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SARDAR PATEL UNIVERSITY

M.Sc. Physics IV th Semester Examination

Day: Thrusday, Date: 27/10/2016, Time: 2.00 a.m. to 5.00 p.m.

Subject: PHYSICS, Paper:PS04EPHY01

Subject: Advanced crystallography and biophysics

Instructions:

(a) Figure to the right indicate marks. **Total Marks: 70**

Q.1	(i) To obtain NOESY spectrum in NMR how many radiofrequency pulse are used ? (a) one (b) two (c) three (d) four (ii) Myoglobin molecule possess which type of atoms at corners of heme plane a) oxygen (b) nitrogen (c) phosphorus (d) carbon **(iii) During double strand formation of DNA, the guanine of the first chain pairs with ------ of the second chain** (a) cytosine (b) thymine (c) adenine (d) guanine (iv) For crystallization of proteins in aqueous solution the additives normally used are (a) alcohol (b) polyethylene glycol (c) ammonium sulphate (d) salts **(v)The crystal structure of aluminium is** **(a) SC (b) BCC (c) FCC (d) HCP** **(vi) Metal screen used in weissenberg photographs to stop** **(a) Incident beam (b)Specific undesired diffracted beam (c) Transmitted beam (d) all diffracted bem** **(vii) If the interatomic distance of Nacl is 0.28 A, the lattice parameter is in Å** **(a) 0.14 (b) 0.28(c) 0.07 (d) none of the above**	**[8]**
	(viii) In Laue method ----- Xrays are used **(a) monochromatic (b) heterocromatic (c) CuK (d) none**	
Q.2	**Attempt any Seven of the following:** **(i) What are the condition for** DNA to be positively supercoiled and negatively supercoiled ? What are A and B forms of DNA ? **(ii)** How α helix and β sheet secondary structure of proteins differ from each other. **(iii)Differentiate between – helix and –sheet structure of protein** **(iv) Explain the pullman's criteria for caciogenic activity .** **(v) What are the minimum requirements of LAUE technique.** **(vi) Differentiate between atomic scattering factor and structure factor** **(vii) What is the basic principle of weissenberg technique?** **(viii) Explain body centered can have only even no. of reflection**	**[14]**

	(ix) Define absolute intensity and integrated intensity .	
Q.3(a)	**Discuss the debye scherrer powder method to index the diffraction pattern from a cubic specimen.**	[6]
Q.3(b)	Discuss the experimental set up to record the Laue Photograph for Transmission Laue method . Interpret the result with the help of gnomonic projection What minimum tube voltage is required to produce 100 reflection? The plane makes an angle of 90 degree with the incident radiation, and the film is at 5 cm from the specimen. Calculate the distance of the laue spots from the film .	[6]
	OR	
Q.3(b)	**A single crystal is to be characterized for its internal structure- discuss a suitable technique in detail.**	[6]
Q.4(a)	**List the factors affecting the intensity of diffraction line.** **Discuss polarization factor , temperature factor and multiplicity factor in detail.**	[6]
Q.4(b)	Obtain the scherrer equation for diffraction under non –ideal condition. Interpret the result.	[6]
	OR	
Q.4(b)	**Give the outline of single crystal diffractometer.** **What is Wilson plot?** **What do you mean by systematic absences ?**	[6]
Q.5(a)	Explain primary, secondary and tertiary structure of DNA.	[6]
Q.5(b)	Explain vapour diffusion and dialysis method to crystallize proteins.	[6]
	OR	
Q.5(b)	Explain how fluorescence spectroscopy can provide information about molecular conformation and dynamics of biological molecules.	[6]
Q.6(a)	Discuss delocalization in biomolecules specifically considering example of benzene molecule and explain various parameters which can be obtained applying tight binding model to it.	[6]
Q.6(b)	What is the basic principle of NMR ? Discuss NMR applications in biophysics and medicine	[6]
	OR	
Q.6(b)	State the basic principle of Infrared spectroscopy and discuss how proteins can be studied with the help of this technique	[6]

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