

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

MAKEUP EXAMINATION- 2016

B.Tech. II Semester

COURSE CODE: 10B11PH211

MAX. MARKS: 25

COURSE NAME: PHYSICS-II

COURSE CREDITS: 04

MAX. TIME: 1Hr 30 Min

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*Note: All questions are compulsory. Carrying of mobile phone during examinations will be treated as case of unfair means.*

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**Q1.** Discuss Carnot's reversible heat engine. What is Carnot's cycle? Calculate work done in each cycle and deduce an expression for the efficiency of Carnot's reversible heat engine. [5]

**Q2.** Calculate the increase in entropy when **1 gram** of ice at  $-10^{\circ}\text{C}$  is converted into steam at  $100^{\circ}\text{C}$ . Given: specific heat of ice = **0.5**, Latent heat of ice = **80 cal/gram** and Latent heat of steam = **540 cal/gram**. [4]

**Q3.** A hollow spherical shell carries a charge density  $\rho = k/r^2$  in the region  $a \leq r \leq b$ . Find the electric field in the regions (i)  $r < a$ , (ii)  $a < r < b$  and (iii)  $r > b$ . Plot E as a function of r. [4]

**Q4.** Derive the expression for electrostatic energy in terms of field quantities (E & D). Using this find the electrostatic energy stored in a parallel plate capacitor of area **S** and separation **d**, charged to a potential **V**. With a dielectric placed between the two plates having permittivity  $\epsilon$ . [4]

**Q5.** Write down Poisson's and Laplace's equations and explain their importance in solving electrostatic problems. Also state and prove Uniqueness theorem. [4]

**Q6.** What are Maxwell's equations for electromagnetic waves? Derive Maxwell's equations in integral form. Discuss their significance to electricity and magnetism. [4]