? iii. State the safety measures to be taken by the workers and supervisors.	*CO2*	*PO7*	**10**
		OR			
3	a	What is ergonomics? List the principles of ergonomics and give the applications of ergonomics in a work system.	*CO2*	*PO7*	**12**
	b	Discuss the common personal protective equipment (PPE) with their requirement and limitations.	*CO2*	*PO7*	**08**

			UNIT -III			
	4	a	Elucidate the policy of zero mechanical state.	***CO3***	***PO8***	**10**
		b	What is a machine guard? Explain the various types of machine guards used to eliminate the danger to the employees.	***CO3***	***PO8***	**10**
			UNIT -IV			
	5	a	Explain the five 'E's to achieve accident prevention.	***CO4***	***PO9***	**10**
		b	Discuss how the periodic inspection of workplace to validate the operability and availability of controls is designed.	***CO5***	***PO10***	**10**
			UNIT V			
	6	a	Justify the need for an electrical safe work condition. Elucidate on how to establish electrical safe work condition.	***CO6***	***PO12***	**08**
		b	Discuss the responsibilities of employer and employee, while performing work on energized electrical equipment.	***CO6***	***PO12***	**06**
		c	Briefly explain electrostatics and electromagnetism.	***CO6***	***PO12***	**06**
			OR			
	7	a	What are the primary and secondary electrical hazards?	***CO6***	***PO12***	**08**
		b	Explain about shock hazard and flash hazard analysis.	***CO6***	***PO12***	**06**
		c	How are the lighting hazards are arrested? Elucidate.	***CO6***	***PO12***	**06**

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May 2024 Semester End Main Examinations

Programme: B.E. **Semester: VIII**
Branch: Institutional Elective **Duration: 3 hrs.**
Course Code: 19CY8OEIEM **Max Marks: 100**
Course: Industrial Engineering Materials

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.

			CO	PO	Marks
		UNIT - I			
1	a)	What are polycrystalline glasses? Explain their preparation and properties.	*CO2*	*PO1*	**6**
	b)	Define devitrification. Discuss the causes and preventions.	*CO1*	*PO1*	**6**
	c)	Describe the manufacturing of glass by Tank Furnace method with a neat diagram.	*CO3*	*PO2*	**8**
		UNIT - II			
2	a)	What are natural abrasives? Discuss with suitable examples.	*CO2*	*PO1*	**6**
	b)	Elaborate the preparation and properties of acidic refractories.	*CO1*	*PO1*	**6**
	c)	Describe the determination of refractoriness by seger cone test with neat diagram.	*CO3*	*PO2*	**8**
		OR			
3	a)	Explain refractoriness under load (RUL)? Analyze the role of thermal expansion on RUL.	*CO2*	*PO1*	**6**
	b)	Discuss the characteristics of grinding wheel with suitable specifications.	*CO2*	*PO1*	**6**
	c)	Explain the preparation, properties and applications of fireclay refractories.	*CO1*	*PO1*	**8**
		UNIT - III			
4	a)	What are thermal insulating materials? Explain their behavior with suitable example.	*CO1*	*PO1*	**6**
	b)	Describe the preparation of nanocomposites. Elaborate the applications of nanocomposites in food packaging industry.	*CO2*	*PO1*	**6**

		c)	Elaborate on importance and properties of electrical insulating materials.	*CO2*	*PO1*	**8**
			UNIT - IV			
	5	a)	What is solid state sensor? Describe its working principle.	*CO1*	*PO1*	**6**
		b)	Why structural hierarchy is important factor of biomaterials?	*CO2*	*PO1*	**6**
		c)	What are IR sensors? Explain their working and applications.	*CO3*	*PO2*	**8**
			OR			
	6	a)	Why bio-compatibility is an important characteristic of biomaterials?	*CO2*	*PO1*	**6**
		b)	Discuss the importance and applications of Proximity sensor.	*CO1*	*PO1*	**6**
		c)	Describe the working principle of Electrochemical sensors.	*CO3*	*PO2*	**8**
			UNIT - V			
	7	a)	Elaborate on functions of lubricants.	*CO1*	*PO1*	**6**
		b)	Describe the preparation of synthetic lubricant with suitable examples.	*CO2*	*PO1*	**6**
		c)	What is Boundary lubrication? Describe the mechanism of boundary lubrication.	*CO3*	*PO2*	**8**

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May 2024 Semester End Main Examinations

Programme: B.E. **Semester: VIII**
Branch: Institutional Elective **Duration: 3 hrs.**
Course Code: 19EC8OE3AE **Max Marks: 100**
Course: Automotive Electronics

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.

			CO	PO	Marks
		UNIT – I			
1	a)	Discuss the typical modern gasoline-fuelled, four stroke spark-ignition engine with neat diagrams and also draw power pulses from a 4- cylinder engine.	-	-	**10**
	b)	List the different parts of a conventional ignition system of an SI Engine along with their functional Importance	*CO 1*	*PO1*	**10**
		UNIT – II			
2	a)	Discuss the Principle and construction of Lithium ion Battery used in Automotive Systems.	-	-	**10**
	b)	Analyse the automotive subsystem responsible for starting the vehicle and also comment on the functional importance of each module used in a circuit.	*CO 2*	*PO2*	**10**
		UNIT - III			
3	a)	With the help of block diagram explain the electronic systems function to control, measure, or communicate in automotive.	-	-	**10**
	b)	Analyse the Effect of EGR on Engine Performance with necessary graphs.	*CO 2*	*PO2*	**10**
		UNIT – IV			
4	a)	One of the main disadvantages of the magnetic reluctance sensor is its lack of output when the engine isn't running. Suggest a suitable sensor that avoids this problem and also which can be used to measure either camshaft position or crankshaft position along with its construction and working principle used.	*CO 1*	*PO1*	**10**
	b)	Explain how Exhaust Gas Recirculation (EGR) reduces the exhaust gas emissions by recirculating a precisely controlled amount of exhaust gas into the intake.	-	-	**10**

			OR			
	5	a)	Examine the influence of fuel mixture and temperature on EGO output voltage and switching times respectively with relevant graphs.	***CO 1***	***PO1***	**10**
		b)	Describe the automotive sensor which uses the amount of oxygen in the exhaust gas for indirect measurement of the air/fuel ratio.	-	-	**10**
			UNIT – V			
	6	a)	Explain the following Automotive Network Protocols CAN, LIN, MOST and Flex Ray	-	-	**10**
		b)	Identify and Elaborate suitable safety-related system that assists the driver in deceleration of the vehicle in poor or marginal braking conditions.	***CO 3***	***PO6***	**10**
			OR			
	7	a)	Discuss Collision Avoidance Radar Warning System used in Automotive systems.	***CO 3***	***PO6***	**10**
		b)	Explain On board and off board diagnostics in Automotive.	***CO 3***	***PO6***	**10**

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May 2024 Semester End Main Examinations

Programme: B.E. **Semester: VIII**
Branch: Institutional Elective **Duration: 3 hrs.**
Course Code: 19EC8OE3ME **Max Marks: 100**
Course: Micro Electromechanical Systems

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.

				CO	PO	Marks
			UNIT – I			
1	a)		Define Micro Electro Mechanical system (MEMS)? Describe with a suitable example.	CO 1	-	**5**
	b)		With detail block diagram, explain key components in microsystems	CO 1	-	**5**
	c)		What is key difference between microsystems and miniaturization? Enlist miniaturization advantages along with potential applications of microsystems in process engineering.	CO 1	PO1	**10**
			UNIT – II			
2	a)		What is microsensor? Explain its application related to pressure and temperature measurements with suitable diagrams.	CO 1	PO1	**10**
	b)		What is microactuation? Enlist the different principle used in the same. Explain any two techniques in detail.	CO 1	PO1	**10**
			OR			
3	a)		Explain the use of MEMS sensors for biomedical and optical applications.	CO 1	PO1	**10**
	b)		Explain the piezoelectric crystal and electrostatic force actuation technology for micro actuators.	CO 1	PO1	**10**
			UNIT - III			
4	a)		Explain the working principle of micro accelerometers and microfluidics systems used in MEMS	CO 1	PO1	**10**
	b)		Describe the benefits of incorporating silicon and Gallium arsenide as a substrate material for MEMS sub-systems.	CO 1	-	**05**

		c)	Enlist the commonly used silicon compounds materials in MEMS. Explain any one in detail	***CO*** 1	-	**05**
			UNIT – IV			
	5	a)	Explain the working principle of thermal evaporation and sputtering process used in MEMS for thin film deposition.	***CO*** 1	***PO1***	**10**
		b)	Explain the dry etching based on physical and chemical reaction process with neat sketch.	***CO*** 1	***PO1***	**10**
			OR			
	6	a)	Describe the lithography process used in MEMS technology.	***CO*** 2	***PO2***	**10**
		b)	Explain any two advantages and dis-advantages for bulk micromachining and surface micromachining	***CO*** 1	-	**05**
		c)	Write a short note on latest advancement in microfabrication process.	***CO*** 1	-	**05**
			UNIT – V			
	7	a)	What are the essential objectives for good packaging systems in MEMS.	***CO*** 1	-	**05**
		b)	Explain the ball grid array and wafer level packaging methods in detail.	***CO*** 1	***PO1***	**10**
		c)	Differentiate between microelectronics and microsystems.	***CO*** 1	-	**05**

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May 2024 Semester End Main Examinations

Programme: B.E. **Semester: VIII**
Branch: Institutional Elective **Duration: 3 hrs.**
Course Code: 19EE8OE3SG **Max Marks: 100**
Course: Smart Grid Technologies

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)		Describe the functions of smart grid components.	CO2	PO1	**06**
	b)		Discuss the need of smart grid. List the features of smart grid.	CO2	PO2	**08**
	c)		Compare conventional grid and smart grid.	CO2	PO1	**06**
			UNIT - II			
2	a)		Illustrate and explain the architecture of Modern Energy Management Systems.	CO2	PO2	**08**
	b)		Elaborate the architecture of Remote Terminal Unit in detail.	CO3	PO2	**08**
	c)		Justify the need of Wide Area Measurement Systems.	CO3	PO2	**04**
			UNIT - III			
3	a)		Discuss the sustainable energy options for smart grid.	CO2	PO7	**04**
	b)		Illustrate and explain the operation of wind power generation.	CO2	PO7	**08**
	c)		Explain three types of energy storage technologies.	CO2	PO7	**08**
			OR			
4	a)		Explain the challenges and opportunities of renewable energy penetration.	CO2	PO7	**05**
	b)		Illustrate and explain the operation of micro hydro power generation.	CO2	PO7	**10**
	c)		List the advantages and drawbacks of Biomass energy systems.	CO2	PO7	**05**
			UNIT - IV			
5	a)		Describe the features of demand side management.	CO1	PO1	**04**
	b)		Categorize the functions of Advanced Metering Infrastructure (AMI) and also mention its uses.	CO1	PO2	**10**
	c)		State i) Demand Pricing ii) Real time pricing iii) Peak pricing.	CO1	PO1	**06**

			UNIT - V			
	6	a)	Explain the IPv6 protocol along with its advantages.	*CO3*	*PO6*	**05**
		b)	Illustrate and explain the components of local area network.	*CO3*	*PO6*	**10**
		c)	Discuss the basics of web services for smart grid.	*CO3*	*PO6*	**05**
			OR			
	7	a)	Describe the features of Zigbee along with its advantages.	*CO3*	*PO6*	**05**
		b)	Illustrate and explain the components of house area network.	*CO3*	*PO6*	**10**
		c)	Explain the requirements of cyber security for smart grid.	*CO3*	*PO6*	**05**

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May 2024 Semester End Main Examinations

Programme: B.E. **Semester: VIII**

Branch: Institutional Elective **Duration: 3 hrs.**

Course Code: 19EI8OE3AU **Max Marks: 100**

Course: Automotive Instrumentation

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.

				CO	PO	Marks
			UNIT – I			
1	a)		Illustrate the structure of general EV configuration with relevant diagram.	*CO1*	*PO1*	**10**
	b)		Discuss the various types of architectures of hybrid vehicles with the aid of neat diagrams.	*CO1*	*PO1*	**10**
			UNIT – II			
2	a)		Describe the basic operation of a fuel cell.	*CO2*	*PO2*	**05**
	b)		Explain the following i. Proton Exchange Membrane Fuel Cell ii. Alkaline Fuel Cell	*CO2*	*PO1*	**10**
	c)		List the types of batteries used in electric vehicles.	*CO2*	*PO1*	**05**
			UNIT – III			
3	a)		Explain Mechatronic systems and components with neat sketch.	*CO3*	*PO2*	**10**
	b)		Explain the following with respect to control unit i. Data Processing Unit ii. Control Unit Operating Conditions	*CO3*	*PO3*	**10**
			UNIT – IV			
4	a)		Discuss the details of sensor market for automotive applications with neat sketch.	*CO4*	*PO3*	**07**
	b)		Illustrate the working of engine crankshaft angular position Sensor	*CO4*	*PO3*	**07**
	c)		Discuss the various applications of sensors in automotive electronics.	*CO4*	*PO3*	**06**

			OR			
	5	a)	Explain the following i. Fuel injector with neat sketch ii. Magnetic Reluctance Position Sensor	*CO4*	*PO3*	**10**
		b)	Explain the working of Exhaust Gas Recirculation(EGR) Actuator with neat diagram	*CO4*	*PO3*	**06**
		c)	Differentiate between Sensor and Actuator	*CO4*	*PO3*	**04**
			UNIT-V			
	6	a)	Explain in detail about the isolated bidirectional DC-DC converter	*CO5*	*PO3*	**10**
		b)	Illustrate the concept of Z- converter for battery charging system.	*CO5*	*PO3*	**10**
			OR			
	7	a)	Describe in detail any two charging methods used in battery	*CO5*	*PO3*	**10**
		b)	Discuss the concept of charging of the battery from grid with relevant diagram.	*CO5*	*PO3*	**10**

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May 2024 Semester End Main Examinations

Programme: B.E. **Semester: VIII**

Branch: Institutional Elective **Duration: 3 hrs.**

Course Code: 19ET8OE3SP **Max Marks: 100**

Course: Satellite Principles and Applications

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.

				CO	PO	Marks
			UNIT - I			
1	a)	Define and explain the following orbital parameters: (i) Angles defining the direction of the satellite. (ii) Equinoxes (iii) Apogee (iv) Eccentricity (v) Right Ascension of Ascending node		CO1		**10**
	b)	Explain the types of satellite orbits		CO1		**10**
		OR				
2	a)	Define Kepler's laws of planetary motion and explain with neat Diagrams and necessary equations.		CO1		**10**
	b)	Explain the basic principles of orbiting satellites		CO1		**10**
		UNIT - II				
3	a)	Explain telemetry tracking and command subsystem		CO1		**10**
	b)	Explain three tracking techniques used for satellite tracking.		CO1		**10**
		UNIT - III				
4	a)	Compare DS-CDMA, FH-CDMA and TH-CDMA systems.		CO1		**10**
	b)	List and explain the various parameters that influence the design of a satellite communication link.		CO1		**10**
		OR				
5	a)	Derive the expression for the following: (i) Frequency spectrum of AM signal (ii) Power in AM signal (iii) Noise in AM signal		CO2	PO1	**10**

		b)	Define frequency modulation. Also define i) Modulation index ii) Depth of modulation iii) Bandwidth of an FM signal	*CO1*		**10**
			UNIT - IV			
	6	a)	Explain the classification of satellite remote sensing systems	*CO1*		**10**
		b)	Describe the principle operation of GPS satellite signal structure. And also list the applications of Satellite Navigation System.	*CO1*		**10**
			UNIT - V			
	7		Analyze the following (i) Military Communication (ii) Applications of Scientific Satellites (iii) Satellites Reconnaissance Satellites (iv) Space Stations	*CO3*	*PO2*	**20**

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May 2024 Semester End Main Examinations

Programme: B.E. **Semester: VIII**
Branch: Institutional Elective **Duration: 3 hrs.**
Course Code: 19ML8OE3BM **Max Marks: 100**
Course: Biometrics

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)	Write a short note on False Non-Match Rate (FNMR) and False Match Rate (FMR).	CO1	PO1	**05**
	b)	Explain in brief the four categories of Doddington's zoo.	CO1	PO1	**05**
	c)	Draw the basic building blocks of a generic biometric system and explain the sensory module	CO1	PO1	**10**
		UNIT - II			
2	a)	Explain the steps of a modified orientation field estimation algorithm used to handle the creases in palmprints	CO2	PO2	**05**
	b)	Write a short note on Optical Frustrated Total Internal Reflection	CO2	PO2	**05**
	c)	Discuss the image acquisition for fingerprint capturing and digitizing, review its merits and demerits.	CO2	PO2	**10**
		OR			
3	a)	Write a short note on Fingerprint Indexing	CO2	PO2	**05**
	b)	Draw the Flowchart of a minutiae matching algorithm and write a short note on alignment.	CO2	PO2	**05**
	c)	Describe the details in a fingerprint, which can be characterized at three different levels ranging from coarse to fine.	CO2	PO2	**10**
		UNIT - III			
4	a)	Write a short note on 3D Sensors used in face recognition systems	CO2	PO2	**05**
	b)	Write a short note on Feature Extraction and Matching in face recognition systems	CO2	PO2	**05**
	c)	Summarize on Categorization of face recognition techniques.	CO3	PO3	**10**

			UNIT – IV			
	5	a)	Outline how the quality evaluation done for an Iris image	*CO3*	*PO3*	**05**
		b)	Write a short note on cross-section of the iris and its layers	*CO3*	*PO3*	**05**
		c)	Explain the various blocks in an iris recognition system.	*CO3*	*PO3*	**10**
			UNIT - V			
	6	a)	Review on the various models used to detect gait.	*CO3*	*PO3*	**05**
		b)	Identify the challenges faced during hand geometry recognition.	*CO3*	*PO3*	**05**
		c)	Illustrate ear recognition process with suitable diagrams and also discuss the challenges involved in it	*CO3*	*PO3*	**10**
			OR			
	7	a)	What are soft biometrics. Mention its applications.	*CO3*	*PO3*	**05**
		b)	Discuss the challenges in ear recognition	*CO3*	*PO3*	**05**
		c)	Illustrate adversary attacks in a biometric system with suitable block diagram	*CO3*	*PO3*	**10**

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

Autonomous Institute Affiliated to VTU

May 2024 Semester End Main Examinations

Programme: B.E. **Semester: VIII**
Branch: Institutional Elective **Duration: 3 hrs.**
Course Code: 20IS8OEWTS **Max Marks: 100**
Course: Web Technologies

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)	Create, test and validate an XHTML document that has a form with the following controls: a. A text box to collect the user's name b. Four checkboxes, one each for the following items: i. Four 100-watt light bulbs for $2.39 ii. Eight 100-watt light bulbs for $4.29 iii. Four 100-watt, long-life light bulbs for $3.95 iv. Eight 100-watt, long-life light bulbs for $7.49 c. A collection of three radio buttons that are labeled as follows: i. Visa ii. Master Card iii. Discover	*CO2*	*PO2*	**10**
	b)	Illustrate the following HTML elements: • image • select • textarea	*CO2*	*PO1*	**10**
		UNIT - II			
2	a)	Develop and demonstrate the usage of inline, internal and external style sheet using CSS.	*CO1*	*PO1*	**10**
	b)	Create and test an HTML document that describes an unordered list of atleast five popular books. The bullet for each book must be a small image of the book's cover. Find the images on the web.	*CO2*	*PO2*	**10**
		OR			
3	a)	Showcase the utilization of word spacing and letter spacing in CSS, employing a sample program to illustrate their application.	*CO2*	*PO2*	**10**

		b)	In CSS, font properties play a vital role in controlling text presentation on webpages. Explore the properties.	*CO1*	*PO1*	**10**
			UNIT - III			
	4	a)	Demonstrate with examples, screen output and keyboard input methods in JavaScript.	*CO3*	*PO2*	**10**
		b)	Explain JavaScript array methods with code snippet.	*CO1*	*PO1*	**10**
			OR			
	5	a)	Develop a JavaScript script to find smallest of three numbers.	*CO4*	*PO2*	**10**
		b)	Demonstrate usage of onkeydown and onkeyup events in JavaScript DOM.	*CO4*	*PO2*	**10**
			UNIT - IV			
	6	a)	Explain about request and response in Postman API.	*CO1*	*PO1*	**10**
		b)	Implement callback function to find subtraction of two numbers and display the result.	*CO3*	*PO2*	**10**
			UNIT - V			
	7	a)	Describe Create, Read, Update and Delete operations on documents in MongoDB.	*CO5*	*PO1*	**10**
		b)	Write a Node JS program to print “Hello BMSCE”.	*CO5*	*PO1*	**10**

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

Autonomous Institute Affiliated to VTU

May 2024 Semester End Main Examinations

Programme: B.E. **Semester:VIII**
Branch: Institutional Elective **Duration: 3 hrs.**
Course Code: 21BT8IEFRS **Max Marks: 100**
Course: Forensic Science

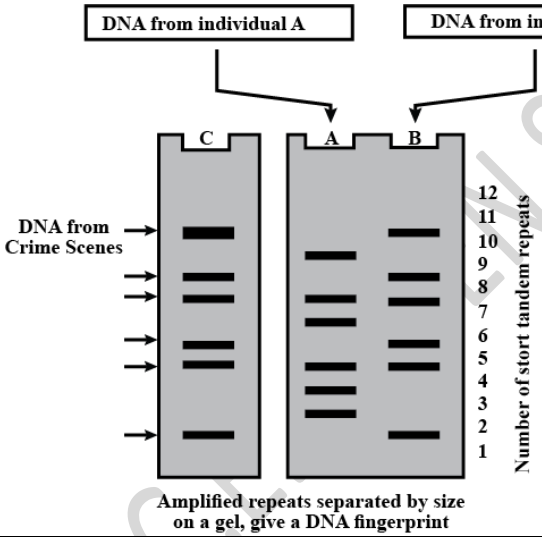
Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

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)	Differentiate the following: i. Dying declaration and dying deposition ii. Primary evidence and circumstantial evidence iii. Examination-in-chief and cross-examination iv. Common witness and expert witness v. Supreme court and sessions court	*CO* 1	*PO1*	**10**
	b)	In considering the impact of eyewitness testimony in legal proceedings, we can examine a notable case where such testimony resulted in a wrongful conviction. For instance, let's delve into the case of Ronald Cotton, who was wrongly convicted of rape in 1984 based on eyewitness identification by the victim, Jennifer Thompson. Despite subsequent DNA evidence proving Cotton's innocence and identifying the true perpetrator, Thompson's initial identification significantly impacted the verdict. Analyzing this case, explore the factors that influence the reliability of witness testimony and why such testimony retains significance in court proceedings despite its inherent limitations	*CO* 3	*PO2*	**10**
		UNIT-II			
2	a)	Consider a case where a 28-year-old married woman is discovered dead, having fallen from the 10th floor of her apartment. While a printed suicide note is found in her room, additional evidence at the scene raises suspicions, prompting the involvement of forensic experts for thorough examination and analysis. Explore the contributions of the biology, physics, and documentation divisions within the forensic science laboratory in relation to this case.	*CO* 2	*PO1*	**10**

		b)	A young woman, aged 19, reportedly fell victim to rape and murder. Three individuals have been apprehended by the police on suspicion of sexually assaulting and murdering her. In relation to this incident, examine and deliberate on the typical physical evidence crucially analyzed at the crime scene. Additionally, elaborate on the methods employed for the collection and preservation of each physical evidence at the scene of the crime.	***CO*** 3	***PO2***	**10**
			OR			
	3	a)	Classify with necessary justifications the following physical evidences as individual and class evidences. i. Hair ii. Soil iii. Fingerprints iv. Tyre marks v. Blood	***CO*** 2	***PO1***	**10**
		b)	In a rural area near a forest and highway, a camper reported discovering human remains while hiking. The body was found partially buried in a shallow grave, indicating foul play. As the lead investigator, you must coordinate the search for evidence and clues in the surrounding area. How would you direct your team to conduct a systematic search, considering the remote location and potential challenges? Justify your chosen method of search and specify what physical evidences to look for and where to search for them during the investigation.	***CO*** 3	***PO2***	**10**
			UNIT-III			
	4	a)	Four friends aged 25 years, went for camping near a forest. When 3 of the friends were preparing dinner at the camp barbecue site, the fourth friend went out for a walk nearby. Few minutes later, the 3 friends cooking at the camp, heard a sudden sharp cry and rushed to the spot to see a wild dog, backing out, pulling the friend in its jaws. It ran away when they tried to free their friend. There was no sign of the missing person or the wild dog, except for footprints leading to the road and beyond. Friends reported to nearby police station and case was registered. Eight days later a hiker discovered jacket and shirt in a crumpled heap near a rock in the forest. On the neck of the jacket and shirt were bloodstains that were later thought to be consistent with the type of stain that would result from a knife cut, not a bite. There were also no tooth marks on the clothing. Around the scene, investigators found no sign of human remains, no dog hair, and no indication that violence had occurred between an animal and a man. No dog saliva was found on the clothing. That left human involvement---someone who left the man's clothing several miles from where he was taken. Suspicion turned to the friends, There also appeared to be two bloodstained prints on the jacket made by the hands of an adult, like a man. A search of the car produced what appeared to be the blood on the seats and on a pair of scissors in the vehicle. After that, the 3 friends were arrested and tried for the murder of the person. They insisted they were innocent, but the evidence appeared to say otherwise. I. Explain any two presumptive test which the experts can use to confirm blood in the car seat. II. Describe any one method to differentiate human blood from animal blood.	***CO*** 2	***PO1***	**10**

		b)	On a rainy night in April 2023, Anna Smith, a pedestrian, was struck and killed by a vehicle while crossing the street in downtown Springfield. The driver fled the scene, leaving Anna critically injured. Despite efforts by emergency responders, Anna succumbed to her injuries before reaching the hospital. The vehicle involved in the hit-and-run was described as a dark-colored sedan, but no further details about the driver were available. i. How does chromatography aid forensic investigators in analyzing paint samples retrieved from both the victim's clothing and the vehicle involved in the accident? ii. What unique characteristics of paint particles are observed under a microscope, and how do they aid in determining the origin of the paint?	***CO*** 2	***PO1***	**10**
			OR			
	5	a)	A 60 year old man dies from hit and run accident at a highway. Police-officer in charge arrives at the crime scene and his team starts collecting the evidences. Do you think soil samples are significant as physical evidence in this case? If yes, explain what information we can get from soil samples collected in this crime scene. Also explain the density gradient technique used for soil analysis with a suitable diagram.	***CO*** 2	***PO1***	**10**
		b)	A woman with long hair is a suspect in a burglary case. At the crime scene, several long hairs were found attached to a broken lock of the safe. The police obtain a warrant and request a sample of 25 to 50 hairs from this woman. They tell the woman it is important that they pull the hairs from her head rather than to merely cut the hairs. The police suspect that the woman was stealing to help support a drug habit. i. Why is it important that the police pull the hairs from her head rather than cut her hair? ii. Why is it necessary to obtain 25 to 50 hairs from this woman? iii. The woman denies that she is currently taking drugs and states that she stopped using drugs a year ago. Explain how the police can determine if the woman has been off drugs for over one year. iv. Suppose the hairs of the woman match the hairs found at the crime scene. Why does this not necessarily prove that she was the guilty?	***CO*** 3	***PO2***	**10**

			UNIT-IV			
	6	a)	As a forensic pathologist, your job is to calculate the time of death for a victim. This could lead to valuable information needed to solve a case of a 19-year-old female who was found in the woods behind the local hospital. She is found lying on her torso (face down), but lividity is present on the dorsal (back) side of the victim. The dead body temperature measured is 88°F. i. What can you conclude about the victim/situation from the lividity? ii. Determine the PMI from these evidences. iii. According to you, based on the PMI, has the body decomposed? Tabulate and explain the stages of decomposition of a dead body with corresponding duration and common insects found during each stage.	***CO*** 3	***PO2***	**10**
		b)	Schematic representation of DNA fingerprints are shown below : (i) Which one of the suspected individual may be involved in the crime? (ii) Discuss elaborately the stages in DNA fingerprinting.  	***CO*** 3	***PO2***	**10**
			UNIT-V			
	7	a)	What is PLUS process in forensic ethics? List its steps. Enumerate common ethical issues in forensic crime investigations.	***CO*** 2	***PO1***	**10**
		b)	In 2023, several individuals across India fell victim to a sophisticated cyber scam involving unauthorized access to their bank accounts and subsequent financial fraud. The perpetrators used social engineering tactics, including phishing messages and fraudulent websites to trick victims into disclosing their OTPs (One-Time Passwords) and clicking on malicious URLs, resulting in unauthorized transactions and monetary losses. (i) Which type of computer crime category does this belong to? How is it different from other types of computer crimes? (ii) What are the implications of the absence of national cybercrime laws?	***CO*** 2	***PO1***	**10**

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

Autonomous Institute Affiliated to VTU

May 2024 Semester End Main Examinations

Programme: B.E. **Semester: VIII**

Branch: Institutional Elective **Duration: 3 hrs.**

Course Code: 21CS8OECCT **Max Marks: 100**

Course: Cloud Computing

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)	Explain rapid elasticity and multitenancy characteristics of cloud computing.		*CO1*	*PO1*	**6**
	b)	Illustrate the importance of replicating the data in cloud and demonstrate the different replication approaches with diagrams.		*CO1*	*PO 1*	**8**
	c)	Applying the knowledge of various cloud deployment model, identify and explain the cloud deployment model that is suitable for the following scenarios and justify the same. ➢ A defense organization needs greater level of security to their data. ➢ An e-commerce website needs to handle sudden spike in demand. Also, it needs to store both critical applications as well as non-critical applications. ➢ An educational institution wants to store data which is not much critical.		*CO1*	*PO1*	**6**
		UNIT - II				
2	a)	Differentiate among Full Virtualization, Para-Virtualization and Hardware-Assisted Virtualization.		*CO2*	*PO2*	**6**
	b)	Discuss the pros and cons of Virtualization technique.		*CO2*	*PO2*	**8**
	c)	Demonstrate the working of XEN hypervisor with a neat Diagram.		*CO2*	*PO2*	**6**
		OR				
3	a)	Demonstrate the various steps involved in the live migration of a virtual machine.		*CO 2*	*PO2*	**6**
	b)	Explain the Hyper-V Architecture with a neat diagram.		*CO1*	*PO1*	**8**
	c)	Illustrate the concept of Virtual machines and state the advantages and disadvantages of a virtual machine.		*CO2*	*PO2*	**6**

			UNIT - III			
	4	a)	Illustrate with a neat diagram the stack of six layers of cloud services.	*CO2*	*PO2*	**6**
		b)	Demonstrate with necessary diagrams the problems associated with static cloud resource provisioning policies. Illustrate the resource-provisioning methods applied by providers to overcome these problems.	*CO2*	*PO2*	**8**
		c)	Demonstrate the security solutions adopted by cloud service providers for the Protection of shared files and datasets.	*CO2*	*PO2*	**6**
			OR			
	5	a)	To support trusted cloud services building a trust overlay network is suggested. Justify the statement with suitable diagram.	*CO2*	*PO2*	**6**
		b)	Identify and explain the various security and privacy protection techniques used for different cloud service models, with a necessary diagram.	*CO2*	*PO2*	**8**
		c)	Analyse and list the desirable features of a security and privacy protection software used by cloud users.	*CO2*	*PO2*	**6**
			UNIT - IV			
	6	a)	Demonstrate the process of Hadoop Map Reduce job execution with a diagram.	*CO 2*	*PO2*	**6**
		b)	Explain the FIFO and Capacity scheduling algorithms used by Hadoop.	*CO1*	*PO1*	**8**
		c)	Identify a suitable cloud deployment architecture for e-commerce and banking applications and illustrate the same with a neat diagram.	*CO 2*	*PO2*	**6**
			UNIT - V			
	7	a)	Explain the benefits of Containerization.	*CO1*	*PO1*	**6**
		b)	Draw the Kubernetes architecture with a neat diagram and explain the following concepts: a) Clusters b) Nodes c) Pods d) Labels	*CO1*	*PO1*	**8**
		c)	Differentiate between dedicated hosts, virtual machines, and docker with necessary diagrams.	*CO2*	*PO2*	**6**

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Autonomous Institute Affiliated to VTU

May 2024 Semester End Main Examinations

Programme: B.E. **Semester: VIII**
Branch: Institutional Elective **Duration: 3 hrs.**
Course Code: 21CV8OEOSH **Max Marks: 100**
Course: Occupational Safety And Health Administration

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)		Briefly explain the occupational safety and health act.	CO 1	PO 1	10
	b)		Write short notes on the following: i) 3E's of safety ii) Electricity Act.	CO 1	PO 1	10
			UNIT – II			
2	a)		What is an accident? List and explain the factors causing occupational injuries or accidents.	CO 2	PO 2	10
	b)		Enumerate the supervisor's role in accident reporting.	CO 2	PO 2	10
			UNIT - III			
3	a)		Explain the stages of fire development. Explain the general Do's and Don'ts during fire accident.	CO 1	PO 1	10
	b)		What is a fire extinguisher? Classify the fire extinguisher and explain in detail	CO 1	PO 1	10
			UNIT – IV			
4	a)		Summarize worksite analysis program for ergonomics.	CO 3	PO 1	10
	b)		Write a note on HAZOP (Hazard and operability review)	CO 3	PO 1	10
			OR			
5	a)		Enumerate the process of Fault Tree Analysis with its advantages and disadvantages.	CO 3	PO 1	10
	b)		What is the purpose of Ergonomic task analysis? What are the benefits?	CO 3	PO 1	10
			UNIT – V			
6	a)		Discuss on musculoskeletal disorders in a workplace.	CO 3	PO 1	10
	b)		Enumerate Environmental management plan for safety and sustainability.	CO 3	PO 1	10
			OR			
7	a)		Enumerate the most common work place diseases.	CO 3	PO 1	10
	b)		Discuss on occupational health and toxicology.	CO 3	PO 1	10

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

Autonomous Institute Affiliated to VTU

May 2024 Semester End Main Examinations

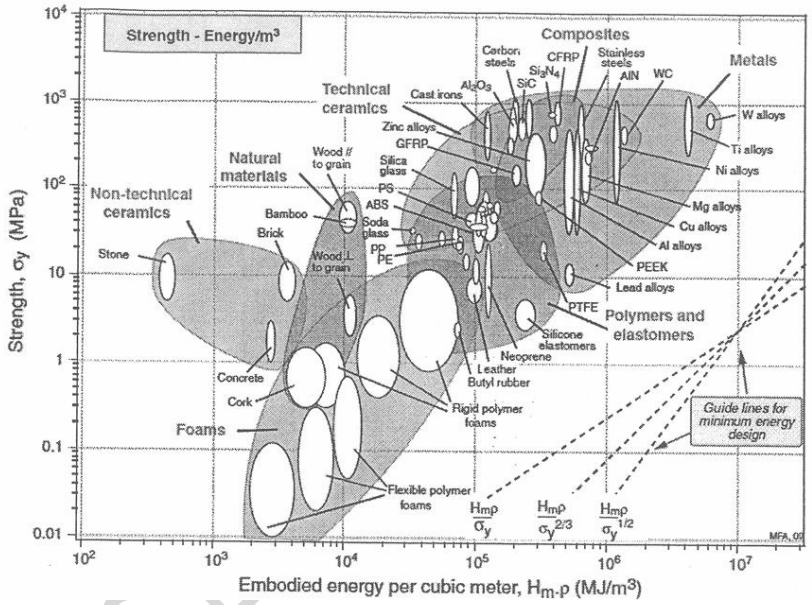
Programme: B.E. **Semester: VIII**
Branch: Institutional Elective **Duration: 3 hrs.**
Course Code: 21CV8OESLA **Max Marks: 100**
Course: Sustainability And Lifecycle Assessment

Instructions: 1. Answer 5 full questions choosing one full question from Units 3 and 4
2. Standard normal distribution table and interest factor tables are allowed
3. Answer all parts of the questions together
4. 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)	Briefly discuss the evolution of SDGs. Identify five Sustainable Development Goals (SDGs) and outline two specific targets associated with each goal.	CO3	PO7	**10**
	b)	Create a Venn diagram illustrating the concept of a "sustainable" solution and label its sections. Then, identify three products, materials, components, processes, systems, or technologies that fit into each of the following categories: a) Bearable b) Viable c) Equitable Support your choices with two facts or points for each category.	CO3	PO7	**10**
		UNIT - II			
2	a)	List and discuss any 5 indicators used to measure sustainability.	CO2	PO7	**10**
	b)	Explain the concept of "Eco-efficiency" and eco audit highlight their key components.	CO3	PO7	**10**
		UNIT - III			
3	a)	Given the properties of Material A and Material B, determine which material is more cost-effective for selection. Additionally, provide a brief discussion on the results considering various other criteria.	CO1	PO1 PO7	**10**

Material	*Strength (MPa)*	*Cost (Rs/cum)*	*Energy consumed (MJ/cum)*	*Quantity required (cum)*
A	20.0	3600.00	40.0	40.0
B	30.0	4800.00	62.0	36.0

		b)	Describe various approaches for estimating embodied energy and embodied carbon in materials or products.	*CO3*	*PO7*	**10**
			OR			
	4	a)	For the use-phase of following products, indicate which type of input energy and output energy relation suits best and which units of energy are preferred for each of them? i. Automobile ii. Phone iii. Baked product iv. Timber v. Solar panels	*CO1*	*PO1* *PO7*	**10**
		b)	Figure 1 shows the plot of EE versus strength of various classes of materials. List four reasons to state that non-technical ceramics are relatively more sustainable than technical ceramics, assuming that they satisfy the technical requirements.  Figure 1.	*CO3*	*PO7*	**10**
			UNIT - IV			
	5	a)	Discuss the objective of Life Cycle Analysis (LCA) and illustrate the stages involved in LCA with a flow chart.	*CO2*	*PO7*	**10**
		b)	Define energy conversion efficiency and elucidate it using an example.	*CO2*	*PO7*	**10**
			OR			
	6	a)	Provide two instances where each of the following life cycle perspectives is examined: i) Cradle to gate ii) Gate to gate iii) Cradle to grave	*CO2*	*PO7*	**10**
		b)	Create a lifecycle framework tailored for sustainable operations at a paper production plant. Outline the key characteristics of this lifecycle strategy in a concise manner.	*CO2*	*PO7*	**10**

			UNIT - V			
	7	a)	Define Life Cycle Impact Assessment and elucidate the fundamental steps required to conduct it.	*CO2*	*PO7*	**10**
		b)	Share your perspective on the implementation of a regulation mandating the removal of vehicles failing to meet emission and safety standards from the road. Justify your stance with appropriate reasoning.	*CO3*	*PO7*	**10**

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

Autonomous Institute Affiliated to VTU

May 2024 Semester End Main Examinations

Programme: B.E. **Semester: VIII**
Branch: Institutional Elective **Duration: 3 hrs.**
Course Code: 21EE8OE3ES **Max Marks: 100**
Course: Holistic Approach to Electrical Safety

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)	Enumerate the Significance of electrical safety issues that has to be given top priority as per your suggestion.	CO1	PO1	**06**
	b)	What is the main goal of APELL? How are they achieved? Mention the parts of APELL.	CO1	PO1	**06**
	c)	What is electric shock? Enumerate the Factors affecting the severity of shock to a person. Define Threshold Minimum perception current and Let-go Threshold current.	CO1	PO1	**08**
		UNIT - II			
2	a)	Differentiate between ELCB vs RCCB	CO2	PO2	**06**
	b)	Enumerate briefly the Common Causes of Power Surges.	CO2	PO2	**08**
	c)	What are the effects due to Voltage Fluctuations on a power supply? How can it be avoided?	CO2	PO2	**06**
		OR			
3	a)	Differentiate between AFCI Vs GFCI	CO2	PO2	**06**
	b)	Identify Some Basic Characteristics of lightning. Also enumerate Effects of Lightning.	CO2	PO2	**08**
	c)	Explain how Power Surge can be Prevented.	CO2	PO2	**06**
		UNIT - III			
4	a)	Define Earthing. What are the Characteristics of Good Earthing	CO3	PO6	**07**
	b)	Enumerate the basic steps of a lockout/tagout procedure.	CO3	PO6	**07**
	c)	What is PPE? What PPEs are available for Electrical Safety?	CO3	PO6	**06**
		OR			
5	a)	List and identify the various categories of PPE.	CO3	PO6	**07**

		b)	What are the Conditions necessary for generation of static electricity? How it can be controlled?	*CO3*	*PO6*	**07**
		c)	As per IS'.5572 what are the safety zones in hazardous atmosphere identified for the purpose of appropriate electrical installation?	*CO3*	*PO6*	**06**
			UNIT - IV			
	6	a)	What is Safe Operating Procedure? What are its features and significance?	*CO4*	*PO9*	**05**
		b)	As per IS-14489-1998 List some of the relevant points observed during safety audit	*CO4*	*PO9*	**08**
		c)	Differentiate between Corrective Maintenance vs Preventive Maintenance. What are the plans available for Preventive Maintenance Pre-Check?	*CO4*	*PO9*	**07**
			UNIT - V			
	7	a)	Enumerate the various Safety of Machinery, Electrical Equipments under IEC 60204.	*CO5*	*P12*	**10**
		b)	Discuss the salient mandates as per National Electric Code with respect to electrical safety.	*CO5*	*P12*	**10**

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Autonomous Institute Affiliated to VTU

May 2024 Semester End Main Examinations

Programme: B.E **Semester: VIII**
Branch: Institutional Elective **Duration: 3 hrs.**
Course Code: 21MA8OELIA **Max Marks: 100**
Course: LINEAR ALGEBRA

Instructions: 1. Answer 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

1 a) Find the value of k such that $(-4, 3, k)$ is the linear combination of the vectors $(1, -1, -2)$, $(5, -4, -7)$ and $(-3, 1, 0)$. **6**

b) Find a basis of subspace of $\mathbb{R}^5$ spanned by $S = \{u_1, u_2, u_3, u_4, u_5,\}$ where $u_1 = (1, 2, -1, 3, 4)$, $u_2 = (2, 4, -2, 6, 8)$, $u_3 = (1, 3, 2, 2, 6)$, $u_4 = (1, 4, 5, 1, 8)$ and $u_5 = (2, 7, 3, 3, 9)$. **6**

c) Show that the set M of 2×2 matrices of the form $M = \left\{ \begin{bmatrix} a & b \\ c & d \end{bmatrix}, \text{ where } a, b, c, d \in \mathbb{R} \right\}$ forms a vector space over the field of reals. **8**

UNIT - II

2 a) Define Linear transformation. Also find the matrix of linear transformation $T: R^3 \to R^3$ given $T(x, y, z) = (x + 2y - 3z,\ 4x - 5y - 6z,\ 7x + 8y + 9z)$ with respect to the standard basis. **6**

b) Find the range and kernel of the linear transformation $T: \mathbb{R}^4 \to \mathbb{R}^3$ given by the $A = \begin{bmatrix} 1 & 1 & 3 \\ 2 & 3 & 8 \\ 3 & 5 & 13 \\ 1 & -2 & -3 \end{bmatrix}$. Also verify Rank-Nullity theorem. **7**

c) Let $G: R^2 \to R^2$ be the linear transformation defined by $G(x, y) = (2x + y, 3x + 2y)$. Show that G is non-singular and hence find G^{-1} if it exists. **7**

UNIT - III

3 a) Verify Cayley-Hamilton theorem for the matrix $A = \begin{bmatrix} 1 & 0 & 3 \\ 2 & 1 & -1 \\ 1 & -1 & 1 \end{bmatrix}$. **6**

b) Diagonalize the matrix $A=\begin{bmatrix}1 & 4\\ 3 & 2\end{bmatrix}$ if possible and hence find A^4. **7**

c) Let $A=\begin{bmatrix}2 & -3\\ 5 & 1\end{bmatrix}$. Find the root of the polynomials $f(t)=2t^2-5t+6$ and $g(t)=t^3-2t^2+t+3$ of the matrix A. **7**

OR

4 a) Find the eigenvalues and eigenvectors of the matrix $A=\begin{bmatrix}8 & -6 & 2\\ -6 & 7 & -4\\ 2 & -4 & 3\end{bmatrix}$. **6**

b) Find the characteristic and minimal polynomial of the matrix **7**

$$A=\begin{bmatrix}4 & -1 & 0 & 0 & 0\\ 1 & 2 & 0 & 0 & 0\\ 0 & 0 & 3 & 1 & 0\\ 0 & 0 & 0 & 3 & 1\\ 0 & 0 & 0 & 0 & 3\end{bmatrix}.$$

c) Obtain the Eigen space for the linear transformation defined by $T(x,y,z)=(2x+y+z,\ y-z,\ 2y+4z)$. **7**

UNIT - IV

5 a) Let W be the subspace of R^5 spanned by $u=(1,2,3,-1,2)$ and $v=(2,4,7,2,-1)$. Find a basis of the orthogonal complement $W^{\perp}$ of W. **6**

b) Find an orthogonal basis and hence an orthonormal basis of the subspace W spanned by the following vectors $S=\{1,\ t,\ t^2\}$ of $P_2(t)$ given **8**

$\langle f,g\rangle=\int_0^1 f(t)g(t)dt$.

c) Find an orthogonal matrix P whose first row is $u_1=\left(\frac{1}{3},\frac{2}{3},\frac{2}{3}\right)$. **6**

OR

6 a) Find the angle between the matrices $A=\begin{bmatrix}2 & -3\\ 2 & 1\end{bmatrix}$ and $B=\begin{bmatrix}1 & 2\\ 3 & 4\end{bmatrix}$ in the $M_{m\times n}$ inner product space with respect to inner product $\langle A,B\rangle=Tr(B^TA)$. **5**

b) Obtain the QR factorization of the matrix $A=\begin{bmatrix}1 & 0 & -1\\ 2 & -3 & 3\\ -1 & 2 & 4\end{bmatrix}$. **8**

c) Solve the system of equations $AX=b$ by the method of least squares where **7**

$A=\begin{bmatrix}1 & -3\\ 2 & 6\\ 7 & -3\\ 3 & 4\end{bmatrix}$ and $b=\begin{bmatrix}1\\ 3\\ 2\\ 1\end{bmatrix}$ and hence find the least square error.

UNIT - V

7 a) Orthogonally diagonalize $A=\begin{bmatrix}0 & 2 & 2\\ 2 & 0 & 2\\ 2 & 2 & 0\end{bmatrix}$. **10**

b) Find the singular value decomposition of the matrix $A=\begin{bmatrix}1 & -1\\ -2 & 2\\ 2 & -2\end{bmatrix}$. **10**

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

Autonomous Institute Affiliated to VTU

May 2024 Semester End Main Examinations

Programme: B.E. **Semester: VIII**
Branch: Institutional Elective **Duration: 3 hrs.**
Course Code: 21ME8OEFIM **Max Marks: 100**
Course: Financial Management

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.
3. Use of compound interest table is permitted.

		UNIT - I	CO	PO	Marks
1	a)	Explain Partnership form of organization with any 2 advantages and any 2 disadvantages.	CO1	PO1	**08**
	b)	Following is the data pertaining to two companies. Calculate the expected return and standard deviation of both companies. Also, calculate return and standard deviation of a portfolio consisting of both companies in equal proportion. (Coefficient of correlation=0.6).	CO1	PO1	**12**
		OR			
2	a)	Explain the various sources of risk.	CO1	PO1	**10**
	b)	A businessperson has two proposals to help him expand his operation. The net cash flows of the proposals are as follows:	CO1	PO2	**10**

	α company		**β company**	
Possible outcome	Prob. of Occurrence	% Rate of return	Prob. of Occurrence	% Rate of return
1	0.1	50	0.05	90
2	0.2	30	0.25	50
3	0.4	10	0.3	20
4	0.2	-10	0.3	-10
5	0.1	-30	0.1	-50

	End of year Cash flows				
Proposals	0	1	2	3	4
P	-20000	7000	9000	7000	8000
Q	-20000	10000	6000	7000	6000

Compare the present worth of both the proposals at interest rate of 13.5% and give your conclusions.

			UNIT - II			
	3	a)	Explain gross working capital and net working capital. Explain the need for working capital.	*CO2*	*PO1*	**08**
		b)	The board of directors of Nanak Engineering Company Ltd. Requests you to prepare a statement showing the working capital requirements for a level of activity at 1,56,000 units of production. The following information is available for you calculation: Raw materials: Rs 90 Direct labour: 40 Overheads: 75 Total: 205 Profit: 60 Selling price: 265 i) Raw materials are in stock, on average for 1 month ii) Material are in process, (50% complete) on average for 4 weeks iii) Finished goods are in stock on average for 1 month iv) Credit allowed by suppliers is 1 month v) Time lag in payment from debtors is 2 months vi) Average lag in payments of overheads is 1 month vii) 20% of the output is sold against cash. Desired minimum cash in hand and in bank, Rs 60,000. It is assumed that production is carried on evenly throughout the year: wages and overheads accrue similarly, and a time period of 4 weeks is equivalent to a month.	*CO2*	*PO2*	**12**
			OR			
	4	a)	Explain the advantages and disadvantages of debentures.	*CO2*	*PO2*	**10**
		b)	Explain the features of ordinary shares.	*CO2*	*PO2*	**10**
			UNIT - III			
	5	a)	From the Trial Balance of M/s Sri Ram and Co. for the year ending 31st March 2023. Prepare a trading account, Profit and Loss account and balance sheet. Closing stock is valued at Rs. 12,500,000 as on 31st March 2023.	*CO3*	*PO3*	**12**

Particulars	Rs (in 1000)	Particulars	Rs (in 1000)
Stock as on 1st April 2022	500	Return outwards	250
Purchases	2250	Trade Expenses	100
Wages	19500	Office Furniture	500
Insurance	1400	Cash in Hand	250
Sundry Debtors	15000	Cash in Bank	2375
Carriage Inwards	400	Rent and taxes	550
Commission (Dr)	400	Carriage Outwards	725
Allow Interest on Capital	350	Sales	25000
Stationary	225	Bills Payable	1500
Return inwards	650	Creditors	9825
Commission (Cr)	200	Capital	8950

	b)	Illustrate the format of Trial balance, highlighting its advantages.	*CO3*	*PO1*	**08**
		UNIT - IV			
6	a)	Write a note on variance analysis and classification of variances.	*CO4*	*PO1*	**08**
	b)	The following details were taken from the books of an oil mill for one month ending on 31st March 2023. Purchase of 100 tons of oil seeds is at Rs. 1000/ ton.	*CO4*	*PO1*	**12**

PARTICULARS	CRUSHING	REFINING	FINISHING
Wages	1000	700	900
Sundry stores	200	600	100
Electricity	400	350	200
Steam	300	250	200
Factory expenses	500	400	300
Containers	-	-	2,350

i. 60 tons of crude oil was produced.
ii. 51 tons of oil was produced in the refinery process.
iii. 50 tons of refined oil was finished for delivery.
iv. Empty bags of oil seeds were sold for Rs.100/-
v. 35 tons of oil cakes were sold at Rs.60/- per ton.
vi. Loss in weight in crushing is 5 tons.
vii. 8.5 tons by-products from refinery process were valued at Rs.2550/-

Prepare the accounts with respect to each of the processes and calculate cost of production at the end of each process.

			UNIT - V			
	7	a)	The following information available in respect of a firm: Capitalization rate=0.10, Earnings per share=Rs10. Assume rate of return on investment (i) 15 (ii) 8 (iii) 10. Show the effect of dividend policy on the market price of shares using Walters's model for different D/P ratio.	*CO5*	*PO1*	**12**
		b)	Mention the assumptions of MM hypothesis and Walters's model.	*CO5*	*PO1*	**08**

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

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May 2024 Semester End Main Examinations

Programme: B.E. **Semester: VIII**
Branch: Institutional Elective **Duration: 3 hrs.**
Course Code: 21ME8OEORB **Max Marks: 100**
Course: Organizational Behaviour

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
1	a)	What is job satisfaction? Explain any 5 reasons why job satisfaction is so important?	CO1	PO3	**06**
	b)	What are the foundations of OB? Discuss in detail.	CO1	PO3	**07**
	c)	Explain in detail, the historical development of OB.	CO1	PO3	**07**
		OR			
2	a)	What is individual behavior? Discuss the factors influencing individual behavior.	CO1	PO2	**05**
	b)	What is the importance of OB? Discuss.	CO1	PO2	**05**
	c)	"Many contemporary personality psychologists believe that there are five basic dimensions of personality, often referred to as the "Big 5" personality traits." Elaborate.	CO1	PO2	**10**
		UNIT - II			
3	a)	"Learning theory describes the way people receive, process, and retain knowledge as a result of the learning they're given." Elaborate the given statement with the help of theories of Learning.	CO2	PO2	**10**
	b)	Write a note on attribution theory.	CO2	PO2	**10**
		OR			
4	a)	What is Perception? Explain the subprocess of perception.	CO2	PO2	**10**
	b)	"There are a numerous complex factors that enter into perception." Discuss the statement with the help of factors affecting perception.	CO2	PO2	**10**

			UNIT - III			
	5	a)	"The Hawthorne studies showed that people's work performance is dependent on social issues and job satisfaction." – Discuss.	*CO3*	*PO2*	**05**
		b)	"One of the most popular needs theories is Abraham Maslow's hierarchy of needs theory" – Explain.	*CO3*	*PO2*	**05**
		c)	What is a group? Differentiate group and team. Also explain the factors affecting group formation.	*CO3*	*PO2*	**10**
			UNIT - IV			
	6	a)	What is job rotation and job enlargement?	*CO4*	*PO2*	**03**
		b)	What is conflict? Differentiate functional and dysfunctional conflict.	*CO4*	*PO2*	**07**
		c)	Explain the process of conflict in detail.			**10**
			UNIT - V			
	7	a)	What is Organizational Change? What is its need?	*CO5*	*PO2*	**03**
		b)	Explain Shannon-Weaver model of communication in detail.	*CO5*	*PO2*	**07**
		c)	"There are lot of obstacles that one may face when attempting to effectively communicate with another person." – Elaborate.	*CO5*	*PO2*	**10**

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(Autonomous Institute Affiliated to VTU)

May 2024 Semester End Main Examinations

Programme: B.E. **Semester: VIII**

Branch: Institutional Elective **Duration: 3 hrs.**

Course Code: 23CY8OEBMT **Max Marks: 100**

Course: Battery Materials and Technology

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.

			CO	PO	Marks
		UNIT - I			
1	a)	Explain the working of Double-layer capacitor as an energy storage system.	*CO1*	*PO1*	**7**
	b)	Elaborate on the following mechanical storage system a) Regenerative fuel cell storage b) Fly wheel energy storage.	*CO2*	*PO2*	**7**
	c)	Analyze the similarities and differences between batteries and supercapacitors.	*CO2*	*PO2*	**6**
		UNIT-II			
2	a)	Elaborate on the different anode materials used in batteries.	*CO1*	*PO1*	**7**
	b)	Discuss the criteria to asses battery materials.	*CO1*	*PO1*	**7**
	c)	What are separators? Discuss the role of separator in energy storage devices.	*CO3*	*PO7*	**6**
		UNIT-III			
3	a)	Discuss the construction and working of Ni-Metal hydride battery. Mention its applications.	*CO2*	*PO2*	**7**
	b)	Illustrate the construction and working of Zn-Air battery. Mention any two advantages.	*CO2*	*PO2*	**7**
	c)	Elaborate on the working principle of Zn-Ag_2O battery with a neat diagram.	*CO2*	*PO2*	**6**
		OR			
4	a)	Explain the construction and working of Ni-Cd battery. Mention any two disadvantages.	*CO2*	*PO2*	**7**

		b)	Illustrate the construction and working of Zn-MnO_2 battery. Give its uses.	*CO2*	*PO2*	**7**
		c)	Analyze the advantages and disadvantages of lead-acid battery.	*CO2*	*PO2*	**6**
			UNIT - IV			
	5	a)	Explain the construction and working of sodium-ion battery. Mention its advantages over lithium-ion battery.	*CO2*	*PO2*	**7**
		b)	Illustrate the mechanism of energy storage in redox flow battery.	*CO3*	*PO7*	**7**
		c)	Elaborate on the applications of batteries in space technology.	*CO3*	*PO7*	**6**
			UNIT - V			
	6	a)	With a suitable example, explain the hydrometallurgical process of extraction of metals from used batteries.	*CO3*	*PO7*	**7**
		b)	Summarize the ecological aspects involved in battery recycling process.	*CO4*	*PO12*	**7**
		c)	Analyze the challenges related to sustainability of battery recycling.	*CO4*	*PO12*	**6**
			OR			
	7	a)	Discuss the various steps involved in disassembling of used battery.	*CO2*	*PO2*	**7**
		b)	Explain the pyrometallurgical process of extraction of lithium from Li-ion battery.	*CO2*	*PO2*	**7**
		c)	Elaborate on the current state-of-the-art of battery recycling process.	*CO4*	*PO12*	**6**

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May 2024 Semester End Main Examinations

Programme: B.E. **Semester: VIII**
Branch: Institutional Elective **Duration: 3 hrs.**
Course Code: 23CY8OEEDM **Max Marks: 100**
Course: Environmental Disaster Management and Mitigation

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)	Elaborate on the formation of acid rain and its consequences.	*CO1*	*PO1*	**6**
	b)	Contrast in-situ and ex-situ ecological bio remediation stating the examples. Mention advantages and disadvantages of in-situ and ex-situ ecological bio remediation.	*CO2*	*PO4*	**8**
	c)	With a neat diagram explain the construction and working of Scintillation counter.	*CO3*	*PO7*	**6**
		UNIT - II			
2	a)	Describe Flash evaporation to desalinate water	*CO1*	*PO1*	**6**
	b)	Explain with suitable examples the role of nano carbon-based adsorbents, metal oxides and hybrid adsorbents for the treatment of contaminated water.	*CO2*	*PO7*	**8**
	c)	Outline the techniques involved in artificial ground water recharging	*CO3*	*PO4*	**6**
		OR			
3	a)	Define desalination of water. Describe reverse osmosis method with a suitable diagram.	*CO1*	*PO4*	**6**
	b)	Outline the steps involved in the mechanism of degradation of pollutants using photocatalysis.	*CO2*	*PO1*	**8**
	c)	Define Gravimetric analysis. Outline the estimation of Sulphate by gravimetry.	*CO3*	*PO7*	**6**
		UNIT - III			
4	a)	Outline the sources and control methods for gaseous pollutants.	*CO1*	*PO4*	**6**

		b)	List the various types of particulate pollutants. Explain the construction and working of devices available for the removal of particulate matter.	*CO2*	*PO1*	**8**
		c)	Summarize the construction and working of NO_x gas sensor.	*CO3*	*PO7*	**6**
			UNIT - IV			
	5	a)	Outline the various steps involved in recycling and recovery of e-waste.	*CO1*	*PO1*	**6**
		b)	Highlight the importance of site selection and design for a secured landfill of solid hazardous waste.	*CO2*	*PO4*	**8**
		c)	Appraise the method adopted to manage the liquid hazardous waste.	*CO3*	*PO7*	**6**
			UNIT - V			
	6	a)	State any six principles of Green Chemistry.	*CO1*	*PO4*	**6**
		b)	List the advantages and disadvantages of Hydrogen as a fuel. Explain the production of Hydrogen by Electrolysis of water with a neat labeled diagram.	*CO2*	*PO1*	**8**
		c)	What are photo voltaic cells? Outline the construction and working of a photovoltaic cell.	*CO3*	*PO7*	**6**
			OR			
	7	a)	List the major challenges of sustainability	*CO1*	*PO1*	**6**
		b)	Appraise the advantages of Bio diesel. Outline the production of bio-diesel by trans-esterification of triglycerides with the relevant chemical reaction.	*CO2*	*PO4*	**8**
		c)	With a neat schematic diagram, explain the working of Quantum dot solar cell.	*CO3*	*PO7*	**6**

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May 2024 Semester End Main Examinations

Programme: B.E. **Semester: VIII**
Branch: Institutional Elective **Duration: 3 hrs.**
Course Code: 23PY8OERHP **Max Marks: 100**
Course: Radiation Hazard and Protection

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.

			Module - I	*CO*	*PO*	Marks
1	a)		Describe artificial radioactivity with examples. Mention the major sources of artificial radioactivity in the environment.	*CO1*	*PO1*	**10**
	b)		Explain the following terms. i) Intensity ii) exposure iii) radiation dose iv) absorbed dose v) effective dose	*CO1*	*PO1*	**10**
			OR			
2	a)		What are the different types of radioactive emissions? Discuss any three radioactive emissions.	*CO1*	*PO1*	**10**
	b)		Describe the half value layer and linear attenuation coefficient.	*CO1*	*PO1*	**10**
			Module - II			
3	a)		Mention the plannings of nuclear medicine laboratory. Explain any three plannings in details.	*CO1*	*PO1*	**10**
	b)		Discuss the commonly used radiation monitoring instruments.	*CO1*	*PO1*	**10**
			OR			
4	a)		Explain responsibilities of nuclear medicine laboratories	*CO1*	*PO1*	**10**
	b)		Discuss in detail the radiation monitoring and decontamination procedures.	*CO1*	*PO1*	**10**
			Module - III			
5	a)		Mention all the regulatory aspects and licensing for production and usage of radionuclides. Explain any two in detail.	*CO1*	*PO1*	**10**
	b)		Discuss the different types of radiation emergencies. Explain any four radiation emergencies.	*CO1*	*PO1*	**10**

			Module - IV			
	6	a)	What are radiation detectors? Mention their types. Explain scintillation counters.	*CO1*	*PO1*	**10**
		b)	Discuss the applications of particle accelerators.	*CO1*	*PO1*	**10**
			Module - V			
	7	a)	What are the different types of materials modification that can be done using radiation? Explain.	*CO1*	*PO1*	**10**
		b)	Discuss the environmental applications of radioisotopes.	*CO1*	*PO1*	**10**

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