| (Following Paper ID and Roll No. to be filled in your Answer Book) |
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| **PAPER ID : 9928**    **Roll No.** [ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ] |

# B. Tech.

## (SEM. II) THEORY EXAMINATION 2010-11

## CHEMISTRY

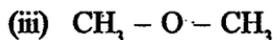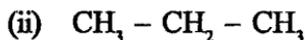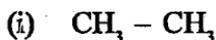*Time : 3 Hours*                            *Total Marks : 100*

**Note :** Attempt **all** questions.

1. Attempt any **two** parts of the following :       (10×2=20)

   (a) Explain metallic bond on the basis of molecular orbital theory.

   (b) How many NMR signals are observed in the spectrum of :

   (i) $CH_3 - CH_3$

   (ii) $CH_3 - CH_2 - CH_3$

   (iii) $CH_3 - O - CH_3$

   (iv) $CH_3CH_2 -\!\langle O \rangle\!- CH_2CH_3$

   (v) $CH_3 - \overset{\overset{\displaystyle O}{\|}}{C} - O - CH_3$ .
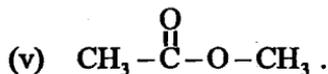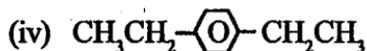
   (c) Give the mechanism of the following reactions :

   (i) Cannizaro Reaction

   (ii) Reimer-Tiemann Reaction.

2. Attempt any **four** parts of the following : **(5×4=20)**

   (a) Discuss the mechanism of electrochemical corrosion.

   (b) What is meant by calorific value of fuel ? What is the difference between GCV and NCV ?

   (c) How is ozone formed and depleted in nature ?

   (d) Explain n-type and p-type semi conductors.

   (e) Calculate the pH of 0.1N acetic acid. The Ka for acetic acid is $1.86 \times 10^{-5}$.

   (f) Distinguish between catalytic promoters and poisons.

3. Attempt any **two** parts of the following : **(10×2=20)**

   (a) What is permanent hardness ? Write the constituents responsible for permanent hardness.

      A water sample contains 408 mg of $CaSO_4$ per litre. Calculate the hardness in terms of $CaSO_4$ equivalents.

   (b) Distinguish between natural and artificial fuel. Calculate the GCV and NCV of coal having following compositions; C = 85%, H = 8%, S = 1%, N = 2%, ash = 4% Latent heat = 587 Cal/g.

   (c) What is meant by polymerization ? Differentiate between addition and condensation polymerization.

4. Attempt any **four** parts of the following : **(5×4=20)**

   (a) Differentiate between thermoplastic and thermosetting polymers.

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(b)  Differentiate between order and Molecularity of reaction.

(c)  Explain the methods of prevention of corrosion.

(d)  A solution of thickness 3 cm transmits 30% incident light. Calculate the concentration of the solution, given extinction coefficient $\in = 4,000$ $dm^3 mol^{-1} cm^{-1}$.

(e)  What do you mean by acid rain ? Explain the consequences of acid rain.

(f)  Draw the molecular orbital energy diagram of $N_2$.


5.  Attempt any **two** of the following :  (10×2=20)

(a)  What do you mean by Energy Activation ? Explain with the help of energy reaction coordinate diagram. Also explain how the nature of activated complex changes in the presence of a catalyst.

(b)  Define pollution. List various sources of pollution and discuss their effect on the environment.

(c)  Explain clearly the terms; component, phase and degree of freedom. State the phase rule and discuss its application to the system of water vapour, liquid water and ice.