FY B. Tech	School of Technology	Semester II
FYT 102	Applied Physics	Max Marks: 100
May 2018	End Semester Examination (ESE)	Time: 3 Hrs.

23/5/2018
10:30 AM To 1:30 PM.

Instructions for Students: 1) All Questions are compulsory.
2) Figures to the right indicate full marks.
3) Use of scientific calculator is allowed.

		Marks	CO
Q.1.	Attempt any three from the following questions		
a.	What is architectural acoustic? Explain any five factors affecting architectural acoustics of a building.	6	CO1
b.	What is piezoelectric effect? With neat labeled circuit diagram explain how ultrasonic waves are generated by using piezoelectric oscillator.	6	CO1
c.	Write any five applications of ultrasonic waves.	5	CO1
d.	Solve the following example: A class room has dimensions $20 \times 15 \times 5$ m^3, the reverberation time is 3.5 sec. Calculate the total absorption of surfaces and average absorption coefficient.	5	CO1
Q.2	Attempt any three from the following questions		
a.	Explain the terms i) stimulated emission ii) spontaneous emission iii) Population inversion.	6	CO2
b.	State industrial and medical applications of laser.	6	CO2
c.	Explain the types of optical fibers.	5	CO2
d.	An optical fiber has a NA = 0.20 and cladding refractive index of 1.59. Determine the acceptance angle for the fiber in water which has a refractive index of 1.33.	5	CO2
Q.3.	Attempt any three from the following questions		
a.	What is plane transmission grating? Derive the relation $\text{Sin}\theta = N.n.\lambda$ for plane diffraction grating. (The symbols have usual meaning).	6	CO3
b.	Define double refraction. Give four points of differences between negative and positive crystals.	5	CO3
c.	Explain the use of Laurent's half shade polarimeter to measure the specific rotation of the optical active substance.	5	CO3

d.	i) A tube of sugar solution 20 cm long is placed between crossed Nicols and illuminated with a monochromatic light. If the optical rotation produced is 13° and specific rotation is 65°. Determine the concentration of solution.	2	CO3
	ii) What is the highest order spectrum which can be seen with monochromatic light of wavelength 6000Å by means of a diffraction grating with 5000 lines/ cm?	3	CO3

Q.4		Attempt any three from the following questions		
	a.	Explain de Broglie's hypothesis of matter wave.	5	CO4
	b.	Define matter wave. Derive an expression for the wavelength of matter wave for a particle moving with kinetic energy "E".	6	CO4
	c.	State and explain Heisenberg's uncertainty principle.	5	CO4
	d.	i) Calculate change in wavelength due to Compton scattering at an angle of 30°. (Given $h = 6.625 \times 10^{-34}$ J.s, $c = 3 \times 10^8$ m/s, $m_o = 9.11 \times 10^{-31}$ Kg).	3	CO4
		ii) X-ray photon of wavelength 1.24 Å scattered through an angle of 60° to the direction of incidence. Find the Compton shift. (Given $h = 6.625 \times 10^{-34}$ J.s, $c = 3 \times 10^8$ m/s, $m_o = 9.11 \times 10^{-31}$ Kg).	3	CO4

Q.5		Attempt any three from the following questions		
	a.	What are ferromagnetic materials?	6	CO5
	b.	Explain hysteresis loop in case of ferromagnetic materials.	5	CO5
	c.	State applications of magnetic materials.	5	CO5
	d.	Explain the terms i) magnetic flux density ii) magnetic susceptibility iii) relative permeability.	6	CO5

Q.6		Attempt any three from the following questions		
	a.	Define atomic radius. Obtain its value for Sc, BCC and FCC crystals.	6	CO6
	b.	Define unit cell and co-ordination number. Obtain co-ordination number value for SC, BCC and FCC crystals.	5	CO6
	c.	Define centre of symmetry. Explain axis of symmetry in case of cubic crystal.	5	CO6
	d.	i) Calculate the longest wavelength that can be analyzed by rock salt crystal of spacing d = 2.82° in the first order.	2	CO6
		ii) A crystal plane cuts at 3a, 4b, 2c along the three axes. Determine the Miller indices of the given plane.	3	CO6

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