**Printed Pages : 4**

**EAG-102**

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

**PAPER ID : 991102**

**Roll No.** | | | | | | | | | | |

# B. Tech.

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

## ENGINEERING PHYSICS

Time : **3** Hours] [Total Marks : **100**

Note : Attempt questions from each Section as per instructions.

**Physical Constants**

| | |
|---|---|
| Mass of electron | $m_e = 9.1\times10^{-31}$ kg |
| Mass of proton | $m_p = 1.67 \times10^{-27}$ kg |
| Speed of Light | $c = 3\times10^{8}$ m/s |
| Plank's constant | $h = 6.63\times10^{-34}$ J-s |
| Avogadro's number | $N = 6.023\times10^{23}$ per mole |

### SECTION-A

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

Each part carries 2 marks.

(a) What do you mean by turbulent motion?

(b) What do you understand by capillary action?

(c) What do you mean by interference of light?

(d) What are coherent sources of light?

(e) What is plane polarized light?

(f) What are quarter wave plates?

(g) Define population inversion.

(h) What is ferroelectricity?

(i) What do you understand by diffraction of X-rays?

(j) Distinguish between metal and insulator.

## SECTION-B

2 Attempt any three parts of this question. $3 \times 10 = 30$

Each part carries 10 marks :

(a) In a horizontal tube 4 km long and 8 cm in diameter, water flows at the rate of 20 liters/sec against viscous resistance. If the viscosity of water is0.01C.G.S. unit calculate the pressure required to maintain the flow.

(b) In a certain set-up the Newton's rings observed with light of wavelength 5890 $\mathring{A}$ show the difference of square of diameters of successive rings as 0.124 $cm^2$. What happens to this quantity if wavelength is changed to 4360 $\mathring{A}$ ?

(c) Light of wavelength 5000 $\mathring{A}$ falls on a grating normally. Two adjacent principal maxima occur at $\sin\theta = 0.2$ and $\sin\theta = 0.3$ respectively. Calculate the grating element. If the width of the grating surface is 2.5 cm, calculate its resolving power in second order.

(d) Calculate the thickness of a doubly refracting crystal plane required to introduce a path difference of $\lambda/2$ between ordinary and extraordinary rays when $\lambda = 6000$ Å, $\mu_0 = 1.55$, $\mu_e = 1.54$.

(e) Calculate the de-Broglie wavelength of an $\alpha$-particle accelerated through a potential difference of 200 volts.

## SECTION-C

Attempt any one part of all the questions of this section. Each question carries 10 marks. **5×10=50**

3. (a) Discuss capillary action. Calculate the height to which capillary action will lift water. Explain why will water rise higher in a smaller tube.

(b) Derive the Poiseuille's equation and also discuss the viscometer.

4. (a) Discuss the Fraunhofer diffraction at a double slit. What is the effect of increasing the (i) slit width (ii) wavelength?

(b) Discuss the phenomenon of interference of light due to thin films and find the conditions maxima and minima. Show that the interference patterns of reflected and transmitted monochromatic source of light are complementary.

5 (a) What is He-Ne Laser? How it work?

Explain with suitable diagrams. Compare the Laser beam characteristics of Ruby and He-Ne laser.

(b) Describe how, the plane polarized, circularly polarized and elliptically polarized lights are produced and detected.

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

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

7. (a) Describe an X-ray spectrometer used in study of crystal structure. Explain how it is used in determining the structure of a cubic crystal.

(b) What are intrinsic and extrinsic semiconductors? Describe different types of extrinsic semiconductors in detail.