* P B E - 0 0 3 - 1 0 1 3 0 0 4 *

PBE-003-1013004

Seat No. _____

B. Sc. (Sem. III) Examination

November / December - 2018

C - 301 : Chemistry

(New Course)

Faculty Code : 003

Subject Code : 1013004

Time : $2\frac{1}{2}$ Hours] [Total Marks : **70**

Instructions : (1) There are total five questions and all are compulsory.

(2) All questions carry 14 marks each.

(3) Write subquestions a, b, c and d of particular question together.

1 (a) Answer the following questions in short : **4**

(1) Write symbol of Hamiltonian operator.

(2) Write full name of BMO and ABMO.

(3) Write mathematical form of the Eigen value condition.

(4) What is the difference between σ and σ^* molecular orbital ?

(b) Answer any **one** question : **2**

(1) Define Eigen function and Eigen value.

(2) Give difference between BMO and ABMO.

(c) Answer any **one** question : **3**

(1) Explain LCAO method.

(2) Prove that $\psi_I = \sqrt{2/a} \sin\frac{\pi x}{a}$ and $\psi_{II} = \sqrt{2/a} \sin\frac{3\pi x}{a}$ are orthogonal to each other. $(0 \le x \le a)$

(d) Answer any **one** question : **5**

(1) Explain potential energy and derive Schrodinger's equation for H_2 molecule.

(2) Explain wave functions of sp hybrid orbitals.

2 (a) Answer the following questions in short : **4**

(1) Write atomic number of Lanthanum.

(2) What will be the colour of Ce^{+3} ion ?

(3) Write structure of Benzene diazonium chloride.

(4) Write structure of Benzotrichloride.

(b) Answer any **one** question : **2**

(1) Give any four uses of Lanthanide compounds.

(2) Give one example of Ulmann reaction.

(c) Answer any **one** question : **3**

(1) Write short note on oxidation state and their stability of Lanthanides.

(2) Explain any three chemical reactions of aryl halide.

(d) Answer any **one** question : **5**

(1) Explain individual isolation of Lanthanides by Ion exchange method and write note on Lanthanide contraction.

(2) Give any two synthesis of Benzyne and also write any three chemical properties.

3 (a) Answer the following questions in short : **4**

(1) Write one example of 3^o alcohol.

(2) Write structure for epoxide.

(3) Write structure of phthalimide.

(4) Write one structure for 2^o amine.

(b) Answer any **one** question : **2**

(1) Give one reaction each for the reduction of aldehyde and ketone.

(2) Write any two reactions for the synthesis of primary amine.

(c) Answer any **one** question : **3**

(1) Give reaction of Diethyl ether with Cl_2 (i) in dark and (ii) in sunlight.

(2) Give reaction for the preparation of Benzenediazonium chloride and it's reaction with H_3PO_2 and CuCN.

(d) Answer any **one** question : **5**

(1) Explain Sulphonation, Nitration and Bromination of Phenol.

(2) What is the use of Heinsberg's test ? Explain test in detail.

4 (a) Answer the following questions in short : **4**

(1) Give structure of Indole.

(2) Write structure of Pyrogallol.

(3) How many phases are there in Sulphur system ?

(4) Define phase.

(b) Answer any **one** question : **2**

(1) Give one application of Reimer-Tiemann reaction.

(2) Describe what is super cooled water ?

(c) Answer any **one** question : **3**

(1) Explain Kolbe's Schmidt reaction with mechanism.

(2) Explain Park's process for desilverization.

(d) Answer any **one** question : **5**

(1) Explain Pinacol-Pinacolone rearrangement with mechanism.

(2) Explain in detail phase diagram of sulphur system.

5 (a) Answer the following questions in short : **4**

(1) Define super saturated solution.

(2) What is steam distillation ?

(3) Name any two factors affect on Distribution law.

(4) What is partition coefficient of Iodine in solvent water and carbon tetra chloride ?

(b) Answer any **one** question : **2**

(1) Write Henry's law with equation.

(2) Describe any one application of Distribution law.

(c) Answer any **one** question : **3**

(1) Write note on Non ideal solution.

(2) Explain thermodynamical derivation of Nernst distribution law.

(d) Answer any **one** question : **5**

(1) Explain temperature-composition curves for Ideal and Non ideal solution.

(2) Explain solvent extraction in detail and derive equation for it.
