

LOYOLA COLLEGE (AUTONOMOUS), CHENNAI-600 034  
B.Sc. DEGREE EXAMINATIONS-CHEMISTRY  
FOURTH SEMESTER – APRIL 2002  
**PHY 201 PHYSICS FOR CHEMISTRY**

17.4.2002  
9.00-12.00

Max: 100 Marks

**PART-A**

Answer ALL questions:

(10 x 2 = 20 Marks)

01. Find the thickness of a quarter wave plate when the wavelength of light is  $5890 \text{ \AA}$ ,  $\mu_E = 1.553$  and  $\mu_0 = 1.544$ .
02. What is a Polaroid? State one of its uses.
03. State Biot-Savart's law.
04. Define self-inductance. Give its unit.
05. Explain Pauli's exclusion principle.
06. Calculate the binding energy of a deuteron  
[Given  ${}_1^1\text{P} = 1.00813 \text{ a m u}$ ,  ${}_0^1\text{n} = 1.00893 \text{ a m u}$   
 ${}_1^2\text{H} = 2.01473 \text{ a m u}$ ]
07. Define c MRR and write its output equation.
08. What is a flipflop? How and where is it used?
09. Find the lattice parameter 'a' for a BCC structure, having atoms each of radii  $1.5\text{\AA}$ .
10. What is the difference between Laue technique and rotating crystal method?

**PART-B**

Answer any FOUR questions:

(4 x 7 ½ = 30 Marks)

11. a) What are the differences between Fresnel and Fraunhofer diffractions?  
b) A monochromatic light of wavelength  $4751 \text{ \AA}$  is allowed to be incident normally on a plane diffraction grating and a second order maximum intensity is observed at a diffraction angle of  $30^\circ$ . Find the number of lines per meter in the grating. (3 ½)
12. a) Obtain an expression for the loss of energy due to sharing of charges between two conductors (4)  
b) A capacitor of  $10\mu\text{F}$  charged to  $100 \text{ V}$  is connected in parallel to another capacitor of  $5\mu\text{F}$  charged to  $50\text{V}$ . Calculate the loss of energy after contact. (3 ½)

13. a) Write a note on Spectral series of hydrogen atom (4 ½)  
 b) Wavelength of Balmer first line is  $6563 \text{ \AA}$ . Calculate the wavelength of second line. (3)
14. Describe the ideal OP-AMP conditions and construct with neat diagrams and theory, circuits involving OP-AMP as an inverter, adder and integrator. (7 ½)
15. a) What are the different types of symmetry operations? Explain in detail rotation and reflection symmetries. (4 ½)  
 b) A FCC crystal has an atomic radius of  $1.246 \text{ \AA}$ . What are  $d_{300}$  and  $d_{321}$  spacings? (given  $a\sqrt{2} = 4r$ ) (3)

### PART-C

Answer any FOUR questions: (4 x 12 ½ = 50 Marks)

16. a) Define optical activity (2)  
 b) State specific rotation and describe an experimental arrangement of Laurent's half shade polarimeter. How is it used to find the specific rotation of sugar A? (8 ½)  
 c) Determine the specific rotation of a given sample of sugar solution, if the plane of polarization is rotated through  $13.2^\circ$  by a 20 cm tube containing 10% of sugar solution. (2)
17. a) State Kirchoff's laws of electrical network. (2 ½)  
 b) Explain with necessary theory the method of finding the specific resistance of the material of a wire using Carey Foster's bridge. (10)
18. a) Give the theory of successive disintegration of radioactive substance. Explain what is radioactive equilibrium. (10 ½)  
 b) Find the radioactive constant of radium, whose half life period is 1620 years. (2)
19. a) Construct a 3-bit Asynchronous counter with truth table and draw its output waveform. (6)  
 b) A 4—variable input gives a high output for alternate input conditions from 0000 = 0, 0001=1, .....etc.,. Draw the truth table and simplify the above conditions by constructing a Karnaugh map. Draw the simplified circuit. (6)
20. a) Find the miller indices for planes with each of the following sets of intercepts (i) 3a, 3b, 2c (ii) a, 2b,  $\alpha$  (iii)  $a/2$ ,  $b/2$ ,  $\alpha$ . (3)  
 b) Write a short note on NaCl structure. (4)  
 c) State Bragg's law and explain with a diagram the Laue Diffraction method (5 ½)

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