P P SAVANI UNIVERSITY

Second Semester of B. Tech. Examination
May 2019
SESH1210 Applied Physics

22.05.2019, Wednesday   Time: 12:30 p.m. To 3:00 p.m.   **Maximum Marks: 60**

Instructions:
1. The question paper comprises of two sections.
2. Section I and II must be attempted in separate answer sheets.
3. Make suitable assumptions and draw neat figures wherever required.
4. Use of scientific calculator is allowed.

<u>**SECTION – I**</u>

Q - 1	Fill in the blanks (Any five)	[05]
(i)	The expression of group (V_g) velocity of matter wave is _____.	
(ii)	_____ has suggested the wave particle duality.	
(iii)	Mathematical form of Bragg's law is _____.	
(iv)	The production of electric charges on the surface of certain crystals by application of an external stress is known as _____.	
(v)	The sabine's formula for reverberation time is _____.	
(vi)	The relation between interracial angles of an Orthorhombic crystal system are given by _____.	

Q - 2 (a)	Derive an expression of Heisenberg's uncertainty principle.	[05]
Q - 2 (b)	Derive Time dependent Schrödinger equation.	[05]

OR

Q - 2 (a)	Write a short note on "Application of Heisenberg's uncertainty principle".	[05]
Q - 2 (b)	Derive a relation for energy of a particle in one dimensional box.	[05]

Q - 3 (a)	Explain in detail Piezoelectric effect for the production of ultrasonic sound.	[05]
Q - 3 (b)	Find the miller indices of a set of parallel planes which makes intercept in the ratio 3:4 on the X and Y axis and are parallel to Z axis.	[05]

OR

Q - 3 (a)	Write a short mote on X-ray: Production, properties and application.	[05]
Q - 3 (b)	Draw the (110) and (111) plane and [110] and [111] direction in simple cubic crystal. Explain the use of miller indices notation in crystal system.	[05]

Q - 4	Attempt any one.	[05]
(i)	Calculate the intensity level of a plane just leaving the runway having sound intensity of about 1,000 Wm^{-2}.	
(ii)	Explain different types of sound absorbing materials.	

SECTION – II

Q - 1 Fill in the blanks (Any five) [05]

(i) The expression of acceptance angle of an optical fibre is _____.

(ii) The refractive index of cladding (n_2) is always _____ then refractive index of core(n_1).

(iii) The full form of MESFET is _____.

(iv) The power factor of purely capacitive circuit is _____.

(v) The form factor is the ratio of _____.

(vi) A high resistance reading in both forward- and reverse-bias directions indicate _____.

Q - 2 (a) Describe the working of a Nd:YAG in detail using appropriate diagrams. [05]

Q - 2 (b) Find the currents (I_1, I_2, I_3) flowing around the following circuit using Kirchhoff's Law. [05]
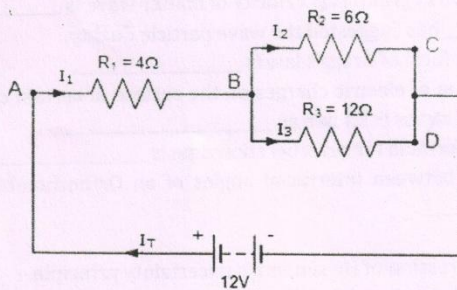
OR

Q - 2 (a) Differentiate between the spontaneous emission and stimulated emission. Explain the meaning of population inversion. [05]

Q - 2 (b) The specific resistance of the material of the wire is 44×10^{-6} ohm-meter. If the resistance of wire is 1.4 ohms and its diameter is 1 mm, calculate the length of the wire. [05]

Q - 3 (a) Distinguish between an alternating current and direct current. Mention their advantages over each other. [05]

Q - 3 (b) Write a short note on Transistor and their types. [05]

OR

Q - 3 (a) Obtain an expression for average and R.M.S value of current for AC sinusoidal waveform. [05]

Q - 3 (b) Write a short note on Inductor and capacitor. [05]

Q - 4 Attempt the following. [05]

An alternating e.m.f is applied to a circuit having capacitor and resistor in series. Derive an expression for the impedance and average and total power of a circuit.

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