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PAF-003-1612001

Seat No. _____

M. Phil. (Sem. II) Examination

August - 2020

Physics

(Advances in Physics) (New Course)

Faculty Code : 003

Subject Code : 1612001

Time : **3** Hours] [Total Marks : **100**

Instructions :
(1) Attempt all questions.
(2) All questions carry equal marks.
(3) Assigned marks are given in the R.H.S.
(4) Mathematical symbols have usual meanings.

1 Answer in brief any **ten** :

(a) What do you understand by high T_c superconductivity ? Which are popular high T_c superconductors ? How high T_c superconductors differ from normal superconductors ? **2**

(b) What is the role of oxygen in high T_c super conductors ? **2**

(c) Write importance of manganites. **2**

(d) What is the role of substrates in thin film depositions ? How substances for substrates are selected ? Name popular substrate materials. **2**

(e) Write general formulation of spinel oxides. Draw the spinel structure. **2**

(f) Explain how particle size affect the lines in powder XRD patterns. **2**

(g) Which types of crystals can be grown by the melt techniques ? **2**

(h) Name two most popular crystals exhibit NLO effect. Write main applications of NLO effect. **2**

(i) Draw the vertical diagram of ionosphere and indicate different layers. **2**

(j) Which constituents of atmosphere give threat to ozone layer in atmosphere ? Explain in brief. **2**

(k) Write applications of ferrites. **2**

(l) Explain the spin polarized tunnelling. **2**

2 Answer any **two** :

(a) Explain the concept of "hole filling" and "pair breaking" in HTSC. Discuss in detail. **10**

(b) Discuss in detail electrical, thermal and thermoelectric power studies in 1-2-3 HTSC compounds. **10**

(c) With neat diagram discuss the PLD technique. What are the main advantages of PLD ? **10**

3 (a) Explain in detail Sputtering method. Writes its limitations. **10**

(b) Discuss in detail the spin depend scattering. What is its significance ? **10**

OR

3 (a) What are the mixed ferrites ? Considering the example of Ni-Zn ferrite explain the variation taking place in saturation magnetization with content. **10**

(b) How the distribution of cations in ferrites is obtained ? Explain the role of X-ray diffraction. **10**

4 Answer any **two** :

(a) Discuss with neat diagram Czochralski method for crystal growth. Which types cyrstals can be grow by this method ? Why it is very popular ? **10**

(b) What is importance of super-saturation ? What is solubility curve ? Explain the solution growth method for crystal growth. **10**

(c) Discuss the photo-ionization occurring in atmosphere in detail. **10**

5 Write notes on any **two** :

(a) Mossbauer Spectroscopy **10**

(b) Heterostructures **10**

(c) Hydrothermal Growth **10**

(d) Airglow **10**