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RF-3589-90

M. Sc. (Part-II) Examination

April / May – 2010

Physics : Paper - III

(Spl. Materials Science-II)

Time : **3** Hours] [Total Marks : **70**

RF-3589

Instructions :

(1)

નીચે દર્શાવેલ ☛ નિશાનીવાળી વિગતો ઉત્તરવહી પર અવશ્ય લખવી.
Fillup strictly the details of ☛ signs on your answer book.

Name of the Examination :

☛ **M. Sc. (Part-2)**

Name of the Subject :

☛ **Physics - 3**

☛ Subject Code No. : **3 5 8 9** ☛ Section No. (1, 2,.....) : **1**

Seat No. :

Student's Signature

(2) Answers to the each sections must be written in **separate** answer books.

(3) Attempt **all** questions.

(4) Assume standard data if required.

(5) Symbols have their usual meaning.

(6) Simple calculators are allowed to use.

(7) Figures to right indicates full marks of the questions.

1 (a) What is polymerization? Discuss about addition and condensation polymerization. **3**

(b) List the names of polymer additives with their significant functions. **3**

(c) Briefly describe automobile valve spring with basic function of spring and also obtain the formula of shear yield strength of material. **4**

2 (a) What is colour centers? write any five method by which colour conters can created. 3

(b) How characteristics of X-Rays are produced? Find the shortest wave length that is present in the X-ray produced at and accelerating potential 50KV. Calculate the corresponding frequency also. 5

(c) Which method can be used to determine all the lattice parameters of single crystal ? Describe this method in detail. 4

OR

2 (a) Explain silica glasses in detail with necessary schematic representation. 4

(b) Using the expression for stress analysis on helical springs used in mattresses, explain value spring that is utilized in automobile engines. 4

(c) Demonstrate that the minimum cation-to-anion ratio for a coordination number of 8 is 0.732. 5

3 (a) Write an essay on advance polymeric material. Include a list of general characteristics of material with their applications. 7

(b) A (422) plane from an Al crystal makes an angle 5^{o} with incident beam, what is the tube voltage required to produced this reflection? 5

OR

3 (a) What are point defects? Derive the expression for concetration at Schottky defects. 7

(b) Write design requirements for thermal protection system for space shutter orbiter. 5

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Name of the Examination :

☛ **M. Sc. (Part-2)**

Name of the Subject :

☛ **Physics - 3**

☛ Subject Code No. : **3 5 9 0** ☛ Section No. (1, 2,.....) : **2**

Seat No. :

Student's Signature

(2) Answers to the each sections must be written in **separate** answer books.

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(6) Simple calculators are allowed to use.

(7) Figures to right indicates full marks of the questions.

4 (a) List the types of vapour deposition technique? Explain RF sputtering in detail.

(b) Write a note on eblipsometry and list their advantages.

(c) A McLeod gage has V_B=100 cm^3 and capillary diameter of 1 mm. Calculate the pressure indicated by a reading of 300 cm., What error would result if $P = \frac{ay^2}{V_B}$ were used instead of equation $P = \frac{ay^2}{V_B - ay}$.

5 (a) Discuss the principle , construction and working of Turbomolecular pump.

(b) Explain the different procedure adopted for cleaning on substrate material.

(c) In an antireflecting thin film coating, the referactive indices of the substrate and film are 1.671 abd 1.400 respectively. If they are immered in water with refractive index 1.33, find the reflectance of the coated surface.

OR

5 (a) What do you understand by NDT? Explain the eddy current method and radiography testing in detail.

(b) In transmission electron microscope the accelerating voltage is 100kV and if the spherical abberation constant is 3.3 mm and the angle the beam maker with paraxial direction is very small and it is d = 10^{-2} rad. Find the radiation at disc of confusion.

6 (a) How CVD process differ from PVD process of thin film growth? Explain in brief various CVD reaction type.

(b) Find the echotime of ultrasonic pulse travelling with velocity 5.9×10^3 m/sec in a mild steel whose correct thickness displayed by gauge is 18 mm.

OR

6 (a) Explain construction, working and pressure range of an oil diffusion pump and state why requires a baking pump for its efficient operation. Also discuss backstrearing and the ways to prevent it.

(b) The ultrasonic pulse echo is used with defective and non defective steel bar at thickness 40 cms. If pluse arrival times are 30 μS and 80 μS. locate the distance at which defect has occured.