

MID TERM EXAMINATION

B.TECH PROGRAMMES (UNDER THE AEGIS OF USICT & USAR)

Second Semester, May, 2023

Paper Code: BS-104

Subject: Applied Chemistry

Time: 1½ Hrs.

Max. Marks: 30

Note: Attempt Q. No. 1 which is compulsory and any two more questions from remaining.

Q.	Question	Max. Marks	CO(s)
1	Q1 (Attempt any 4 parts from Q1 all question carry equal marks) a. Calculate the GCV of a coal sample if its LCV is 6767.45 cal/g and if it contains 5% hydrogen. (Latent heat of steam is 587 cal/g) b. "Good fuel for petrol engine is considered to be bad fuel for diesel engine". Why? c. Explain triple point and Metastable equilibrium with the help of phase diagram. d. Determine the number of components present in following system: e. $MgCO_3(s) \rightleftharpoons MgO(s) + CO_2$ (in closed vessel) List out differences between LDPE and HDPE.	2.5 2.5 2.5 2.5 2.5	1 1 2 2 2
2	Q2 Attempt any one part between i and ii i. a. With the help of a well-labeled diagram explain the determination of calorific value of a gaseous or volatile liquid fuel. b. A sample of coal was analysed as follows. Exactly 2.5 g was weighed into a silica crucible. After heating for an hour at 110 °C, the residue weighed 2.415 g. The crucible was then covered with a vented lid and strongly heated for exactly 7 min at 950 ± 20 °C. The residue weighed 1.528 g. The crucible was then heated without the cover, until a constant weight was obtained. The last residue was found to weigh 0.245 g. Calculate the % of moisture, volatile matter, ash and fixed carbon in the coal sample c. "All coking coals are caking coals but all caking coals are not coking coals". Throw some light on the statement. OR ii. a. The composition by volume of coal sample is H=24%, CO=6%, CO ₂ = 8% CH ₄ = 30%, C ₂ H ₆ =11% , C ₂ H ₄ =4.5%, C ₄ H ₈ =25%, O=2%, N=12%. What theoretical amount of air would be required at 25 degree centigrade and 750mm pressure for complete combustion of 1M ³ of the fuel. Explain the process of Carbonisation using Otto Hoffman oven with its construction and working.	5 2.5 2.5 5	1 1 1 1
3	Q3 Attempt any one part between i and ii i. a. Explain with phase diagram the Pattison process for desilverisation of Lead. b. What is Congruent melting point and how it varies from Eutectic point and normal melting point. c. What is reduced phase rule? Under what condition is it applicable. OR ii. a. List down preparation, properties and application of Bakelite with Chemical reaction involved. Write down a note on Condensation polymerisation and Co-polymerisation giving examples for both	5 3 2 5 3	2 2 2 2 2

c	How functionality of polymer affects the polymeric structure? Explain.	2	2
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4.	Q 4 Attempt any 2 part . Each part carries equal marks.		
a.	What is Cracking? Write down the types of Cracking. Which type of Cracking is considered to be superior and why?	5	1
b.	Draw phase diagram of Sulphur System and explain Phase, component and degree of freedom	5	2
c.	Classify the polymer on the basis of Inter molecular force of attraction giving chemical formula of each one.	5	2
d.	0.25 g of a sample of coal was analysed by combustion method. The increase in weights of CaCl_2 tube and the potash bulbs at the end of the operation was found to be 0.15 g and 0.55 g, respectively. Calculate the percentage of carbon and hydrogen in the coal	5	1

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CLASS TEST

B.Tech – 2nd Semester

June, 2023

Paper Code: BS-104

Subject: Applied Chemistry

Time: 1.5 hours

Max. Marks: 30

Note: Q. No. 1 is compulsory. Attempt any two more Questions from the rest.

Q.1	Attempt any 5	Max. Marks	COS
a	What happens when temporary hardness of water is boiled (with reaction).	2	3
b	If P = M, what type of Alkalinity is present in water?	2	3
c	What are the salts responsible for Scale formation in boiler?	2	3
d.	Phosphate conditioning is better than Carbonate conditioning. Explain	2	3
e	What is Pilling-Bedworth Rule?	2	4
f	What is Reverse Osmosis as applied to water purification?	2	3
Q.2 a	Describe the principle and theory of EDTA method for determination of Hardness of water.	5	3
b	500ml of a water sample on titration with N/50 H ₂ SO ₄ gave a titre value of 29ml to Phenolphthalein end point and another 500ml sample on titration with same acid gave a titre value of 58ml to Methyl orange end point. Calculate the Alkalinity of the water sample in terms of CaCO ₃ and comment on the type of Alkalinity present.	5	3
Q.3 a	Write a short note on Caustic Embrittlement in boilers? How can this be prevented.	5	3
b	Calculate the quantity of Lime and Soda required for softening 50,000 litres of water containing the following salts per litre. Ca(HCO ₃) ₂ = 9.2mg; Mg(HCO ₃) ₂ = 7.9mg; CaSO ₄ = 15.3mg; MgSO ₄ = 15mg; MgCl ₂ = 3mg.	5	3
Q.4 a	What is Demineralization of water? How is it done? Explain with the help of diagram.	5	3
b	What is Corrosion? Discuss the factors responsible for Corrosion.	5	4