

G.R. No.

Paper Code - 0119-105B (BE-ES)

**DECEMBER 2019 / BACKLOG EXAM**  
**F. Y. B.TECH. (COMMON) (SEMESTER – I/II)**  
**COURSE NAME: Engineering Chemistry**  
**COURSE CODE: ES10175B**  
**(PATTERN 2017)**

Time: [2 Hours]

[Max. Marks: 50]

**(\*) Instructions to candidates:**

- 1) Answer Q.1 OR Q.2, Q.3 OR Q.4 and Q.5
- 2) Figures to the right indicate full marks.
- 3) Use of scientific calculator is allowed.
- 4) Use suitable data wherever required.

- Q.1) a) Distinguish the following [6 marks]  
a) anodic protection and cathodic protection. (3 points)  
b) galvanizing and tinning. (3 points)  
b) Write reaction of following metals with oxygen and [6 marks]  
identify types of oxide films formed.  
(i) Mg (ii) Cr (iii) Mo (iv) Ag (v) Na (vi) Cu  
c) Explain any four factors affecting rate of corrosion on the [4 marks]  
basis of nature of environment.

**OR**

- Q.2) a) What is electroplating? Explain electroplating with [6 marks]  
process, reaction and figure. Give 2 advantages  
and 2 applications of electroplating.  
b) What is principle of cathodic protection? Give the various [6 marks]  
types of cathodic protection with figure and explanation.  
c) Define galvanization. Explain the process with the help of [4 marks]  
diagram.
- Q.3) a) Define fuel cell. Explain working with reaction, figure, [6 marks]  
two advantages and two disadvantages of Solid Oxide fuel  
cell.  
b) Mention any four outstanding features of lithium [4 marks]  
batteries in comparison with conventional batteries.  
c) Write discharging electrode reactions of dry cell (Zn – [4 marks]  
MnO<sub>2</sub> cell). Give two advantages and two disadvantages  
of it.

**OR**

- Q.4) a) Write discharging electrode reactions of following cells [6 marks]



- a) Nickel Metal Hydride Battery
- b) Lithium-Manganese Dioxide [Li/MnO<sub>2</sub>] Cell
- c) Ni-Cd cell
- b) Give any four merits and four demerits of fuel cell. [4 marks]
- c) Differentiate between primary batteries and secondary batteries. (4 points) [4 marks]

Q.5) Attempt following multiple choice questions:  
[1x20=20marks]

- 1 In a glass electrode the glass bulb is filled with  
(a) 0.01 M HCl (b) 0.1 M HCl  
(c) 1 M HCl (d) None of these
- 2 The reciprocal of resistance is called -----  
a) Conductance b) Potential c) Current d) Cell constant
- 3 The conducting power of all ions produced by one mole of an electrolyte in 1 dm<sup>3</sup> of water is known as \_\_\_\_\_.  
(a) Conductance (b) Equivalent conductance  
(c) Molar conductance (d) Specific conductance
- 4 In potentiometric redox titration between Fe<sup>+2</sup> and Ce<sup>+4</sup>, at equivalence point-----  
a) [Fe<sup>+3</sup>] and [Fe<sup>+2</sup>] ions are present  
b) [Ce<sup>+3</sup>] and [Fe<sup>+2</sup>] ions are present  
c) [Ce<sup>+3</sup>] and [Ce<sup>+4</sup>] ions are present  
d) [Fe<sup>+3</sup>] and [Ce<sup>+3</sup>] ions are present
- 5 Maximum energy is required for transition of ----  
a)  $\sigma \rightarrow \sigma^*$  b)  $\pi \rightarrow \pi^*$  c)  $n \rightarrow \pi^*$  d)  $n \rightarrow \sigma^*$
- 6 Number average molecular weight is measured by  
a) osmotic pressure b) light scattering  
c) ultra-centrifugation d) viscosity measurement
- 7 Degree of polymerization is  
a) number of monomers in polymer chain  
b) number of reaction sites in monomer  
c) number of ways polymerization is carried out  
d) none of these
- 8 Thermosetting polymers are those, \_\_\_\_\_  
a) which become soft on heating but do not become hard on cooling  
b) which become soft on heating and hard on cooling  
c) which do not become soft on heating  
d) which are not affected by heat
- 9 Which of the following is liquid crystal polymer?  
a) polyacetylene b) Kevlar

- c) PPV                      d) HB – HV
- 10 Bulk polymerization techniques uses  
a) monomer dispersed in water  
b) monomer dispersed in water with emulsifier  
c) only monomer and initiator  
d) monomer and initiator along with solvent
- 11  $C(s) + O_2(g) \rightarrow CO_2(g)$   
In above reaction 12g C reacts with how many grams of  $O_2$ ?  
a) 32          b) 16          c) 8          d) 64
- 12 Cetane number of \_\_\_\_\_ is 100  
a) n – Heptane                      b) Iso octane  
c) Hexadecane                      d) 2 – methyl naphthalene
- 13 Knocking in diesel engine is because of \_\_\_\_\_  
a) Ignition delay                      b) No ignition  
c) Pre – ignition                      d) None of above
- 14 Cooling Correction during calculating GCV for Bomb Calorimeter should be \_\_\_\_\_.  
a) Added b) Multiplied c) Not considered d )Subtracted
- 15 The relation between the two terms Gross Calorific Value and Net Calorific Value can be explained as  
a)  $GCV = NCV$     b)  $GCV > NCV$     c)  $GCV < NCV$     d)  $GCV \geq NCV$
- 16 The colour of Metal-EDTA complex is  
(a) Blue                      (b) Wine red  
(c) Pink                      (d) Colourless
- 17 Corrosion of boiler occurs due to water containing the impurity  
(a) Dissolved oxygen                      (b) Dissolved carbon dioxide  
(c) Dissolved magnesium sulphate        (d) All of these
- 18 The process used to decrease concentration of salts in water by applying direct electric current is  
(a) Ion exchange    (b) Reverse osmosis  
(c) Electrodialysis    (d) Osmosis
- 19 Water softened by ion exchanger is free from  
(a) All types of cations                      (b) All types of anions  
(c) Both (a) and (b)                      (d) None of these
- 20 Scales are formed in the boilers due to  
(a) Decomposition of bicarbonates  
(b) Decrease in solubility of calcium sulphate  
(c) Hydrolysis of magnesium salts  
(d) All of these