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**Z—216—2011**

**FACULTY OF ENGINEERING**

**F.E. (Gen.) EXAMINATION**

**MAY/JUNE, 2011**

**(New Course)**

**ENGINEERING PHYSICS**

**(Saturday, 28-5-2011)**

**Time : 10.00 a.m. to 1.00 p.m.**

*Time—Three Hours*

*Maximum Marks—80*

*N.B. :— (i) Use separate answer-book for each Section.*

*(ii) Question No. 1 in Section A and Question No. 5 in Section B are compulsory.*

*(iii) Attempt any two other questions from Section A and Section B each.*

*(iv) Non-programmable calculator is allowed.*

*(v) Figures to the right indicate full marks.*

**Section A**

1. Attempt any *four* of the following : 16

- (i) Define reverberation and reverberation time. A cinema hall has a volume of  $7500 \text{ m}^3$ . It is required to have reverberation time of 1.5 second. What should be the total absorption in the hall ?

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- (ii) Define mass defect, binding energy and atomic mass unit.
- (iii) Explain the phenomena of interference. What is constructive and destructive interference ?
- (iv) Explain any *two* applications of CRO.
- (v) What are cathode rays ? Mention their properties.
2. (a) What is Zeeman effect ? Obtain necessary expression for Zeeman shift. 6
- (b) Explain different types of sound absorbing material in detail. 6
3. (a) Derive an expression for  $e/m$  of an electron using crossed electric and magnetic field in a cathode ray tube. 6
- (b) Define magneto striction effect and Piezoelectric effect. An ultrasonic source of 0.07 MHz sends down a pulse towards the seabed which returns after 0.065 sec. The velocity of sound in sea water is 1700 m/sec. Calculate depth of sea and the wavelength of pulse. 6

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4. (a) Explain the formation of Newton's ring and show that radii of dark rings are proportional to underroot of natural number. 6
- (b) Explain Nuclear fission in natural Uranium. 6

**Section B**

5. Attempt any *four* of the following : 16
- (i) Define Fresnel and Fraunhofer diffraction and distinguish between them.
- (ii) What is Heisenberg's uncertainty principle ?
- (iii) State and explain Brewster's law.
- (iv) Calculate the numerical aperture, acceptance angle and the critical angle of the fibre having refractive index of core ( $n_1 = 1.5$ ) and refractive index of cladding ( $n_2 = 1.45$ ).
- (v) Write any *four* applications of Laser.
6. (a) What is the significance of critical temp., critical magnetic field and critical current density for superconductor ? 6
- (b) Explain with neat diagram working of Bragg's X-ray spectrometer. 6

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7. (a) Explain the construction and working of semiconductor laser. 6
- (b) Describe and explain Davisson and Germer experiment for the determination of wavelength of electron. 6
8. (a) Derive an expression for numerical aperture and state the relation between numerical aperture and fractional refractive index change. 6
- (b) Describe plane of polarisation and plane of vibration Explain optical method to show that light waves are transverse. 6