Printed Pages : 4

NAG-104

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 991104

Roll No.

B. Tech.

(SEM. I) (ODD SEM.) THEORY EXAMINATION, 2014-15

ENGINEERING PHYSICS

Time : **2** Hours]   [Total Marks : **50**

Physical Constants

Mass of electron	m_e = 9.1×10^{-31} kg
Speed of Light	c = 3×10^8 m/s
Plank's constant	h = 6.63×10^{-34} J-s
Avogadro's number	N = 6.023×10^{23} per mole

SECTION-A

1   Attempt all parts of this question.   5×2=10

Each part carries 2 marks.

(a)   What do you understand by angle of contact?

(b)   Give any two methods for obtaining coherent light sources.

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(c) What are the retardation plates? What are the uses of these plates?

(d) What is Ferroelectricity?

(e) Distinguish between metal and insulator.

SECTION-B

2. Attempt any three parts of this question.   **3×5=15**

Each part carries 5 marks.

(a)   A plate of metal 100 cm^2 in area rests on a layer of castor oil 2mm thick whose coefficient of viscosity is 15.5 poise. Calculate the horizontal force required to move the plate with a speed of 3cm/s.

(b) A particle is moving in one dimensional potential box of infinite height of width 25Å. Calculate the probability of finding the particle within an interval of 5Å at the centre of the box when it is in its state of least energy.

(c) Newton's rings are observed normally in the reflected light of wavelength 5893 Å. The diameter of the 10th dark ring is 0.005 m. Find the radius of curvature of the lens and the thickness of the film.

(d) A diffraction grating is just able to resolve two lines of wavelengths 5140.34 Å and 5140.85 Å in the first order. Will it resolve the lines 8037.20 Å and 8037.50 Å in the second order?

(e) An electron has de-Broglie wavelength 2.0×10^{-12} m. Find its KE. Also find the phase velocity of its de-Broglie waves.

SECTION-C

Attempt any one part of all the questions of this section. **5×5=25** Each question carries 5 marks.

3. (a) Describe Jaeger's method for determination of surface tension.

(b) Explain what you mean by viscosity. Describe an accurate method to find coefficient of viscosity.

4. (a) What do you understand by resolving power of a grating? Derive the necessary expression for resolving power of the grating.

(b) Discuss the phenomenon of Fraunhofer's diffraction at a single slit and show that the relative intensities of the successive maximum are nearly 1 :

$$\frac{4}{9\pi^2} : \frac{4}{25\pi^2} : \frac{4}{49\pi^2}$$

5 (a) What is Laser? Describe the working principle of ruby laser with suitable diagrams.

(b) Describe the methods for production and detection of circularly and elliptically polarized lights.

6. (a) State and explain Heisenberg's uncertainty principle. Using this principle show that electrons cannot reside in an atomic nucleus.

(b) What is hysteresis curve? Explain residual magnetism, coercive force and hysteresis loss.

7 (a) Explain and deduce Bragg's law in X- rays diffraction. Describe a Bragg's spectrometer.

(b) Describe the method for determination of energy gap in semiconductor.

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