Total No. of printed pages = 3

CY 181101

Roll No. of candidate | | | | | | | | | | |

28/3/ 2022

B.Tech. 1st Semester End-Term Examination

CHEMISTRY – 101

New Regulation (w.e.f. 2017-18) &

New Syllabus (Group-A) (w.e.f. 2018-19)

Full Marks – 70 Time – Three hours

The figures in the margin indicate full marks for the questions.

Answer question No. 1 and any *four* from the rest.

1. Answer the following : (All are compulsory) (10 × 1 = 10)

(i) The minimum number of functionality of a monomer is

(a) 1 (b) 2

(c) 3 (d) 0

(ii) The wavelength range corresponding to UV-visible region is

(a) 400 – 800 nm (b) 200 -800 nm

(c) 500 – 800 nm (d) 600- 900 nm

(iii) The possible transition for water molecule in uv- visible region are

(a) $\sigma \rightarrow \sigma^*$ (b) $n \rightarrow \pi^*$, $\pi \rightarrow \pi^*$

(c) $\sigma \rightarrow \sigma^*$, $n \rightarrow \pi^*$ (d) $n \rightarrow \sigma^*$

(iv) Number of unpaired electrons in N^{2+} is

(a) 3 (b) 1

(c) 2 (d) 0

(v) Who discovered electron

(a) Rutherford (b) J. J. Thomson

(c) Neils Bohr (d) James Chadwick

[Turn over

(vi) Select the incorrect statement from the following

(a) Lubricant keeps out dirt

(b) Lubricant act as a seal

(c) Lubricant enhance corrosion

(d) Lubricant transmit fluid power

(vii) Heat of hydration in cement is mainly due to

(a) di-calcium silicate (b) tri-calcium silicate

(c) tri-calcium aluminate (d) tetra-calcium aluminate ferrite

(viii) Which is not a basic refractory

(a) Silicon carbide (b) Magnesite

(c) Dolomite (d) Chrome magnesite

(ix) One of the principles of green chemistry says that to ———— goods

(a) Harmful (b) Safer

(c) Commercial (d) Most used

(x) The green synthesis methods should have ————

(a) Low atom efficiency (b) Low efficiency

(c) High harmful products (d) Low energy requirements

2. (a) Write the Schrodinger wave equation and explain terms involved in it (2+3 = 5)

(b) Draw the molecular orbital diagram of CO molecule and calculate the bond order. (3+2=5)

(c) A polymer sample with five molecules having molecular mass 20,000, seven molecules with molecular mass 30,000 and nine molecules with molecular mass 40,000. Calculate number average and weight molecular weight of the polymer sample. Calculate the polydispersity index (PDI) value. (2+2+1 =5)

3. (a) Define refractory materials? Classify refractory materials with one example for each class. (1+4=5)

(b) What is biodegradable polymer? Give two examples of biodegradable polymer. (1+2 = 3)

(c) Draw the radial distribution curves with respect to radius for the following orbitals

(i) 1s (ii) 2s (iii) 2p (1+1+1 = 3)

(d) Write the principle of UV-Visible spectrometer (4)

4. (a) What is wet corrosion? Describe the mechanism of electrochemical corrosion by hydrogen evaluation and oxygen absorption. (1+ 4 = 5)

(b) Classify the polymer with suitable examples on the basis of mechanical properties. (3)

(c) Giving the formula for % atom economy, calculate the % atom economy of the following reaction : (3)

$(Ph)CH(CH_3)OH + 3Cr_2O_33H_2SO_4 \rightarrow 3(Ph)CO(CH_3) + Cr_2SO_4 + 6H_2O$

(d) How will you differentiate benzene and acetone by NMR spectroscopy? (4)

5. (a) What are the raw material used for the manufacture of Portland cement? What are the chemicals these raw materials provide? What is the ratio of silica and alumina for a good quality of cement? (2+2+1= 5)

(b) Discuss the twelve principle of green chemistry. (6)

(c) Write the chemical reactions involved in rusting of iron. (4)

6. (a) What is nanomaterial? Classify the nanomaterials on the basis of dimension. (2+3 = 5)

(b) Define the terms lubrication and lubricants? Explain any one mechanism of lubrication. (2+3 = 5)

(c) Explain the phenomenon of water-line corrosion. (5)

7. (a) Why are the properties of 'nano materials' different from the 'bulk'? How can 'nano materials' be used as optical sensors? (3+3 = 6)

(b) What is the physical significance of Ψ and Ψ^2. (4)

(c) Write a note on solid waste management? (5)