COCHIN UNIVERSITY OF SCIENCE AND TECHNOLOGY

B.TECH. DEGREE I SEMESTER REGULAR/SUPPLEMENTARY EXAMINATION IN MARINE ENGINEERING MAY 2021

19-208-0103 ENGINEERING CHEMISTRY
(*2019 Scheme*)

Time: 30 Minutes [for Answering and Scanning/Uploading the page of the Answer Sheet]
Max. Marks: 9

INSTRUCTIONS
1. You have to be available in Google Meet Video Camera throughout the examination hours.
2. Those students who are not present through Google Meet Video Camera will not be permitted to write the online examination.
3. You have to share your '**live location**' to the faculty before uploading the answer sheet.
4. You have to answer only one question.
5. You have to write register number, subject code and module/group number (as given in the question paper) in each page.
6. Answer may not exceed one page of an A4 size paper in a standard handwriting, as far as possible.
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MODULE - I
(Answer *ANY ONE* question)

I(1). (a) Describe the various steps involved in the treatment of sewage water. (5)

(b) In the deionization process, water is first passed through the cation exchanger and then through the anion exchanger. Why? (2)

(c) 25 ml of a sample of hard water containing 1 mg of pure $CaCO_3$ per ml consumed 10 ml of EDTA. 25 ml of a water sample consumed 12.5 ml of the same EDTA solution. Calculate the total hardness of water sample in ppm. (2)

OR

I(2). (a) Describe the softening of water by resin ion exchange process. (4)

(b) Write three points of differences between aerobic and anaerobic oxidation. (2)

(c) Water having the following composition (in ppm) has to be softened by lime-soda process: (3)

$Ca(HCO_3)_2$ = 162, $Mg(HCO_3)_2$ = 73, $MgCl_2$ = 142.5, $CaSO$ = 136, $MgSO_4$ = 60.
Calculate the amount of lime and soda required to soften 10^6 litres of water.

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MODULE - II
(Answer *ANY ONE* question)

II(1). (a) Explain the Poggendroff compensation method of determination of emf. (4)

(b) What is a reference Electrode? Explain the construction and working principle of any one reference electrode. (3)

(c) A hydrogen electrode at 25°C is immersed in a solution of P^H 2.5 and coupled with SHE. Calculate the emf of the cell. (2)

OR

II(2). (a) Differentiate between: (5)
   (i) Frenkel and Schottky defects.
   (ii) Thermotropic and lyotropic liquid crystals.

(b) Explain the construction and working of OLED. (4)

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MODULE - III
(Answer *ANY ONE* question)

III(1).	(a)	Apply the electrochemical theory of corrosion to the rusting of iron. Explain the mechanism of hydrogen evolution and oxygen absorption.	(4)
	(b)	Discuss various factors influencing the rate of corrosion.	(3)
	(c)	Iron bolts and nuts are not used in copper boilers. Rationalize.	(2)

OR

III(2).	(a)	What are the constituents of paints? What are their functions?	(5)
	(b)	Describe sacrificial anode protection and impressed current cathodic protection.	(4)

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MODULE - IV
(Answer *ANY ONE* question)

IV(1).	(a)	Describe with a neat diagram the working of a bomb calorimeter for the determination of the calorific value of a fuel.	(5)
	(b)	What is knocking of petrol? How can it be prevented?	(2)
	(c)	Calculate the net and gross calorific value of a coal sample having the following composition: C = 76%, H = 7%, O = 9.2%, N = 3.3% and ash = 4.5%.	(2)

OR

IV(2).	(a)	Explain the construction and working of solar cells.	(5)
	(b)	Describe proximate analysis of coal.	(4)

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MODULE - V
(Answer *ANY ONE* question)

V(1).   (a)   Explain the differences between addition polymerisation and condensation polymerisation with examples.   (2)

      (b)   What is vulcanization of rubber? Explain with equation.   (3)

      (c)   Write the methods of preparation, preperties and uses of: (4)
- (i) Bakelite
- (ii) Neoprene
- (iii) polyurethane

OR

V(2).   (a)   Describe the various ingredients used in the compounding of rubber and their functions.   (4)

      (b)   Give the methods of preparation, properties and uses of the following: (5)
- (i) silicone polymers.
- (ii) Polystyrene
- (iii) Buna-S

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