SECOND SEMESTER DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY

(Common to all Diploma Programs except DCP & CABM)

Model Question Paper

Engineering Chemistry-II

(Maximum Marks: 100) Time: 3 hours

PART-A

I. (Answer all questions in one or two sentences. Each question carries 2 marks)

1. What is the limitation of de Broglie relationship?
2. What is the effect of temperature on the electrical conduction of metallic and electrolytic conductors?
3. List any two uses of optical fibers?
4. How we can reduce the rate of global warming?
5. What is rust? Give its chemical formula.

(5 X 2 = 10 marks)

PART-B

II. (Answer any five full questions. Each question carries 6 marks)

1. (a) Write all the quantum numbers of the electron present in the outermost shell of sodium atom.
   (b) Ionic compounds are bad conductors in solid state. Give reason. (4 + 2 = 6 marks)

2. (a) What is a primary cell? Give two examples.
   (b) Iron does not rust even if the zinc coating is broken in a galvanized iron pipe but rusting occurs much faster if the tin coating over iron is broken. Explain? (4 + 2 = 6 marks)

3. (a) Teflon is a commonly used addition polymer. What is teflon and mention any two uses of it.
   (b) Why the number of organic compounds far exceeds that of inorganic compounds? (4 + 2 = 6 marks)

4. (a) What is catalytic cracking? Mention any two advantages of it.
   (b) The P_H of rain water near a sulfuric acid plant is 5.1. List any three harmful effects of it. (4 + 2 = 6 marks)

5. (a) What do you understand by degenerate orbitals? Give one example.

(b) What is a double bond? Give one example (4 + 2 = 6 marks)

6. (a) What do you understand by a fuel cell? Give any two advantages of fuel cells over ordinary cells?
(b) Is it possible to store silver nitrate solution in copper vessels? Give reason (4 + 2 = 6 marks)

7. (a) What are functional groups? Write the functional group in alcohol and ketone.
(b) List any three techniques used in green chemistry to minimize pollution. (4 + 2 = 6 marks)

(5 X 6 = 30 marks)

PART-C

(Answer four full questions from each module. Each question carries 15 marks)

Module I

III. (a) The teacher wrote the following sets of quantum numbers on the black board.

$n = 3, l = 2, m = 0, s = +½$

$n = 3, l = 2, m = -2, s = -½$

$n = 3, l = 3, m = 3, s = +½$

(i) Which set of quantum number is not possible? Justify (ii) Identify the quantum number which gives information about the shape of an orbital. (iii) Which quantum number distinguishes the two electrons present in an orbital? (iv) Write the values of *n*, *l* and *m* for 2*p* and 4*s* orbitals.

(b) Distinguish between ionic and covalent compounds.
(c) State Aufbau principle? Write the electronic configuration of P (atomic number 15) and Ca. (atomic number 20) (5 + 5 + 5 = 15 marks)

OR

IV. (a) What is the uncertainty in position of an electron if the uncertainty in its velocity is 1.159×10^7 ms^{-1}.
(b) What is a co-ordinate bond? Give any two examples.
(c) List any three merits and two demerits of Bohr model of atom. (5 + 5 + 5 = 15 marks)

Module II

V. (a) Distinguish between metallic and electrolytic conduction.
(b) A Galvanic cell reaction is given below.

$$Zn + 2\ Ag^{+} \longrightarrow Zn^{2+} + 2\ Ag$$

(i) Depict the galvanic cell (ii) Which of the electrode is negatively charged? (iii) The direction of current in the cell (iv) The anode and cathode reaction

(c) Distinguish between chemical and electrochemical corrosion. (5 + 5 + 5 = 15 marks)

OR

VI. (a) Distinguish between electrolytic cell and galvanic cell.

(b) Write down the cell reactions, cell notation and compute the e.m.f.

A copper rod dipped in a solution of Cu^{2+} ions and a silver rod dipped in a solution of Ag^{+} ions are combined to form a cell. Given that E^0 Ag^{+}/ Ag = +0.80 V, E^0 Cu^{2+}/Cu = +0.34 V.

(c) Explain sacrificial anode method with a suitable example (5 + 5 + 5 = 15 marks)

Module III

VII. (a) Distinguish between saturated and unsaturated organic compounds with one example each.

(b) What are refractories? How is it classified and give one example each.

(c) The teacher advised the students not to chew bubble gum, it is a polymer. Then one of the students asked the teacher,

(i) Which is the polymer present in bubble gum? (ii) What are the constituents in that polymer? (iii) What type of a polymer is it? (iv) Other than for making bubble gums, mention any two applications of this polymer (5 + 5 + 5 = 15 marks)

OR

VIII. (a) What are the differences between organic and inorganic compounds

(b) Natural rubber is an elastomer.

(i) Give two properties of elastomers (ii) Write the monomer present in natural rubber (iii) If you are asked to make natural rubber hard, how will you make it hard? Explain the chemistry behind it.

(c) What is borosilicate glass? List its important properties and two uses. (5 + 5 + 5 = 15 marks)

Module IV

IX. (a) What are fuels? How are they classified based upon their physical state? Give two examples for each category.

(b) In a newspaper it was reported that PAN is the major cause for photochemical smog.

(i) What is PAN? (ii) What do you understand by photochemical smog? (iii) Suggest two methods to prevent photochemical smog.

(c) What do you mean by green chemistry? How will it help to reduce environmental pollution? (6 + 5 + 4 = 15 marks)

OR

X. (a) Define calorific value of a fuel? What do you mean by gross and net calorific values?
(b) Write the constituents of the following gaseous fuels.
(i) Water gas (ii) Producer gas (iii) LPG (iv) Gobar gas (v) CNG
(c) What are primary and secondary pollutants? Give examples. (6 + 5 +4 = 15 marks)

(4 X 15 = 60 marks)

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