

Total No. of printed pages = 4

CY 181101

20/12/18

Roll No. of candidate

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2018 Azara, Hatkhowapara,
Guwahati -781017

B.Tech. 1st Semester End-Term Examination

CHEMISTRY – 101

(New Regulations) (w.e.f. 2017-2018)

(New Syllabus) (w.e.f. 2018-2019)

(Group – A)

Full Marks – 70

Time – Three hours

The figures in the margin indicate full marks
for the questions.

Answer question No. 1 and any *four* from the rest.

1. Answer the following : (10 × 1 = 10)
- In some region of space around the nucleus $\psi^2 = 0$. What name is given to this region?
 - Arrange O_2 , O_2^- , O_2^{2-} and O_2^+ in order of increasing bond order.
 - Write down the name of two initiators used in the free radical addition polymerisation.
 - Write two examples of conducting polymers.
 - What is endohedral fullerene?
 - Name two green solvents.

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(vii) Which of the following metals could provide cathodic protection to iron?

Al, Zn, Cu, Ni

(viii) What is visible radiation?

(ix) Why Gypsum is added to Portland cement?

(x) Give two examples of solid lubricants.

2. (a) Write the Schrödinger wave equation and explain the terms involved in it. What is the significance of ψ^2 ? (2+1+2=5)

(b) What do you mean by Eigen function and Eigen values? (4)

(c) On the basis of molecular orbital theory explain :

(i) Which one of the following is more stable and why N_2^+ and N_2^- ?

(ii) Paramagnetic character of O_2 . (1+1)

(d) Draw the molecular orbital diagram for NO molecule and explain the paramagnetic character of NO molecule. (3+1=4)

3. (a) Classify the polymers on the basis of structure with suitable examples of each one. (3)

(b) What is meant by degree of polymerisation? (2)

(c) Identify the monomers in the following : (3)

(i) Polypropylene

(ii) Natural rubber

(iii) Polymethyl Methacrylate (PMMA).

- (d) Distinguish between thermoplastic and thermosetting polymer. (2)
- (e) What are nanomaterials? Write down the applications of nanomaterial in the field of catalysis. (1+3)
- (f) What are nanowires? (1)
4. (a) What are different types of Carbon Nanotubes (CNTs)? Write down two important characteristics and applications of CNT. (5)
- (b) Calculate the atom economy of the following reactions : (3)
- (i) $C_6H_6 + CH_3COCl \rightarrow C_6H_5COCH_3 + HCl$
- (ii) $C_6H_5MgBr + CH_3Br \rightarrow C_6H_5CH_3 + MgBr_2$
- (c) Give two examples of ultrasound assisted reaction. (2)
- (d) Discuss any five principles of green chemistry. (5)
5. (a) What is Corrosion? Explain rusting of iron with the help of electrochemical theory of corrosion. (2+4=6)
- (b) Discuss any two factors affecting the rate of corrosion. (4)
- (c) What is Lambert-Beer Law? Derive mathematical expression of Lambert-Beer law. (5)

6. (a) Give example of the compounds where the following transition occurs (3)
 $\sigma - \sigma^*, n \rightarrow \sigma^*, \pi \rightarrow \pi^*$
- (b) Write down two applications of IR spectroscopy. (2)
- (c) What is Flame photometry? (2)
- (d) Write short notes on high pressure liquid chromatography. (3)
- (e) What are galvanic and pitting corrosion? Explain galvanic corrosion with one example. (5)
7. (a) Give the average chemical composition of Portland cement. Explain briefly the chemistry of setting and hardening of cement. (2+3)
- (b) What are refractory materials? Give the essential requirement of a good refractory. (2+3)
- (c) What are lubricants and lubrications? Write the important functions of a lubricant. (2+3)
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