Reg. No ....   Name **18P430**

M Sc DEGREE END SEMESTER EXAMINATION - MARCH 2018
SEMESTER 4 : CHEMISTRY
COURSE : **16P4CHET15EL ; ADVANCED PHYSICAL CHEMISTRY**
(For Regular - 2016 admission)

Time : Three Hours   Max. Marks: 75

Section A
Answer any 10 (2 marks each)

1.   What are screw axis and glide planes?

2.   Mention the main structural differences between smectic and nematic liquid crystals.

3.   Using a stereo gram represent the operation of a $\bar{2}$ on a pole of a plane. Explain.

4.   What is the Fourier synthesis in crystallography?

5.   What is the probable type of cubic lattices which give the following observed reflections? a) 110,200,103,202,211, b) 111,200,113,220,222.

6.   How polarization is eliminated?

7.   Distinguish between cathodic and anodic overvoltage.

8.   Neutron diffraction techniques are not suitable to analyse biomacromolecules. Explain.

9.   Explain how quantitative analysis of a sample is performed by AAS.

10. Draw a schematic amperometric titration curve of the titration of EDTA with a standard solution of Pb^{2+}

11. What are the advantages of controlled current coulometry over controlled potential coulometry?

12. Give the meaning of limiting current density.

13. A constant 0.800 A is used to deposit copper at the cathode and oxygen at the anode of an electrolytic cell. Calculate the number of grams of each product formed in 15.2 min. assuming no other redox reactions. (Equivalent weights of Copper and Oxygen are 31.8 and 8.0, respectively)

(2 x 10 = 20)

Section B
Answer any 5 (5 marks each)

14. Discuss how the Braggs equation forms the principle in the powder method of crystal analysis. What are advantages of the powder method over the single crystal method?

15. The density of potassium chloride (FCC) is $1.9893 gcm^{-3}$ and the length of a side of the unit cell is $6.2908 A^{o}$, as determined by x-ray diffraction. Calculate the Avogadro constant.

16. At $25^{o}C$ the exchange current density of a $Pt|H_2(g)|H^+(aq)$ electrode is 0.79 mA cm^{-2}.

     Calculate the current flowing through a standard electrode of area 5.0 cm^2 when the overpotential is +5.0 mV.

17. Write a note on concentration cell with transference?

18. Elaborate on chemistry of fuel cells

19. Explain the principle and instrumentation of atomic fluorescence spectroscopy.

20. Explain primary and secondary coulometric analyses using suitable examples.

21. Write briefly on the classification of ion selective electrodes.

(5 x 5 = 25)

Section C
Answer any 2 (15 marks each)

22. Explain the basic principle involved in (a) X-ray, (b) neutron and (c) electron diffraction methods.

23. Derive Tafel equation.Give the diagram of Tafel's plot.Explain the significance of Tafel's plot.

24. Discuss the principle, instrumentation and interferences of flame emission spectroscopy.

25. (i) What is half wave potential? Give the significance of Polarography in the analysis. Describe the advantages of Polarography. (ii) Calculate the value of the diffusion current (i_d) if C = 3 x 10^{-3} moles/ liter D = 7.2 x 10^{-6} cm^2 m = 3 mg/ sec t = 4 seconds and n = 2 ?

(15 x 2 = 30)