No.: Enrolment No.:_____

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/m^3. Take $\varepsilon_0 = 8.85 \times 10^{-12}$ C^2 / (N m^2).	**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**