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 ?

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-x^3/3!+x^5/5!–x^7/7!+.....

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.
