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SUBJECT CODE: PHY022101

Roll No. of candidate

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2017

End Semester (B.Tech) Examination

1st Semester

APPLIED PHYSICS

Full Marks- 70

Pass Marks- 21

Time- 3 hours

The figures in the margin indicate full marks.

PART – A

Q.1. Answer all questions:

16 × 1=16

- Young's modulus of material of a wire is defined as.....
- A simple shear strain θ is equivalent to a compression strain and an extension strain in two mutually perpendicular directions of value.....
- The relation between three electric vectors **E**, **D** and **P** is $\mathbf{D} = \underline{\quad}\mathbf{E} + \mathbf{P}$
- Write Clausius- Mossotti equation.
- According to Weber-Fechner law, the loudness is directly proportional to -----.
- If 'S' is loudness and intensity is denoted by 'I', then $\frac{ds}{dI}$ represents _____.
- Expression for fringe width is.....
- What is double refraction of light?
- Wavelength range of X-ray is.....
- The minimum wavelength limit of the continuous X-ray depend on.....
- Write one drawback of Moseley's law.
- Write the relation of de-Broglie wavelength and Kinetic energy of the particle.
- Opticalfibre are based on the principle of
- The inner most body structure of an optical fibre is known as
- What do you mean by stimulated emission?
- What is population inversion in laser.

PART-B

Q.2. Answer all the questions.

3.5 × 4 = 14.

- A steel bar 6.00 m long and with rectangular cross section of 5.00 cm x 2.50 cm supports a mass of 2000 kg. How much is the bar stretched? Given, Young's modulus of steel = $2 \times 10^{11} \text{ Nm}^{-2}$.

b) A hall of volume 5500 m^3 is found to have a reverberation time of 2.3 sec. The sound absorbing surface of the hall has an area of 750 m^2 . Calculate the average absorption coefficient

c) Calculate the wavelength of the K_α line emitted by an atom having atomic no. $z = 92$.
Given, Rhydberg constant, $R = 1.1 \times 10^7 \text{ m}^{-1}$.

d) The refractive index of core and cladding of an optical fibre is 1.50 and 1.45. Calculate the numerical aperture, acceptance angle and the fractional refractive index change.

PART-C

Answer the questions

4×10 =40

Q.3. If Y, K and η represent Young's modulus, Bulk modulus and modulus of Rigidity respectively, prove the relation,

$$\frac{9}{Y} = \frac{3}{\eta} + \frac{1}{K}$$

OR

Establish Clausius- Mossotti equation.

Q.4. State and explain any five factors affecting the acoustics of buildings and give at least two remedies for each.

OR

Define interference of light? Obtain an expression for fringe width in case of Young's double slit experiment. Prove that in this case interference bright and dark bands are of equal width.

Q.5. State and explain Heisenberg Uncertainty principle. Using Heisenberg Uncertainty principle prove the non existence of electron inside the nucleus.

OR

State Moseley's law. Deduce with the help of Bohr's theory. Briefly explain its importance.

Q.6 Discuss the construction and working principle of semiconductor laser with diagrams.

OR

Discuss in details the block diagram of optical fibre communication system.
