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Total No. of Questions : 09]

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**B.Tech. (Sem. – 1<sup>st</sup>)**  
**ENGINEERING PHYSICS**  
**SUBJECT CODE : BTPH – 101 (2011 Batch)**  
**Paper ID : [A1102]**

**Time : 03 Hours**

**Maximum Marks : 60**

**Instruction to Candidates:**

- 1) Section - A is **Compulsory**.
- 2) Attempt any **Five** questions from Section – B & C.
- 3) Select atleast **Two** questions from Section – B & C.

**Section - A**

**Q1)**

**(2 Marks each)**

- a) Write Maxwell equations for free space.
- b) What do you mean by electromagnetic spectrum?
- c) What are the important features of BCS theory?
- d) Give important properties of X rays.
- e) How does a hologram differ from photograph?
- f) Give important applications of optical fibres.
- g) Give Einstein postulates of special theory of relativity.
- h) Does ether exist? Comment.
- i) What are nano materials?
- j) What is Quantum confinement?

**Section - B**

**(8 marks each)**

- Q2)** (a) What is modified Ampere's law? Discuss its significance in terms of Maxwell theory and obtain an expression for displacement current density.
- (b) Curl of a vector field represents whirling/rotational features of the field. Justify.
- Q3)** (a) What is the physical mechanism behind Meissner effect.
- (b) Discuss London's theory of superconductivity.

- Q4)** (a) What are continuous and characteristic X-rays? How is the continuous X-ray spectrum and its short wavelength limit explained.
- (b) An X-ray photon is found to have its wavelength doubled on being scattered through  $90^\circ$ . Find the energy of incident photon. (mass of electron =  $9 \times 10^{-31}$  Kg).
- Q5)** (a) Find the coherence length for white light, the wavelength of white light ranges from 400nm to 700nm.
- (b) Differentiate between spontaneous and stimulated emission by taking suitable examples. Which of them is applicable to laser action, and why.

### Section - C

*(8 marks each)*

- Q6)** (a) A 20 km long fibre cable has loss of 2 dB/Km and connector loss of 0.6 dB/Km. Find the total loss.
- (b) Derive an expression for pulse broadening due to intermodal dispersion in multimode step index fibre.
- Q7)** (a) A particle of rest mass  $m_0$  moves with a speed  $c/2$ . Calculate its mass, momentum, total energy and kinetic energy.
- (b) Explain the concept of Einstein's time dilation. Deduce the necessary relation.
- Q8)** (a) Calculate the wave number of 10kV neutrons.
- (b) Explain Heisenberg's principle of Uncertainty.
- Q9)** (a) What are advantages of synthesizing nano material using Sol-gel method?
- (b) Advocate the utility of fullerene structure in reference to the synthesis of nanotubes.

