

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

**DE-118**

**December-2013**

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

**ELE-305 : Physics**

**Common for Physics & Electronics**

**(Nano Science and Nano Technology)**

**Time : 3 Hours]**

**[Max. Marks : 70**

- Instructions :** (1) Attempt **all** the questions.  
(2) Symbols used have their usual meaning.

1. (a) What are Nano materials ? Explain how can Nano materials be characterized. **7**

**OR**

What do you mean by Hardness of the solid material ? Give the different scales to measure hardness. Explain how the hardness of the material is related to the grain size.

- (b) Explain optical properties of metallic nano particle. Define coefficient of extinction and show that absorption is independent of particle size. In which condition extinction would be maximum ? **7**

**OR**

Explain semiconductor nano particles. Write the expression for exciton energy ( $\Delta E$ ) and explain each term of this expression. Discuss characterization of semiconductor nano particles.

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

**OR**

Discuss the Laser Vaporization (Ablation) method. Give the salient feature of this method.

- (b) Discuss the Chemical Vapour Phase Deposition (CVD) method to synthesize nano materials. **7**

**OR**

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

3. (a) What are carbon nano tubes ? Define Chiral vector  $R$  and discuss the zigzag, armchair and helical Carbon Nano Tubes. 7
- OR**
- Write a note on synthesis of Carbon Nano Tubes.
- (b) Discuss the X-ray diffraction method for analysis of crystal structure. Show how it is used for structure analysis of nano materials. 7
- OR**
- Describe the diffraction from nano particles. Discuss the effect of crystal size on the diffraction and obtain Scherrer equation.
4. (a) Describe the construction and working of Transmission Electron Microscope (TEM). 7
- OR**
- Write a note on Scanning Electron Microscope.
- (b) Explain the phenomenon of Coulomb blockade. Why the resistivity of materials having nano size grains is generally quite large ? 7
- OR**
- Write a note on the applications of Nano technology.
5. Answer the following short questions : 14
- (1) What do you mean by plastic deformation ?
  - (2) Define Young Modulus.
  - (3) What do you mean by Quantum dot ?
  - (4) What are plasmons ?
  - (5) What is exciton ?
  - (6) Define Bohr Radius of exciton.
  - (7) Define Thermo luminescence.
  - (8) What is field emission ?
  - (9) Give the definition of Magneto Resistance (MR).
  - (10) What is Fullerite ?
  - (11) What do you mean by Multi Wall Carbon Nano Tube (MWCNT) ?
  - (12) What are paramagnetic materials ?
  - (13) Write the modified Curie law for the susceptibility of Ferromagnetic materials.
  - (14) Define atomic scattering factor  $f$ .

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**December-2013**

**T.Y. B.Sc. Sem. V**

**Physics – 305**

**(Common for Physics & Electronics)**

**(Elective Atmospheric Science)**

**Time : 3 Hours]**

**[Max. Marks : 70**

- Instructions :** (1) All questions carry equal marks.  
(2) Marks are indicated inside the circle on the right end of each question.

1. (a) Explain with a neat diagram, the division of Earth's atmosphere based on its temperature profile. **8**  
**OR**  
Explain in detail, the evolution of Earth's atmosphere and different views regarding its origin.
- (b) Describe the Chemical composition of Earth's atmosphere. **6**  
**OR**  
Write a short note on turbulence.
2. (a) Write a short note on the sources and sinks of tropospheric ozone. **8**  
**OR**  
Write a short note on the sources and sinks of stratospheric ozone.
- (b) Explain the dual role of ozone leading to two different, yet important environmental issues. **6**  
**OR**  
Explain how, the transport of ozone from stratosphere to troposphere influences life on earth.
3. (a) Discuss in detail, the sources of atmospheric aerosols. **8**  
**OR**  
Explain the method of monitoring particulate matter.
- (b) What are the environmental and health effects of aerosols ? **6**  
**OR**  
Classify the aerosols based on their size and properties.

4. (a) What is ozone hole ? How, where and when does it form ? **8**
- OR**
- Draw a neat vertical ozone profile, and explain the mechanism leading to its typical shape, on the basis of Chapman's theory.
- (b) What is the difference between subsonic and supersonic aircraft ? How do they influence the earth's atmosphere ? **6**
- OR**
- How do volcanic eruptions influence stratospheric ozone ?
5. Answer the following short questions : (Each question carries **2** marks) **14**
- (i) What is the time scale for transport of air from troposphere to stratosphere and vice versa ?
  - (ii) What is green house effect ?
  - (iii) Why is the exchange of air between the troposphere and stratosphere slower than mixing of air within the troposphere ?
  - (iv) Where is maximum ozone produced on the earth's surface ?
  - (v) Where on earth, is the ozone concentration maximum and where is it minimum ?
  - (vi) Which radical is called the detergent of earth's atmosphere ?
  - (vii) Classify the solar UV radiation, based on its wavelength.
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**DE-118**

**December-2013**

**B.Sc. Sem. V**

**(Common for Physics & Electronics)**

**Elective : Object Oriented Programming in C++**

**Time : 3 Hours]**

**[Max. Marks : 70**

1. (a) What are the uses of Object Oriented Programming C ++ ? 7  
(b) Write the all arithmetic operators used in C++ program. 7

**OR**

- (a) Write all the data types of C++.  
(b) Write a program to find sum of Input two numbers.

2. (a) Explain the Member Function with suitable example. 7  
(b) Write a program to input data and display with class and objects. 7

**OR**

- (a) Explain *Constructors in C++ programming*.  
(b) Write a program to add time data in minutes format & Display hour And minutes.

3. (a) Write all the logical operators used in C++ program. 7  
(b) Write a program for Operator ( + ) Overloading to add Distance in meter and centimeter. 7

**OR**

- (a) Write the note on Operator Overloading.  
(b) Write a program for function Overloading.

4. (a) Write a note on Exception Handling. 7  
(b) Write a program to Display string in triangle "MADAM". 7

**OR**

- (a) Explain different mode of *open()*.  
(b) Write a program to convert temperature in Fahrenheit to Celcius.

5. Write answer in short.

14

- (1) What is the default extension of C++ file.
  - (2) Which keyword is used for integer value in C++ program ?
  - (3) Write the keyword that declare real number in C++ program.
  - (4) List the member functions with the class.
  - (5) How we write remark statement in C++ program ?
  - (6) Which operator performs as a scope resolution operator in C++ program ?
  - (7) Which header file support cout and cin objects ?
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**DE-118**  
**December-2013**  
**T.Y. B.Sc. Sem. V**  
**Electronics Only**  
**(ELE-305 C- Consumer Electronics)**

**Time : 3 Hours]**

**[Max. Marks : 70**

1. Answer any **two** of the following : **20**

- (a) What is a microphone ? What are the requirements of a microphone ? What are the qualities a microphone should have to match the requirements ?
- (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) What is a loudspeaker ? Discuss the features which a loudspeaker should have to give good sound reproduction.
- (d) What are woofers and tweeters ? What is the difference between them ? Why are they needed ? Also draw a cross over circuit and explain its working.

2. Answer any **two** of the following : **20**

- (a) Explain the significance of scanning. What are the different methods of scanning ? Explain linear scanning of the image.
- (b) Explain the working of a monochrome video camera with the help of a simplified diagram.
- (c) Explain the working of a vidicon camera tube.
- (d) Explain the constituents of a composite video signal.

3. Answer any **two** of the following : **20**
- (a) Explain the construction of a video disc. What is video disc mastering and replication ?
  - (b) Briefly explain the different optical recording mediums.
  - (c) Explain the recording and playback system of an optical video disc.
  - (d) Explain how data is recorded on a floppy disc.

4. Answer the following in a sentence or **two**. **10**
- (a) Write the principle on which the moving coil microphone works.
  - (b) Write the applications of crystal microphone.
  - (c) What is the advantage of using a horn loudspeaker ?
  - (d) Why do loudspeakers need baffles ?
  - (e) What is the difference in the tracks of a magnetic disc and a normal LP record ?
  - (f) Why are discs for NTSC television system and for SECAM television system not interchangeable ?
  - (g) What is laser vision disc ?
  - (h) What should be the least BW of every link in the chain of FM transmission ?
  - (i) Which is the aspect ratio that is least fatiguing to the eye ?
  - (j) Define the critical flicker frequency.
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