Total No. of printed pages = 4

PH 171201

Roll No. of candidate ⬚⬚⬚⬚⬚⬚⬚⬚⬚⬚

2018

B.Tech. 2nd Semester End-Term Examination

ENGINEERING PHYSICS — II

(New Regulation)

Full Marks – 70   Time – Three hours

The figures in the margin indicate full marks
for the questions.

Answer Q.No. 1 and any *four* from the rest.

1. Answer the following questions : $(10 \times 1 = 10)$

    (a) Chromatic aberration = —————— × mean
         focal length.

    (b) The phenomenon through which chromatic
         aberration can be minimized is called
         ——————.

    (c) The EMF equation of LCR circuit at switch on
         stage is ——————.

    (d) Time constant of LR circuit containing a steady
         source of emf ——————.

    (e) The principle of optical fiber is ——————.

(f) Population inversion is when the number of atoms in the ————————.

(g) Newton's rings are ———————— rings.

(h) ———————— bias is when no external source is connected to the two terminals of the diode.

(i) During forward bias the width of the depletion region ————————.

(j) In ———————— the positive terminals of the battery is connected to the *n*-side and the negative terminals to the *p*-side.

2. Answer the following : (3 × 5 = 15)

(a) Find the condition of achromatism of two thin lenses separated by a distance.

(b) Show that the interference pattern in the reflected and transmitted system of thin films is complimentary of each other.

(c) Explain the formation of interference fringes in case of reflected system for thin film of uniform thickness.

3. Answer the following : (3 × 5 = 15)

(a) Explain the theory of discharging of a condenser through an inductor.

(b) Derive the Helmholtz equation of growth of current in L-R circuit.

(c) Show the theory of discharge of a capacitor through an inductor is oscillatory. Also find the frequency of oscillation so produced.

4. Answer the following : (3 × 5 = 15)

   (a) Write short notes on stimulated emission and metastable state.

   (b) Derive an expression for Einstein's coefficients A and B.

   (c) Explain construction of Ruby laser with diagram.

5. Answer the following : (3 × 5 = 15)

   (a) State the difference between Avalanche and Zener breakdown of a P-N junction diode.

   (b) Distinguish between Type-I and Type-II superconductors. Give examples for each type of superconductors.

   (c) What is BCS theory? Explain the origin of superconductivity using BCS theory.

6. Answer the following : (3 × 5 = 15)

   (a) Give the physical significance of the gradient and curl of a vector.

   (b) What are the difference between conduction current and displacement current?

   (c) (i) Show that the divergence of a vector is a scalar.

       (ii) Determine the gradient of the scalar field $V = x^2 y + xyz$.

7. Answer the following : $(3 \times 5 = 15)$

(a) Dispersive power of a crown and flint glasses are 0.2 and 0.4 respectively. Find the focal length of the two component lenses of the combination in contact forming achromatic doublet if the combination has the focal length of 20 cm.

(b) Calculate the energy and momentum of a photon of a laser beam of wavelength 6328 Å.

(Given $c = 3 \times 10^8 \dfrac{\text{m}}{\text{sec}}$ and $h = 6.62 \times 10^{-34}$ J.sec)

(c) In an oscillatory circuit $L = 0.2\ H$, $C = 0.0012\ \mu F$, what is the maximum value of resistance for the circuit to be oscillatory?

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