PAPER ID-421050

Subject Code: KAS202T

Roll No: | | | | | | | | | | | | | |

BTECH
(SEM II) THEORY EXAMINATION 2021-22
ENGINEERING CHEMISTRY

Time: 3 Hours ***Total Marks: 100***

Notes:

- *Attempt all Sections and Assume any missing data.*
- *Appropriate marks are allotted to each question, answer accordingly.*

SECTION-A	Attempt **All** of the following Questions in brief	Marks**(10X2=20)**		
Q1(a)	Explain why helium is monatomic and hydrogen is diatomic?		1	2
Q1(b)	Arrange the following molecules or ions in increasing order of bond stability. N_2^{2-},N_2^-& N_2		1	3
Q1(c)	A solution shows a transmittance of 20%, when kept in a cell of 2.5 cm thickness. Calculate its concentration if the molar absorption coefficient is 12000 $dm^3mol^{-1}cm^{-1}$.		2	4
Q1(d)	What are Raman active molecules?		2	1
Q1(e)	Why KCl−NaCl – H_2O should be regarded as a 3 components system, Whereas KCl−NaCl−H_2O should be regarded as 4 components system?		3	4
Q1(f)	Calculate the EMF of the cell reaction: Zn / Zn^{2+} [0.1M] || Cu^{2+}[0.2M] / Cu Standard reduction potential of Zn^{2+} and Cu^{2+} are -0.76V and 0.34V respectively.		3	2
Q1(g)	0.4 gm of a coal sample was used in bomb calorimeter for the determination of calorific value .The ash formed in the bomb calorimeter was extracted with acid and the acid extracted was heated with $BaCl_2$ solution and a precipitate of $BaSO_4$ was formed .The precipitate was filtered dried and weighted. The weighted of precipitate was to 0.04 gm Calculate the percentage of sulphur in the sample?		4	4
Q1(h)	A sample of hard water has hardness 500 ppm. express the hardness in ^oCl and ^oCl		4	5
Q1(i)	Write monomers of Buna-S and Nylon 66?		5	2
Q1(j)	Write structure of Ferrocene and Dibenzene chromium.		5	2

SECTION-B	Attempt **ANY THREE** of the following Questions	Marks**(3X10=30)**		**BL**
Q2(a)	(i) Explain the applications of Graphite and comment upon the electrical and lubrication property of Graphite?		1	2
Q2(b)	Define the principle of Raman spectroscopy. Explain the term chromophore and auxochrome in UV Spectroscopy?		2	1
Q2(c)	Explain the mechanism of electrochemical theory of corrosion with the help of hydrogen evolution and oxygen absoption reactions. Describe cathodic protection in detail.		3	3
Q2(d)	(i) Write the process of lime soda softening. (ii) Calculate the amount of lime and soda required for the treatment of 20000 lts. of water whose analysis is as follows: $Ca(HCO_3)_2$ = 40.5; $Mg(HCO_3)_2$ =36.5 ppm; $MgSO_4$= 30 ppm; $CaCl_2$= 27.75 ppm.		4	4

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Q2(e)	What are organometallic compounds? How Grignard reagents are prepared? Write any five applications of Grignard reagents.	5	2

SECTION-C	Attempt **ANY ONE** following Question	Marks **(1X10=10)**		**BL**
Q3(a)	With the help of molecular orbital diagram, explain the paramagnetic character of O_2 and diamagnetic character N_2.		1	3
Q3(b)	What is Fullerene? Indicating the method of preparations, properties and their application?		1	2

SECTION-C	Attempt **ANY ONE** following Question	Marks **(1X10=10)**		**BL**
Q4(a)	What is rotational spectroscopy? Explain the instrument of microwave spectroscopy and what are the conditions for microwave active molecules?		2	1
Q4(b)	Define infrared spectroscopy. Describe the various molecular vibrations in the technique and write the application of infrared spectroscopy.		2	2

SECTION-C	Attempt **ANY ONE** following Question	Marks **(1X10=10)**		**BL**
Q5(a)	What is secondary storage battery? Write charging and discharging reaction of Lead acid battery with application of lead acid battery.		3	2
Q5(b)	With the help of phase diagram of a water system. Calculate the degree of freedom of triple point and define term involved in Phase rule?		3	3

SECTION-C	Attempt **ANY ONE** following Question	Marks **(1X10=10)**		**BL**
Q6(a)	Explain the process of determination of calorific value using Bomb calorimeter method.		4	4
Q6(b)	What is calorific value? Explain the construction and working of bomb calorimeter? A coal has the following composition by weight C=92% ,O=2.0% ,S=0.5% ,N=0.5% and ash =2.5% Net calorific value of the coal was found to be 9,430 kcal/Kg ,Calculate the percentage of hydrogen and gross calorific value of coal?		4	3

SECTION-C	Attempt **ANY ONE** following Question	Marks **(1X10=10)**		**BL**
Q7(a)	Write down synthesis and application of following polymers- **i)**-BUNA-S **ii)**-Neoprene **iii)**- Nylon 66 **iv)**– Dacron		5	2
Q7(b)	What are conducting polymers? Write the classification and application of conducting polymers.		5	1