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. Answersheet 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 question from each unit.
5. Assume suitable data wherever necessary state the assumptions made.
6. Diagrams / sketches should be given wherever necessary.
7. Use of non - programmable calculator is permitted.
8. Figures to the right indicate full marks.

UNIT - I

1. a) What is ultrasonic wave ? Explain the generation of ultrasonic waves using the principal of piezo electric generator.   8

    b) i) Define the following term.   4
            a) Loudness   b) Magnetostriction oscillator
            c) Absorption coefficient   d) Echo.

        ii) A lecture hall of 15x12x5 meter dimension has an average absorption coefficient 0.2. Calculate reverberation time. If 14.30 microwatt source is used in the hall, calculate ultimate intensity in the hall.   4

    c) i) Give engineering applications of ultrasonic wave.   4

        ii) An ultrasonic pulse of frequency 80 KHz is sent down towards the sea bed. The echo is recorded after 0.7sec. If the velocity of sound in sea water is 1500 m/s. Calculate the depth of the sea and the wavelength of the pulse.   4

UNIT - II

2. a) What are ferrites ? How are they prepared ? Give its property and application. 8

b) i) On the basis of Hysterisis curve, explain soft and Hard magnetic materials. **4**

ii) Superconducting tin (s_n) has a critical temperature of 3.7 k at zero magnetic field and a critical field of 0.0306 tesla at O K. Find the critical field at 2K.   **4**

c) i) Give applications of superconductor.   **4**

ii) An iron ring of cross sectional area $1cm^2$ and mean circumference of 0.6×10^2 cm has 400 turns of wire uniformly wound on it. When a current of 5×10^{-2} A flows, the flux in the ring is found to be 4×10^{-6} wb. Calculate :

i)   Flux density
ii) Magnetic flux intensity
iii) Permeability
iv) Relative permeability

$\left(\text{Given} : \mu = 4\pi \times 10^{-7} \text{ H/M}\right)$ **4**

UNIT - III

3. a) What is positive rays ? Explain the construction and working of Bainbridge mass spectrograph.   **8**

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

ii) An electron accelerated from rest through a pd of 900 V enters a uniform magnetic field of 0.1 wb/m^2, whose direction is perpendicular to the initial direction of the electron. Determine.
i)   The linear velocity of electron.
ii) The radius of circular path followed by the electron in the magnetic field.   **4**

c) i) What is Zeeman effect ? Explain normal zeeman effect.   **4**

ii) Calculate normal zeeman separation (shift) when magnetic field applied is 1 wb/m^2.   **4**

UNIT - IV

4. a) What are matter wave ? Give its property ? Obtain an expression for de Broglie wave length in terms of K.E.   **8**

b) i) State and explain Heisenberg's Uncertainty principle.   4

    ii) Find the De Broglie wavelength of electron of 10 KeV.   4

c) i) Derive schrodinger's time dependent wave equation for matter wave.   4

    ii) An electron has a speed of 300 m/s accurate to 0.01% with in what range the best we can locate the position of the electron.

Given : planks constant, $h = 6.625 \times 10^{-34}$ J – S.   4

UNIT - V

5. a) What is Nanotechnology ? Describe the method for synthesis of Nanoparticle by physical method.   8

   b) i) Explain optical properties of Nanoparticle.   4

     ii) Give application of Nanoparticle.   4

   c) i) Explain the synthesis of colloids.   4

     ii) Explain the mechanical property of Nanoparticle.   4

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