B.Tech. (2012 to 2017)   (Sem.–1,2)
ENGINEERING PHYSICS
Subject Code : BTPH-101
M.Code : 54105

Time : 3 Hrs.   **Max. Marks : 60**

INSTRUCTIONS TO CANDIDATES :
1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION - B & C have FOUR questions each.**
3. **Attempt any FIVE questions from SECTION B & C carrying EIGHT marks each.**
4. **Select atleast TWO questions from SECTION - B & C.**

SECTION-A

Write briefly :

1. What do you mean by a rotational and irrotational field?

2. Give the expression for Poynting vector and its physical significance.

3. Differentiate between Type-I & Type-II superconductors.

4. Define terms: unit cell, basis and space lattice.

5. Write about the basic components of a laser system.

6. What do you understand by material dispersion and pulse broadening in optical fibres?

7. Write Einstein's two postulates of special theory of relativity.

8. Derive the energy-momentum relationship.

9. What do you understand by eigen functions & eigen values in quantum mechanics?

10. What is the surface to volume ratio at nanoscale?

SECTION-B

11. a) Discuss different types of polarization in dielectrics.   3

    b) Write Maxwell's equations in free space in their integral form.   2

    c) Explain Electromagnetic spectrum giving basic ideas of different regions.   3

12. What is a superconducting state of a substance? Explain superconductivity on the basis of BCS theory.   8

13. a) Differentiate between continuous and characteristic X-rays.   3

    b) Discuss briefly the experimental method for crystal structure determination by X-ray diffraction.   5

14. a) Differentiate between three & four level laser systems.   3

    b) Discuss the construction, working and energy level diagram of He-Ne Ruby laser.   5

SECTION-C

15. a) Discuss the propagation mechanism of light waves in optical fibre.   2

    b) What are single mode, multimode and graded index fibres?   3

    c) Write a short note on the applications of optical fibres.   3

16. a) Explain the construction, working and result of Michelson Morley experiment.   5

    b) Derive the expression for addition of velocities under relativistic motion.   3

17. a) By giving suitable examples, explain the need and origin of quantum mechanics.   4

    b) Derive time-independent Schrodinger wave equation.   4

18. a) Discuss the basic difference between 0D, 1D, 2D and 3D nanomaterials.   4

    b) What do you understand by carbon nanotubes and methods for their synthesis?   4

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.