Engineering Physics - I
(101101)

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 question from each unit.
5. Assume suitable data wherever necessary and 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) Explain Biogas with neat labelled diagram? Give its advantages and disadvantages.   **8**

    b) i)   Define the following terms :   **4**
        1) Atomic Mass Unit (a.m.u.)   2) Solar Cell
        3) Nuclear Fission   4) Wind energy.

    ii) Draw an array of solar cells which supply 2 V and 150 mA current output.   **4**
    Given – each cell supplies 0.5V and 50 mA current when illuminated with light. Also calculate the wavelength of light absorbed by silicon cell having energy gap 1.2 eV.

    c) i)   Write a note on Nuclear Reactor.   **4**

    ii) Calculate the power output of a nuclear reactor which consumes 20kg of U^{235} per day.   **4**
    Given : i) The average energy released per fission of U^{235} is 200 MeV. ii) Avogadros Number – 6.025×10^{26} kg – mole.

UNIT – II

2. a) Explain with neat labelled diagram the construction and working of Nd : YAG Laser. **8**

b) i) Define the following term : **4**
1) Pumping   2) Population Inversion
3) Spontaneous emission   4) Holography.

ii) In an optical fibre, the core material has refractive index 1.6 and refractive index of clad as 1.3 What is the value of critical angle? Also calculate the value of angle of acceptance cone. **4**

c) i) Give the advantages of optical fibre over metallic cable. **4**

ii) The angle of acceptance of an optical fibre is 30⁰ when kept in air. Find the angle of acceptance when it is in a medium of refractive index 1.33. **4**

UNIT – III

3. a) What is x-ray? Explain the production of x-ray by coolidge tube. **8**

b) i) Define the following term : **4**

1) Atomic radius   2) Space Lattice

3) Unit Cell   4) Coordination number.

ii) NaCl Crystal has a lattice constant of 5.643 A⁰. Given : Molecular weight of NaCl is 58.45 and Avogadros number is 6×10^{26} kg-mole. Find its density. **4**

c) i) Give the properties and applications of x-ray. **4**

ii) The shortest wavelength of x-ray produced is 1 A⁰, when the tube operates at 0.124×10^2 KV. Calculate the Plank's constant. **4**

UNIT – IV

4. a) State Valence band and conduction band? Explain the classification of solid on the basis of band theory. **8**

b) i) Distinguish between P-type and N-type semi conductor. **4**

	ii)	Calculate the current produced in a small Ge plate of area $1cm^2$ and of thickness 0.3 mm, when a pd of 2 V is applied across the faces.	**4**

Given : $n_i = 2 \times 10^{19} / m^3$

$$\mu_e = 0.36 m^2 / V.S, \quad \mu_h = 0.17 m^2 / V.S.$$

c) i) Give the properties of semi conductor. **4**

ii) A silver wire is in the form of a ribbon of 0.5 cm wide and 0.1 mm thick. When a current of 2 amp passes through the ribbon, perpendicular to 0.8 tesla magnetic field, calculate the Hall voltage produced. The density of silver is 10.5 gm/cc and atomic weight of Ag = 108. **4**

UNIT – V

5. a) What is interference? Draw the diagram of Michelson's Interferometer? Explain two applications of Michelson's Interferometer. **8**

b) i) Explain Rayleigh's Criterion of resolution with suitable diagram. **4**

ii) A monochromatic light of wavelength 6580 A° falls normally on a grating 2 cm wide. The first order spectrum is produced at an angle of 18° 14' from the normal. What are the total no. of lines on the grating. **4**

c) i) Give engineering applications of polarization. **4**

ii) What would be the maximum angle of refraction, if a glass plate of refractive index 1.52 is used as a polarizer. **4**

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