Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER– 1st / 2nd • EXAMINATION – SUMMER • 2014

Subject Code: 2110011 Date: 21-06-2014

Subject Name: Physics

Time: 02:30 pm - 05:00 pm Total Marks: 70

Instructions:

1. **Question No. 1 is compulsory. Attempt any four out of remaining Six questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1 Objective Question (MCQ)

(a) Choose the correct option from the followings: **07**

1. The rate of change of momentum is _____
(a) Acceleration (b) Force (c) Velocity (d) Momentum

2. The motion of a vehicle on a horizontal road is due to_____
(a) Engine of vehicle (b) driver of vehicle (c) Earth (d) friction between road and vehicle

3. 1 V/m = _____
(a) 1 N/C (b) 1N (c) 1N/m (d) 1J/C

4. The SI unit of resistivity is_____
(a) $\Omega.m^2$ (b) $\Omega^2.m$ (c) $\Omega.m$ (d) $\Omega.m^3$

5. According to Faraday's law of electromagnetic induction, the rate of change of _____ produced induced emf in a closed circuit
(a) Magnetic flux (b) Electric field (c) Magnetic field (d) None of above

6. In a bar magnet, the magnetic field lines_____
(a) are not present (b) depend upon cross section area of the magnet
(c) go from N-pole to S-pole (d) go from S-pole to N-pole

7. The interactive force between two charged particles is given by_____ law.
(a) Newton's (b) Coulomb's (c) Biot-savart (d) Faraday's

(b) Choose the correct option from the followings: **07**

1. The unit of capacitance of capacitor is_____
(a) Henry (b) Ohm (c) Farad (d) Coulomb

2. AC ammeter measures _____ value of current
(a) Average (b) rms (c) entire (d) none of the above

3. An inductor stores energy in its_____
(a) Electric field (b) Conducting wire (c) Magnetic field
(d) Magnetic field and Electric field

4. The equivalent resistance of two resistor connected in parallel with same value R is _____
(a) R/2 (b) 2R (c) 4R (d) R/4

5. The upward force exerted by any fluid on object, placed in it, is called_____
(a) Attractive force (b) Repulsive force (c) Adhesive force (d) Buoyant force

6. The principle of a hydraulic lift used to raise heavy loads is the application of _____ law.
(a) Newton (b) Archimedes (c) Poiseiulle (d) Pascal

7. If the force of 2N is applied on surface area of $2m^2$, the pressure acting on it is____
(a) 1 N/m^2 (b) 10 N/m^2 (c) 2 N/m^2 (d) 0.5 N/m^2

Q.2	**(a)**	1. Deduce Clausius-Mossotti equation. What is its significance?	**04**
		2. Calculate the polarizability and relative permittivity in hydrogen gas with a density of 9.8×10^{26} atoms/m^3.Given the radius of hydrogen atom to be 0.5 °A.	**03**
	(b)	1. Distinguish between hard and soft magnetic materials.	**04**
		2. A Magnetic field strength of 2×10^5 A/m in applied to paramagnetic material with relative permeability of 1.01. Calculate the values of B and M.	**03**
Q.3	**(a)**	1. Discuss briefly about types of sound absorbing materials.	**04**
		2. A hall has a volume of 12,500 m^3 and reverberation time of 1.5 sec. If 200 cushioned Chairs are additionally placed in the hall, What will be the new Reverberation time of the hall? The absorption of each chair is 1 O.W.U.	**03**
	(b)	1. Explain with neat circuit the generation of ultrasonic waves using piezo-electric Oscillator.	**04**
		2. Describe any six applications of ultrasonic waves.	**03**
Q.4	**(a)**	1.Write a short note on followings: i) Isotopic effect ii) Meissner effect	**04**
		2. Calculate the critical current for a superconducting wire of lead having diameter 1mm at 4.2 K. Critical temperature for lead is 7.18 K and $H_0= 6.5 \times10^4$ A/m.	**03**
	(b)	1. Discuss the properties of LASER in detail.	**04**
		2. Define: i) Metastable state ii) Population Inversion iii) Pumping	**03**
Q.5	**(a)**	1. Discuss in detail the advantages of optical fiber over conventional metallic cable.	**04**
		2. A silica optical fiber has a core of relative index 1.55 and a cladding of refractive index 1.47. Determine the critical angle, numerical aperture and the acceptance angle for fiber.	**03**
	(b)	1. Discuss in detail how the different properties of nonmaterial changes with reduction in size.	**04**
		2. Describe Electric arc method of CNT synthesis.	**03**
Q.6	**(a)**	1. Explain the two function properties of shape memory alloys in detail.	**04**
		2. Write a short note on ultra capacitor.	**03**
	(b)	1. Define : i) Electric field Intensity ii) Electric Polarization iii) Magnetic susceptibility iv) Magnetization	**04**
		2. List out the difference between single mode fiber and multi mode fiber.	**03**
Q.7	**(a)**	1. Discuss in detail, the procedure of data recording and reading in floppy disc.	**04**
		2. Discuss in detail quantum confinement.	**03**
	(b)	1. Compare between spontaneous and stimulated emission.	**04**
		2. Explain the melt spinning technique to prepare metallic glasses	**03**

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