Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER– 1st / 2ndEXAMINATION (NEW SYLLABUS) – SUMMER- 2018

Subject Code: 2110011 Date: 18-05-2018

Subject Name: Engineering Physics

Time: 02:30 pm to 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) **Marks**

(a) **07**

1. Electric dipole moment per unit volume is known as ……

(a) Electric Field (b) Electric Polarization

(c) Dielectric Constant (d) Electric Permittivity

2. Susceptibility of Diamagnetic substances is ……

(a) Negative (b) Positive

(c) Infinite (d) None of these

3. Which of the following is Weber-Fechner's law?

(a) $L = K \log_{10} I$ (b) $I = K \log_{10} L$

(c) $L^2 = K \log_{10} I$ (d) $I^2 = K \log_{10} L$

4. The complete expulsion of magnetic field by a superconductor is known as ……

(a) Einstein's Effect (b) Newton's Effect

(c) Meissner's Effect (d) Curie's Effect

5. Emission of light in presence of external energy (photon) is known as ……

(a) Induced Absorption (b) Spontaneous Emission

(c) Stimulated Emission (d) Population Inversion

6. If the grain size of materials is ……. then they are known as nano materials.

(a) 1 to 100 cm (b) 1 to 100 mm

(c) 1 to 100 km (d) 1 to 100 nm

7. NDT means ……

(a) Nano Detection Test (b) Non-Destructing Test

(c) Non Demanding Test (d) Nano Density Test

(b) **07**

1. Unit of electric dipole moment is …….

(a) coulomb • volt (b) coulomb • ampere

(c) farad • ampere (d) coulomb • meter

2. Hysteresis loop for hard ferromagnetic substances is ……..

(a) narrow (b) broad

(c) cannot say (d) None of these

3. Full form of SONAR is …….

(a) Sound Negative and Radiation

(b) Solar Navigation and Radiation

(c) Sound Navigation and Ranging

(d) Solar Negative and Ranging

4. Optical Fiber works on the principle of …… of light.

(a) Scattering (b) Refraction

(c) Dispersion (d) Total Internal Reflection

5. If f is the frequency for ultrasonic waves then,

(a) $f > 20$ kHz (b) $f < 20$ Hz

(c) $20 \text{ Hz} < f < 20$ kHz (d) none of these

6. Solar cell converts …….. energy into ……. energy.

(a) electric, solar (b) chemical, solar

(c) solar, electrical (d) solar, chemical

7. A junction formed by two superconductors with a very thin strip of an insulator is called ……

(a) P-N Junction (b) Transistor Junction

(c) Josephson Junction (d) Bipolar Junction

Q.2 **(a)** Derive Clausius-Mossotti equation. **04**

(b) Write and discuss characteristics of musical sound. **03**

(c) With neat diagram describe the construction and working of Nd-YAG laser. Also write applications of it. **07**

Q.3 **(a)** Write any three properties of superconductors. **03**

(b) The volume of a room is 2500 m^3. The wall area of the room is 330 m^2, the floor area is 165 m^2, and the ceiling area is 165 m^2. The average sound absorption coefficient (*i*) for wall is 0.025; (*ii*) for the ceiling is 0.75; and (*iii*) the floor is 0.05. Calculate the average sound absorption coefficient and reverberation time. **04**

(c) Write general properties of diamagnetic, paramagnetic and ferromagnetic materials. **07**

Q.4 **(a)** Define following terms: **03**

(*i*) Magnetic dipole moment (*ii*) Magnetization (*iii*) Bohr magneton

(b) Write any four points of comparison between Type–I and Type-II superconductors. **04**

(c) Derive formula for acceptance angle and numerical aperture for the light transmission in optical fiber. **04**

(d) A silica optical fiber has a core of refractive index 1.58 and a cladding of refractive index 1.46. Determine (*i*) the critical angle at the core-cladding Interface (*ii*) the numerical aperture for the fiber and (*iii*) the acceptance angle in the air for the fiber. **03**

Q.5 **(a)** What is full form of LASER? Write characteristics of LASER light. **03**

(b) Write any four applications of Shape Memory Alloys (SMAs). **04**

(c) With neat diagram describe construction, working, merits and demerits of Magnetostriction Generator. **07**

Q.6 **(a)** Discuss in brief Solid, Liquid and Gaseous dielectrics. **03**

(b) Write any four properties of nanomaterials. **04**

(c) Write note on following methods of the synthesis of nano materials: **07**

(*i*) Sol-Gel method (*ii*) Ball Milling method

Q.7 **(a)** What are metallic glasses? State types of metallic glasses and discuss melt spinning technique for preparation of metallic glasses. **07**

(b) An ultrasonic source of 0.05 MHz sends down a pulse towards the seabed which returns after 0.55 s. The velocity of sound in water is 1500 m/s. Calculate depth of the sea and wavelength of the pulse. **04**

(c) Calculate polarisability of hydrogen atom. The radius of the hydrogen atom is 0.053 nm. **03**

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