

R16

Code No: 132AA

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech I Year II Semester Examinations, April - 2018

ENGINEERING PHYSICS – II

(Common to EEE, ECE, CSE, EIE, IT, ETM)

Time: 3 hours

Max. Marks: 75

Note: This question paper contains two parts A and B.

Part A is compulsory which carries 25 marks. Answer all questions in Part A.

Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART- A**(25 Marks)**

- 1.a) Show that matter waves velocity is greater than the velocity of light. [2]
- b) Explain Heisenberg uncertainty principle. [3]
- c) Write any three applications of direct band gap semiconductors. [2]
- d) Draw E-K diagram and explain briefly. [3]
- e) Define Polarization in dielectric materials. [2]
- f) Show that $P = \epsilon_0 E (\epsilon_r - 1)$. [3]
- g) Show that $\mu_r = 1 + \chi$. [2]
- h) What is superconductivity [3]
- i) What is nano scale? [2]
- j) Explain how nanomaterials show size dependent properties. [3]

PART-B**(50 Marks)**

- 2.a) Derive an expression for energy of a particle in one dimensional potential box.
- b) Explain classification of materials based on band theory of solids. [6+4]

OR

- 3.a) Explain how de-Broglie's hypothesis supports the concept of the duality.
- b) Describe Kronig-Penny model. [4+6]

- 4.a) Determine the concentration of holes in the valance band of intrinsic semiconductors.

- b) With neat diagram explain how Fermi energy level varies in n-type and p-type semiconductors with respect to temperature. [5+5]

OR

- 5.a) With neat diagram explain energy diagram of PN junction diode. Explain how energy levels varies with respect to forward bias and reverse bias.

- b) Distinguish between n-type and p-type semiconductors. [5+5]

- 6.a) Derive an expression for ionic polarizability.

- b) Describe ferro electricity of dielectric materials. [5+5]

OR

- 7.a) Explain BaTiO_3 structure and behaviour with respect to temperature.

- b) Derive an expression for Internal fields in dielectric material. [5+5]

- 8.a) Explain origin of magnetic moment in magnetic materials.
b) What are the applications of superconductivity?

[5+5]

OR

- 9.a) Write a short note on properties of anti-ferro and ferri magnetic materials.
b) Distinguish between dia, para, ferro magnetic materials.

[5+5]

- 10.a) Explain characterization of nanomaterials by using XRD.
b) Discuss CVD method for the preparation of nanomaterials.

[4+6]

OR

- 11.a) Explain PVD method for the preparation of nanomaterials.
b) With neat diagram explain Ball Mill method.

[5+5]

---ooOoo---

R16

Code No: 132AG

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech I Year II Semester Examinations, April - 2018

ENGINEERING CHEMISTRY

(Common to CE, ME, MCT, MMT, AE, MIE, PTM, CEE, MSNT)

Time: 3 hours

Max. Marks: 75

Note: This question paper contains two parts A and B.

Part A is compulsory which carries 25 marks. Answer all questions in Part A.

Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART- A**(25 Marks)**

- 1.a) What is defluoridation? Mention a technique of it. [2]
- b) A sample of water contains 0.438g of $\text{Mg}(\text{HCO}_3)_2$, 38mg of MgCl_2 , 2.43mg of $\text{Ca}(\text{HCO}_3)_2$ and 13.6mg of CaSO_4 per liter. What is its temporary and permanent hardness. [3]
- c) Write the discharging and recharging reactions of Ni-Cd cell. [2]
- d) Calculate the emf of the galvanic cell consisting of Fe and Ag electrodes the concentration of Fe^{+2} is 0.2M and Ag^+ is 0.02M, if E° of $\text{Fe}/\text{Fe}^{+2} = 0.44\text{V}$ and that of $\text{Ag}^+/\text{Ag} = 0.8\text{V}$. [3]
- e) Give the advantages and applications of polylactic acid. [2]
- f) Differentiate between thermoplastics and thermosets. [3]
- g) Give the composition and uses of LPG and CNG. [2]
- h) Calculate the GCV and NCV of a fuel having the following composition. 80% carbon, 8% hydrogen, 3% sulphur, 2% ash and 4% nitrogen. [3]
- i) Give the characteristics of a good refractory. [2]
- j) Give the applications of composites. [3]

PART-B**(50 Marks)**

- 2.a) Discuss the principle involved in the estimation of hardness of water by complexometric titration using EDTA.
- b) Explain the process of reverse osmosis. How is it useful in softening of water? [5+5]

OR

- 3.a) 50 ml of a standard hard water consumed 25 ml of EDTA. 10 ml of the same EDTA was consumed for 25 ml of water sample before boiling and 8 ml of same EDTA was consumed after boiling. Calculate the hardness of water sample. The standard hard water was prepared by dissolving 0.5 g of CaCO_3 in 250 ml of water.
- b) Discuss the steps involved in the treatment of sewage water. [5+5]
- 4.a) Explain the construction and working of glass electrode.
- b) What is a fuel cell? Explain the construction and functioning of methanol-oxygen fuel cell. [5+5]

OR

- 5.a) What is Daniel cell? Give its cell notation, construction and cell reactions.
b) Explain the construction, charging and discharging reactions of lithium-ion cell. [5+5]

- 6.a) Discuss the free radical addition polymerization of ethene.
b) Give the preparation, properties and engineering applications of Bakelite. [5+5]

OR

- 7.a) What is conducting polymer? Give the characteristics and classification of conducting polymers with suitable examples.
b) Write the structure of natural rubber. Explain its vulcanization and its advantages. [5+5]

- 8.a) Describe the proximate analysis of coal and give its significance.
b) Calculate the minimum amount of air required for the complete combustion of a fuel having the following composition.
74% carbon, 6% hydrogen, 4% ash, 3% Sulphur and 4% Nitrogen. [5+5]

OR

- 9.a) With a neatly sketched diagram, explain the refining of petroleum.
b) What is knocking? How do you rate the quality of petrol and diesel? [5+5]

- 10.a) How are the refractories classified? Explain the porosity and chemical inertness of refractories.
b) Explain the chemistry involved in the setting and hardening of Portland cement. [5+5]

OR

- 11.a) What are composites and their constituents? How composite materials are classified?
b) What are lubricants? What are their functions? Explain thin film lubrication. [5+5]

---ooOoo---