

Seat No.: _____

Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY
BE SEMESTER– 1st/2nd (NEW SYLLABUS) EXAMINATION – SUMMER 2015

Subject Code: 2110011

Date: 17/06/2015

Subject Name: Physics

Time: 10.30am-01.00pm

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)

07

1. The buoyant force of an object is depend on
(A)Object's density (B)Mass of an object (C)Area of an object
(D)Submerged area of an object
2. The unit of an inductance of an inductor is _____
(A)Henry (B)Farad (C)coulomb (D)Ohm
3. Which of the following is a Scalar quantity
(A)Momentum (B) Force (C) Mass (D) Velocity
4. Ohm's Law is not applicable to
(A)Semiconductors (B) DC Circuits (C) High Currents (D) Resistor
5. Potential difference is measured in
(A) Volts (B) Amperes (C) Joules (D) Watts
6. An inductor stores energy in
(A)Electrostatic field (B) electromagnetic field (C) core (D) magnetic field
7. Four identical resistors are first connected in parallel and then in series. The resultant resistance of the first combination to the second will be
(A) $\frac{1}{16}$ times (B) $\frac{1}{4}$ times (C) 4 times (D) 16 times

(b)

07

1. The acceleration in a body is due to
(A)Balanced force (B) unbalanced force (C) mass (D) electrostatic force
2. If any block of material is float on liquid, what can say about block
(A)Block is heavier than liquid (B) liquid is heavier than block
(C) density of liquid is more than block (D) density of block is more than liquid
3. Step up transformer decreases
(A)Voltage (B) current (C) power (D) frequency
4. Which is not a unit of Pressure?
(A)Bar (B) Torr (C) Pascal (D) N/m
5. For an object which is on circular motion, it must have
(A)Continuously accelerated (B) Continuously slow down
(C) Continuously acted on balanced force (D) none of these
6. What is the force acting on an object of mass 10 kg moving with a uniform velocity of 10m/s?
(A)100N (B) 10N (C) 0N (D) 1N
7. What is the SI unit of surface tension

(A)Nm (B) Nm⁻¹ (C) Nm⁻² (D) Jm⁻¹

OR

Q-1 (A) **Choose the correct answer from following options.**

07

1. The SI unit of velocity is _____
(a)Poise (b) Pascal (c) Jule (d) none of these
2. The dimensional formula of surface tension is _____
(a)M¹L¹T⁻¹ (b) M¹ L¹ T⁻² (c) M¹L⁰T⁻² (d) M¹L⁻¹T⁻¹
3. Potential difference is measured in _____
(a)Volt (b) Ampere (c) Joule (d) Watt
4. Kirchoff's second law is based on law of conservation of _____
(a)Charge (b) Momentum (c) Energy (d) Mass
5. In a color code of resistor, number 3 is represented by _____
(a) Blue (b) Orange (c) Grey (d) Violet
6. Resistance of a conductor in the form of a wire depends on its _____
(a)Pressure (b) Length (c) Temperature (d) Material
7. An inductor stores energy in form of _____
(a) Electrostatic field (b) Electromagnetic field (c) Core
(d) Magnetic field

(B) **Choose the correct answer from following options.**

07

1. SI unit of torque is _____
(a) Nm (b) Nm⁻¹ (c) Nm⁻² (d) Jm⁻¹
2. A cube of ice is floating in water contained in a vessel. When the ice melts, the level of water in the vessel _____
(a) rises (b) falls (c) remain unchanged
(d) falls at first and then rises to the same height as before
3. The resultant of balanced force is _____
(a) non zero (b) equal to zero (c) not equal to zero
(d) equal to the acceleration produced in body
4. Inertia is _____
(a) property of matter (b) type of force (c) speed of an object (d) none of these
5. The gravitational force of earth acting on a body of mass 1 kg is _____
(a) 8.9 N (b) 9.8 N (c) 980 N (d) 1 N
6. Which pair of variables defines motion?
(a) speed and distance (b) time and momentum
(c) Change of position and passage of time
(d) speed and passage of time

7. The acceleration in a body is due to _____
 (a) Balanced force (b) Unbalanced force (c) Mass (d) Electrostatic force
- Q.2** (a) Calculate the polarisability and relative permittivity in hydrogen gas with a density of 9.8×10^{26} atom/m³. Given radius of the hydrogen atom to be 0.50Å. **03**
 (b) Deduce clausis-Mossotti equation. **04**
 (c) (1) State any four factors affecting the acoustics of the building and give at least two remedies for each. **04**
 (2) Compare Hard and Soft Magnetic materials. **03**
- Q.3** (a) An ultrasonic source of 0.07 MHz sends down a pulse towards the seabed which returns after 0.65 sec. The velocity of sound in water is 1700 m/s. Calculate the depth of the sea and wavelength of pulse. **03**
 (b) Discuss the properties of superconductors. **04**
 (c) Explain the different types of fibers based on materials, mode and index profile. **07**
- Q.4** (a) The reverberation time is found to be 1.5 sec for an empty hall and it is found to be 1.0 sec when a curtain cloth of 20 m² is suspended at the centre of the hall. If the dimension of the hall are 10×8×6 m³. Calculate the coefficient of absorption of curtain cloth. **03**
 (b) Define piezoelectric effect and draw the circuit diagram of piezoelectric oscillator and explain the production of ultrasonic waves using it. **04**
 (c) (1) Describe the construction and working of Nd: YAG Laser with a suitable energy level diagram. **04**
 (2) List out the properties and application of Metallic glasses. **03**
- Q.5** (a) A refractive index of core for step index fiber is 1.52, diameter is 2.9 μm and a fractional difference of refractive index is 0.0007. It is operated at a wavelength of 1.3 μm. Find the number of modes the fiber will support. **03**
 (b) Explain the producer of data recording and reading in magnetic tape. **04**
 (c) (1) Describe the Ball milling method to produce nano-particles. **04**
 (2) Compare Type-I and Type-II superconductors. **03**
- Q.6** (a) Discuss in detail the quantum confinement. **03**
 (b) With a neat sketch explain how a CNT is synthesized using chemical vapour deposition technique. **04**
 (c) What is the shape memory Alloys (SMA)? Explain the temperature induced and stress induced transformations in detail. **07**
- Q.7** (a) What is solar cell? Discuss a few materials that are used in solar cell design. **03**
 (b) Explain briefly the carbon nanotubes (CNT) and their different structure. **04**
 (c) (1) A paramagnetic material has a magnetic field intensity of 10^4 A/m. If the susceptibility of the material at room temperature is 3.7×10^{-3} , calculate the magnetization and flux density of the material. **03**
 (2) Define the term (1) Dielectric constant (2) Magnetic susceptibility (3) Pumping (4) Total internal reflection **04**
