

GUJARAT TECHNOLOGICAL UNIVERSITY
SPFU-SEMESTER-1st/ 2nd EXAMINATION-Summer 2018**Subject Code: BSP001****Date: 18-05-2018****Subject Name: Engineering Physics****Time: 02:30 to 05:30****Total Marks: 70****Instructions:**

1. Attempt any five questions
2. Make suitable assumptions whenever necessary
3. Figures to the right indicate full marks.

- Q.1 (a)** With neat diagram describe the construction working and applications of Nd:YAG laser. **07**
- (b)** Write any four points of difference between step index and graded index fibre. **04**
- (c)** An optical fibre core and its cladding have refractive indices of 1.55 and 1.46 respectively. Calculate the critical angle Φ_C , acceptance angle $\Phi_{in(max)}$ and numerical aperture. **03**
- Q.2 (a)** With neat diagram describe the construction and working of Piezo-electric Generator. **07**
- (b)** Write and discuss characteristics of musical sound. **04**
- (c)** An ultrasonic wave of 0.07 MHz sends down a pulse towards the seabed, which returns after 0.65 s. The velocity of sound in seawater is 1700 m/s. Calculate the depth of sea and wavelength of pulse. **03**
- Q.3 (a)** Give brief explanation about different types of magnetic materials. **07**
- (b)** Write note on angular momentum of a rigid body. **04**
- (c)** Give brief explanation about damped oscillations and resonance. **03**
- Q.4 (a)** Write points of comparison between type-I and type-II superconductors. **07**
- (b)** List the important properties and applications of CNTs. **07**
- Q.5 (a)** What is Meissner effect? Show that superconductor exhibits perfect diamagnetism. **07**
- (b)** The critical magnetic field at 5×10^3 A/m in a superconductor ring of radius 0.02 m. Find the value of critical current. **03**
- (c)** Define (i) Nano-science and (ii) Nanotechnology. **04**
- Q.6 (a)** What are called reverberation and reverberation time? Write Sabine's formula of reverberation time and explain each term. **05**
- (b)** Write the full form of LASER. **02**
- (c)** What are carbon nanotubes (CNTs)? Explain briefly the carbon nanotubes and their different structures. **07**
- Q.7 (a)** Write and discuss the factors affecting acoustics of buildings and their remedies. **07**
- (b)** Calculate the atomic polarizability of neon. At NTP, the dielectric constant of neon is 1.0025 and its atomic density is 3.54×10^{25} atoms/m³. Take $\epsilon_0 = 8.85 \times 10^{-12}$ C² / (N m²). **04**
- (c)** Initial angular speed of a wheel is 10 rad / s. Its angular displacement in 5 s is 80 rad. Find total angular displacement of the wheel from the beginning to the time till it stops? **03**