

Seat No. : \_\_\_\_\_

**N17-136**

**November-2014**

**B.Sc., Sem.-V (CBCS Semester System)**

**(Common for Physics & Electronics)**

**Physics-305 : Nano Science and Nano Technology (Elective)**

**Time : 3 Hours]**

**[Max. Marks : 70**

- Instructions :** (1) All questions carry equal marks.  
(2) Numbers on right side of questions indicate marks.

1. (a) What is nano science ? Explain how surface area to volume ratio is important for nano materials. **7**

**OR**

Explain elastic properties of common materials. How plastic deformation in nanocrystalline materials differs from that of polycrystalline bulk counterpart ?

- (b) Can nano particles be considered as metals ? Explain Coulomb blockade and Staircase for a quantum dot. **7**

**OR**

Explain optical properties of metallic nano particles. Define coefficient of extinction. Which condition gives rise to strong resonance band ?

2. (a) Discuss the mechanical ball milling method to synthesize nano materials. **7**

**OR**

Giving schematic diagram, discuss how materials are synthesized by sol gel method.

- (b) Write a note on the synthesis of nano particles by physical vapor deposition method. **7**

**OR**

Discuss the Laser vaporization (ablation) method. Give the salient feature of this method.

3. (a) What are Carbon Nano tubes ? Explain different types of Carbon nano tubes. Highlight the properties of the Carbon Nano tubes. **7**

**OR**

Write a detailed note on bucky-ball.

- (b) Write a note on synthesis of carbon nano tubes. **7**

**OR**

Describe the construction and working of Scanning Electron Microscope (SEM).

4. (a) Write a note on Transmission electron microscope (TEM). 7

**OR**

Explain Atomic scattering factor. Derive Bragg's law of Diffraction for X-rays.

- (b) Describe the diffraction from nano particles. Explain the effect of crystal size on the diffraction and derive Scherrer's equation. 7

**OR**

Explain how the nanotechnology is important to us.

5. Answer the following short questions : 14

- (1) What do you mean by hardness of the materials ?
  - (2) Define young modulus.
  - (3) What do you mean by quantum dot ?
  - (4) What do you mean by Plasmons ?
  - (5) What is Mott-Wannier exciton ?
  - (6) Define electroluminescence.
  - (7) What do you mean by after glow ?
  - (8) What are ferromagnetic materials ?
  - (9) Define magneto resistance.
  - (10) What is Fullerene ?
  - (11) What are carbon nanobuds ?
  - (12) Define bottom up approach.
  - (13) Give two examples of uses of nanostructures from earlier times.
  - (14) Find the surface area to volume ratio for two spheres with radii 10 cm and 5 cm.
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**November-2014**

**B.Sc., Sem.-V**

**(Common for Physics & Electronics) 305**

**Object Oriented Programming in C++**

**Time : 3 Hours]**

**[Max. Marks : 70**

1. (a) Write the use of Object Oriented Programming C++ in different areas. 7  
(b) Write a program to evaluate the following equation/series : 7  
 $\cos(x) = 1 - x^2/2! + x^4/4! - x^6/6! + \dots$   
**OR**  
(a) Explain all the logical operators use in C++.  
(b) Write a program to convert temperature in Fahrenheit to Celsius.
2. (a) Explain the types of Data Member. 7  
(b) Write a program to input data and display with class and objects. 7  
**OR**  
(a) Write short note constructors.  
(b) Write a program to add data in inch and foot format.
3. (a) Write the note on member operator function. 7  
(b) Write a program to add three numbers and calculate average. 7  
**OR**  
(a) Write the note on Function Overloading.  
(b) Write a program for Arithmetic Operator ( + ) Overloading to add time in minutes and seconds.
4. (a) Explain the C++ files and Streams. 7  
(b) Write a program to Display string in triangle "OPERATORS". 7  
**OR**  
(a) Explain how to read text file.  
(b) Write a program to print First 10 Numbers.
5. Fill in the Blanks : 14  
(i) Default extension of c++ program is \_\_\_\_\_.  
(ii) \_\_\_\_\_ identifier is used for integer value.  
(iii) \_\_\_\_\_ identifier is used for character value.  
(iv) Member functions defined outside a class are must used \_\_\_\_\_ operator.  
(v) Multiple lines remark statement represent by \_\_\_\_\_ characters.  
(vi) A function designed as \_\_\_\_\_ can be accessed like any other ordinary functions.  
(vii) Cout object from \_\_\_\_\_ header file.

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**N17-136**  
**November-2014**  
**B.Sc., Sem.-V**  
**For Electronics only**  
**ELE-305C : Consumer Electronics**

**Time : 3 Hours]**

**[Max. Marks : 70**

**Instructions :** (1) Symbols used here have their usual meanings.  
(2) Figures to the right indicate marks.

1. Answer any **two** of the following : **20**
  - (a) Give brief classification of microphone. Explain moving coil microphone in detail.
  - (b) Write a note on condenser microphone. The plates of a condenser microphone have a diameter of 12 cm the separation between plates varies from 0.0025 cm to 0.005 cm, depending on sound pressure. Find the capacitance for the two positions.
  - (c) Explain the working principle of Horn loudspeaker.
  - (d) What are woofers and tweeters ? What is the difference between them ? Draw a cross-over circuit and explain its working.
2. Answer any **two** of the following : **20**
  - (a) Why scanning is required ? Enlist the types of scanning. Explain interlace scanning in detail.
  - (b) What are the elements of television system explain them briefly with the help of block diagram.
  - (c) Write a note on composite video signal.
  - (d) Explain the working of monochrome picture tube.
3. Answer any **two** of the following : **20**
  - (a) Briefly explain the different video disc formats.
  - (b) Write a note on video disc mastering and replication.
  - (c) Explain the recording and playback system of an optical video disc.
  - (d) Compare different types of video disc systems.
4. Answer the following in a sentence or two : **10**
  - (a) What is loudspeaker ?
  - (b) Why woofers and tweeters are needed ?
  - (c) Where crystal microphones are used ?
  - (d) What is the principle of electro-dynamic loudspeaker ?
  - (e) What is scanning of an image ?
  - (f) Write the full form of NTSC.
  - (g) Why are discs for NTSC television system and for SECAM television system not interchangeable ?
  - (h) Define the sideband frequency.
  - (i) Write the full form of LASER.
  - (j) Give any two types of different optical recording mediums.