



NBU-003-1212001 Seat No. _____

M. Phil. (Physics) (Sem. II) (CBCS) Examination

April / May - 2017

Advance in Physics

(New Course)

Faculty Code : 003

Subject Code : 1212001

Time : $2\frac{1}{2}$ Hours]

[Total Marks : 70

Instructions :

- (1) Attempt all questions.
- (2) All questions carry equal marks.
- (3) Assigned marks are indicated on R.H.S.
- (4) Mathematical symbols have usual meanings.

1 Answer in brief any **seven** :

- | | |
|---|----------|
| (a) Name different families of high T_c superconductor compounds. | 2 |
| (b) Explain the structural feature of $YBa_2Cu_3O_8$ superconductor in brief. | 2 |
| (c) What you understand by hetero-structures ? Give example. | 2 |
| (d) Explain briefly the spin polarized tunneling. | 2 |
| (e) What is spinel structure ? Explain briefly. | 2 |
| (f) What is Yafet-Kittel model ? | 2 |
| (g) Which method is used for semi-conductor crystal purification ? Explain briefly. | 2 |
| (h) What are the applications of non-linear optical materials crystals ? | 2 |
| (i) Discuss the importance of atmospheric ozone in brief. | 2 |
| (j) What is air-glow ? Why it occurs ? | 2 |

- 2** Answer any **two** :
- (a) Describe in detail any one method of synthesis of HTSC compound. Discuss the role of oxygen in HTSC compounds. **7**
- (b) Explain the following concepts : (1) hole filling (2) hole doping (3) pair-breaking. **7**
- (c) Explain the sputtering phenomenon. Why it is used for growing thin films ? Explain with suitable diagram. **7**
- 3** (a) Explain the chemical solution deposition method in detail. What is its advantage ? **7**
- (b) Explain the x-ray diffraction of spinel ferrite and explain how the cation distribution is obtained ? What is the effect of particle size on XRD lines ? **7**
- OR**
- 3** (a) What are the mixed ferrites ? Taking Ni-Zn ferrite, explain the variation of saturation magnetization with zinc content. **7**
- (b) Explain various effects produced in ferrites on swift heavy ion irradiation. What is the advantage of swift heavy ion irradiation study ? **7**
- 4** Answer any **two** :
- (a) Explain with neat diagram the czochralski method for crystal growth. It is popular for the growth of which type of crystals ? **7**
- (b) Explain the non-linear optical effect with necessary mathematical expressions. Why this effect is seen only by using laser ? **7**
- (c) Explain the chapman's theory in detail. **7**
- 5** Write notes on any **two** :
- (a) Pulsed laser deposition. **7**
- (b) Mossabauer effect. **7**
- (c) Hydrothermal crystal growth. **7**
- (d) Atmospheric vertical structure. **7**