

Seat No. : _____

NF-122

November-2021

B.Sc., Sem.-V

CC-305(A) : Physics

(Nano Science & Nano Technology)

Time : 2 Hours]

[Max. Marks : 50

- Instructions :**
- (1) All questions in Section – I carry equal marks.
 - (2) Attempt any **three** questions in Section – I.
 - (3) Question – **9** in Section – II is Compulsory.

Section – I

1. (A) Can nano particles be considered as metals ? Explain Coulomb blockade and Staircase for a quantum dot. 7
(B) Describe the effect of reducing the size from bulk to nano dimension on the electric property of materials. 7
2. (A) Discuss in brief about Excitons. 7
(B) Write a note on semiconductor nano-particles. 7
3. (A) Write a note on the synthesis of nano particles by Chemical Vapour Deposition (CVD). 7
(B) Describe High Energy Ball Milling method to synthesize nano materials. 7
4. (A) Write a detailed note on Fullerene. 7
(B) Describe about the structure of Carbon Nano tubes. 7
5. (A) What is the difference between Scanning Electron Microscope (SEM) and Transmission Electron Microscope (TEM) ? How do you characterize a material with transmission electron microscope (TEM) ? 7
(B) Describe in detail about X-ray diffraction experiment. 7
6. (A) Discuss applications of nanotechnology in Electronics. 7
(B) Discuss applications of nanotechnology in space and defense. 7

7. (A) Write a note on Ferromagnetic materials. 7
(B) What are Sol and Gels ? Describe Sol-gel method for the synthesis of nano materials. 7
8. (A) What do you mean by Chiral tube ? Explain different types of Carbon Nano tubes. Highlight the properties of Carbon nano tubes. 7
(B) Describe Transmission Electron Microscope (TEM). 7

Section – II

9. Attempt any **eight** : 8
- (1) Define bulk modulus.
 - (2) What do you mean by quantum dot ?
 - (3) State Curie law for paramagnetic substances.
 - (4) Find the surface area to volume ratio for two spheres with radii 10 cm and 15 cm.
 - (5) Define top down approach.
 - (6) Give name of different methods to synthesize nano materials.
 - (7) Define Colloids.
 - (8) Give two examples of bio colloids.
 - (9) What is the range of pressure applied in physical vapor deposition method ?
 - (10) What is Spintronics ?
 - (11) Give two points of difference between Optical and Electron microscope.
 - (12) How much vacuum is necessary for a normal operation of SEM ?
 - (13) Define 'Achiral' and 'Chiral' tube.
 - (14) What is cold cathode ?
 - (15) Define field emission.
 - (16) What is the advantage of using electron in microscopy ?
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Seat No. : _____

NF-122

November-2021

B.Sc., Sem.-V

CC-305 : Physics

(Programming in C++ (Part-C))

Time : 2 Hours]

[Max. Marks : 50

- Instructions :**
- (1) All Questions in Section – I carry equal marks.
 - (2) Attempt any **THREE** questions in Section – I.
 - (3) Question – 9 in Section – II is Compulsory.

Section – I

1. (a) Write the applications of Object Oriented Programming C++. 7
(b) Write the all Primitive data types of C++. 7
2. (a) Write a program to input data and display with class and objects. 7
(b) Write a program to evaluate the following equation/series : 7
$$\sin(x) = x - \frac{x^3}{3!} + \frac{x^5}{5!} - \frac{x^7}{7!} + \dots$$
3. (a) Write a note on multiple constructors. 7
(b) Write a C++ program to add amount data in rupees and paise format. 7
4. (a) Write a note on function overloading. 7
(b) Write a C++ program to calculate sum of first 10 two digits natural numbers. 7
5. (a) Write the rules of overloading operators. 7
(b) Explain the Exception Handling with keywords: throw, catch, try. 7
6. (a) Write the importance of de constructors. 7
(b) Write a program to add distance data in kilometers and meters format. 7
7. (a) Explain the mode with open() 7
(b) Write a program for Arithmetic Operator (+) Overloading to add time in hours and minutes. 7

8. (a) Explain the private member function with suitable example. 7
(b) Write a C++ program to display string in triangle "PHYSICS". 7

Section – II

9. Attempt any **FOUR** : (Each carries **2** marks) 8
- (i) Single line remark statement is represented by _____ characters..
 - (ii) _____ identifier is used for character value.
 - (iii) Default extension of C++ program is _____.
 - (iv) _____ operator is called scope resolution operator.
 - (v) *cout* object from _____ header file.
 - (vi) _____ header file is used for standard input output.
 - (vii) Member functions defined inside a class are _____ by default.
 - (viii) *sqrt()* from _____ header file.
- _____