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PH 171101

Roll No. of candidate

BINA CHOWDHURY CENTRAL LIBRARY
(GIMT & GIPS)

Azara, Hatkhowapara,
Guwahati -781017

2019

B.Tech. 1st Semester End-Term Examination

ENGINEERING PHYSICS - I

(New Regulation) & (New Syllabus)

(w.e.f.2017-2018)

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 × 1 = 10)

(i) The Uncertainty in measurement of time of an event approaches infinity; then the uncertainty in measurement of the energy associated with it tends to

(a) 0

(b) ∞

(c) $\frac{h}{2\pi}$

(d) $\frac{h}{2}$

[Turn over

- (ii) Dielectrics are the substances which are
- (a) Conductors
 - (b) Semiconductors
 - (c) Superconductors
 - (d) Insulators
- (iii) The limiting value of Poisson's ration (σ) is
- (a) $0 \leq \sigma \leq 1$
 - (b) $0 \leq \sigma \leq 0.5$
 - (c) $-1 \leq \sigma \leq 1$
 - (d) None of the above
- (iv) Nano, as a prefix, denotes what order of magnitude?
- (a) 10^9
 - (b) 10^{-6}
 - (c) 10^{-12}
 - (d) 10^{-9}
- (v) The de Broglie wavelength (λ) of an electron is given by
- (a) $\lambda = \frac{h}{\sqrt{2mv}}$
 - (b) $\lambda = \frac{h}{mv^2}$
 - (c) $\lambda = \frac{h}{2mE}$
 - (d) $\lambda = \frac{h}{mv}$

(vi) Hooke's law states that

(a) Stress = Strain

(b) $\text{Stress} = \frac{1}{\text{Strain}}$

(c) Stress \propto Strain

(d) $\frac{\text{Strain}}{\text{Stress}} = \text{Constant}$

(vii) Ultrasonic waves have frequencies

(a) Between 20 Hz to 20 KHz

(b) Less than 20 KHz

(c) Above 20 KHz

(d) Less than 20 Hz

(viii) Elasticity coefficients, Y , σ and η are correlated as

(a) $Y = 2\eta(1 - \sigma)$

(b) $Y = 2\eta(1 + \alpha)$

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

(d) None of the above

(ix) Magnetic induction B and the magnetic field intensity H are related by

(a) $B = \mu_0 H^2$

(b) $B = \mu_0 + H$

(c) $B = \mu_0 \mu_r H$

(d) $B = \mu_0 H^2$

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- (x) Devisson and Germer experiments confirms the
- (a) Particle nature
 - (b) Wave and Particle dual nature
 - (c) Wave nature
 - (d) None of the above.

2. (a) What is Nano technology? Discuss briefly the significant properties of nanomaterial. (2+5)
- (b) State the types of nanomaterial. (4)
- (c) Write the important application of nanomaterial. (4)
3. (a) Distinguish between the Hard and Soft Magnetic materials. (3)
- (b) What is a ferromagnetic domain? Define Hysteresis Loss? Derive an expression for Hysteresis Loss in terms of dissipation energy per cycle. (2+2+5)
- (c) Write important application of magnetic materials. (3)
4. (a) State and explain the Heisenberg's Uncertainty principle. (4)
- (b) What is de Broglie's hypothesis? Show that the wave length associated with an electron of mass m and kinetic energy E is given by $E = \frac{h}{\sqrt{2mE}}$. (2+5)
- (c) Define group velocity and phase velocity. (4)

5. (a) What is Dielectric Polarisation? State different type of dielectric polarisation. (2+3)
- (b) Distinguish between Polar and Nonpolar molecules with examples. (2+2)
- (c) Derive the Claussius-Mossotti Equation. State the physical significance. (5+1)
6. (a) What is reverberation? State the Sabin formula of reverberation time. (2+2)
- (b) Describe the construction and working principles of any one method for production of ultrasonic waves using oscillatory circuit. (4+4)
- (c) What should be minimum length of an iron rod to generate ultrasonic waves of frequency 0.03 MHz? Given, for iron Modulus of elasticity $1.15 \times 10^{11} \text{ Nm}^{-2}$ and Density $7.25 \times 10^3 \text{ Kgm}^{-3}$ respectively. (3)
7. (a) Show that a shear strain is equal to tensile strain and a compression strain at right angle to each other. (5)
- (b) What is a Cantilever? Derive an expression for the depression of the free end of a light cantilever. (2+5)
- (c) Find the Poisson's ration of Silver if the Young's modulus and the bulk modulus of Silver are $7.25 \times 10^{10} \text{ Nm}^{-2}$ and $11 \times 10^{10} \text{ Nm}^{-2}$ respectively. (3)

8. (a) State the Weber Fechner Law. (3)
- (b) What is Architectural Acoustics? Write at least three major factors affecting acoustics of building and their remedies. (2+6)
- (c) A hall of size $20 \text{ m} \times 15 \text{ m} \times 4 \text{ m}$ has a total absorption of 1050 OWU including that of the chairs. If there are 800 chairs, each having an absorption coefficient of 0.45 OWU then compare between the reverberation times of full hall and empty hall? (4)
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