

**PSCPHYT15.2 - Paper-XV - Elective-II : Nanoscience and Nanotechnology -II**

P. Pages : 2

Time : Three Hours



**GUG/W/23/11416**

Max. Marks : 80

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**Either:**

1. a) What is photoluminescence? Explain why the properties of semiconductor increases at nanoscale. **8**
- b) Describe the advantages and disadvantages of CFL, LED and OLED over one another. **8**

**OR**

- e) What are display devices? Explain the use of nanophotonics in display devices. **8**
- f) What is quantum cascade laser? Explain the use of super – lattice to improve the properties of lasers. **8**

**Either:**

2. a) Explain the effect of particle size on ferromagnetism. **8**
- b) What is giant magneto resistance? Explain how ferromagnetic multilayers exhibit giant magneto resistance. **8**

**OR**

- e) Describe the principle and applications of spintronics. **8**
- f) What is nanomagnet? Explain how the use of nanomagnet improves the data storage capacity? **8**

**Either:**

3. a) Describe the construction and characteristics of nanoscale MOSFETs. Explain what are the limits to scaling in CMOS technology? **8**
- b) Draw the schematic structure of a metallic single electron transistor and explain its working. **8**

**OR**

- e) Explain in detail nanowire field effect transistors and their applications. **8**
- f) Give description of carbon nanotube transistors. **8**

**Either:**

4. a) Explain the structure of carbon nanotubes and explain the preparation of carbon nanotube polymer nano-composites using in-situ polymerization. **8**
- b) Describe the tribology of polymeric nanocomposites. **8**

**OR**

- e) Explain the difference between metallic, ceramic and polymer nanocomposites. **8**
- f) Explain any one method for the preparation of graphene – polymer nanocomposites. **8**
5. Attempt all the questions.
- a) Write a note on optically stimulated luminescence. **4**
- b) What are ferrofluids? State its uses. **4**
- c) Explain the construction of FINFETs. **4**
- d) Explain ultra high temperature MEMS. **4**

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