Engineering Physics - II
(102111)

P. Pages : 3

Time : Three Hours   Max. Marks : 80

Instructions to Candidates :
1. Do not write anything on question paper except Seat No.
2. Answer sheet should be written with blue ink only. Graph or diagram should be drawn with the same pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. Attempt **any two** sub questions from each unit.
5. Assume suitable data wherever necessary and state the assumption mode.
6. Diagrams / sketches should be given wherever necessary.
7. Use of non - programmable calculators is permitted.
8. Figure to the right indicates full marks.

UNIT - I

1. a) What are ultrasonic waves ? Define magnetostriction effect. Explain the production of ultrasonic waves by magnetostriction generator. State its merits and demerits.   **8**

    b) i) Define   **4**
            i) Echo
            ii) Reverberation
            iii) Acoustic intensity
            iv) Intensity level.

        ii) The volume of a hall is 3398.4 m^3 and its total absorption equals 92.90 m^2 of an open window when empty. Entry of the audience inside the hall raises the absorption by 185.50m^2. Determine the change in reverberation time.   **4**

    c) i) State the essential features which an acoustically good hall should have.   **4**

ii) Find the natural frequency of vibration of a quartz plate of thickness 1.8mm. Given :- Young's modulus for quartz is 8×10^{10} N/m^2. Density of quartz is 2650 kg/m^3. Calculate the change in thickness if the same plate is used to produce ultrasonic waves of frequency 2 MHz. **4**

UNIT - II

2. a) What are the ferrites ? How are they prepared ? State the applications of ferrites. **8**

   b) i) Define magnetic field intensity, susceptibility and permeability. Derive the relation between susceptibility and permeability. **4**

   ii) A magnetic field of 2000 A/M is applied to a material which has susceptibility 1000. Calculate the
   i) Intensity of magnetization and
   ii) Flux density. $\left(\text{Given } \mu_o = 4\pi \times 10^{-7} \text{ Henry/m} \right)$ **4**

   c) i) Define superconductors ? State the properties of superconductors. **4**

   ii) An iron ring of mean circumferential length 30cm and cross section 1 cm^2 is wound uniformly with 300 turns of wire. When a current of 0.032 awp flows in the windings, the flux in the ring is 2×10^{-6} weber. Find the flux density in the ring, the magnetic intensity and relative permeability of iron. **4**

UNIT - III

3. a) Define positive rays ? Explain with a neat diagram the principle and working of Bainbridge mass spectrograph. **8**

   b) i) Write a note on MRI. **4**

   ii) An electron beam passes through a magnetic field of 2.5×10^{-3} wb$/$m^3. and an electric field of 5×10^4 v/m both acting simultaneously at right angles to each other and to the path electrons. IF the electron follow an undeviated path, find the speed of electrons. If the electric filed is removed, What will be the radius of the electron path. **4**

   c) i) Explain the normal Zeeman effect with experimental arrangement. **4**

ii) In a cathode ray tube a pair of deflecting plates are 2 cm/ Long are spaced 0.5 cm apart. The distance from the center of the plates to the screen is 24 cm. The final anode voltage is 1000 volts. Calculate. **4**

    i) The displacement produced by deflecting voltage of 30 volts.

    ii) The angle which the beam makes with the axis of the tube on emerging from the field.

UNIT - IV

4. a) What is De - Broglie's hypothesis ? Obtain an expression for De - Broglie Wavelength in terms of kinetic energy. Give the dissimilarities between mater wave and electromagnetic wave. **8**

    b) i) What is wave function. Give its physical significance. **4**

      ii) If the uncertainty in the location of a particle is equal to its. De-Broglie wavelength, show that the uncertainty in its velocity is equal to its velocity. **4**

    c) i) State and explain Heisenberg's uncertainty principle. **4**

      ii) Find the lowest energy of neutron confined to a nucleus of size 10^{-14} m. (Given mass of neutron = 1.67×10^{27} kg) **4**

UNIT - V

5. a) Define nano particle ? Give brief description that how the nano materials synthesis by mechanical method. **8**

    b) Define nano - particle ? How nano particles may be synthesized by using biological method. **8**

    c) i) State the electrical properties of nanoparticles any five. **4**

      ii) State the applications of nanomaterials. **4**

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