Seat No. : _____

JK-126

January-2021

B.Sc., Sem.-V

305 : Physics

(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) Explain elastic properties of common materials. How plastic deformations in nano-crystalline materials differ from that of poly crystalline bulk counterpart ? **7**
   (B) What are nano-materials ? Give the classification of nano-materials and describe how the quantum confinement results a blue shift on band gap in nanomaterials. **7**

2. (A) Write a note on Photoluminescence. **7**
   (B) Describe about metal nano-clusters. **7**

3. (A) Write a note on the synthesis of nano-particles by Physical Vapour Deposition method. **7**
   (B) Explain the growth mechanism of nano-particles using La-Mer diagram. **7**

4. (A) What are Sol and Gels ? Describe Sol-Gel method for the synthesis of nano-materials. **7**
   (B) Describe High Energy Ball Milling method to synthesis nano-materials. **7**

5. (A) Describe the construction and working of Scanning Electron Microscope (SEM). **7**
   (B) Describe the construction and working of Transmission Electron Microscope (TEM). **7**

6. (A) Describe how nano-materials are useful in cosmetic industry. **7**
   (B) Describe in detail about X-ray diffraction experiment. **7**

7. (A) Discuss applications of nano-technology in Electronics. **7**
   (B) Describe about the structure of Carbon Nano tubes. **7**

8. (A) Discuss Colloids and Colloids in solutions. Also discuss synthesis of Colloids. **7**
   (B) Write a note on Ferromagnetic materials. **7**

Section – II

9. Attempt any **Eight** : **8**

(1) Full form of SET is
   (a) Single Electron Trash (b) Single Electron Transistor
   (c) Systematic Electron Transfer (d) Single Electron Transfer

(2) Nano-materials having two dimensions less than 100 nm are called
   (a) 0 D (b) 1 D
   (c) 2 D (d) 3 D

(3) The excitons are the bound states of photo excited and coulomb correlated _____.
   (a) hole-hole pair (b) electron-proton pair
   (c) electron-electron pair (d) electron-hole pair

(4) In data storage system data is stored with _____.
   (a) Resistively heated AFM tip (b) PZT sensor
   (c) SEM (d) Laser diode

(5) The binding energy of Frankel excitons is of the order of _____.
   (a) 0.1 eV (b) 1 eV
   (c) 2 eV (d) 0.2 eV

(6) Example of material which can be made nano-crystalline using ball mill method is
   (a) Cobalt (b) Uranium
   (c) Platinum (d) Manganese

(7) In planetary ball milling method, mass ratio of balls to materials advisable is _____.
   (a) 3:1 (b) 2:1
   (c) 1:2 (d) 1:5

(8) Materials which has large vapour pressure at a temperature below melting point is
   (a) Cu (b) Au
   (c) Ag (d) Ti

(9) Temperature range used at substrate in Chemical Vapour Deposition Method is _____.
   (a) 30 ^{o}C to 50 ^{o}C (b) 30 ^{o}F to 1200 ^{o}F
   (c) 300 ^{o}C to 1200 ^{o}C (d) 300 K to 1200 K

(10) Full form of EDAX is
   (a) Energy Dispersive X-ray Analysis
   (b) Energy Distribution X-ray Analysis
   (c) Electron Dispersive X-ray Analysis
   (d) None of these

(11) Reactive gas used in evaporation method is _____.
   (a) methane (b) nitrogen
   (c) oxygen (d) helium

(12) Pressure range used in Chemical Vapour Deposition method is _____ torr.
   (a) 0.1 to 1.0 (b) 1.0 to 10.0
   (c) 10.0 to 100.0 (d) 0.001 to 0.1

(13) Define 'Achiral' and 'Chiral' tube.

(14) What is Spintronics ?

(15) Define field emission.

(16) What is the advantage of using electron in microscopy ?

Seat No. : _____

JK-126

January-2021

B.Sc., Sem.-V

305 : Physics

[Object Oriented Programming 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

Attempt any **three** :

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 deconstructors. **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 carried **2** marks) **8**

(1) Single line remark statement represent by _____ characters.

(2) _____ identifier is used for character value.

(3) Default extension of C++ program is _____.

(4) _____ operator is called scope resolution operator.

(5) *Cout* object from _____ header file.

(6) _____ header file is used for standard input output.

(7) Member functions defined inside a class are _____ by default.

(8) Sqrt() from _____ header file.

_____