Total No. of Questions – [5] Total No. of Printed Pages : 3

G.R. No.	

Paper Code - U127-105A (RE-FF FS)

JUNE : **2018 /** RE-EXAM

F. Y. B. TECH. (COMMON) (SEMESTER - II)

COURSE NAME: Engineering Physics

Course code: ES10175A

(2017 PATTERN)

Time: [**2 Hours**] [Max. Marks: **50**]

Instructions to candidates:

1) **Answer Q.1 OR Q.2, Q.3 OR Q.4 and Q.5**
2) **Figures to the right indicate full marks.**
3) **Use of scientific calculator is allowed**
4) **Use suitable data wherever required**

Q1 a) Explain the construction and working of Carbon-dioxide LASER. [6]

b) State the characteristics of LASER beam and explain the "Directionality" in details. [6]

c) Find the intensity of a LASER beam of 20mW power, having a beam diameter of 2mm. [4]

OR

Q2 a) What is a numerical aperture? Derive an expression for it. Show that it is independent of core diameter. [6]

b) State six different applications of LASER and explain any one industrial application of LASER. [6]

c) An optical fiber has R.I. of core and cladding as 1.62 and 1.57 respectively. Calculate the acceptance angle for the fiber in water having R.I. of 1.26. [4]

Q3 a) Normalize the wave function $\psi = A\sin(kx)$ for a particle in a rigid box of length L. Plot the wave function and probability density in the ground state and first excited state. Hence interpret the results. [6]

b) Plot the Binding energy curve and discuss its significance with respect to stability of the nucleus. [4]

c) What is nuclear fusion? Calculate the energy released in a thermo-nuclear reactor in which 1.0×10^{-3} kg of Hydrogen is converted to 0.993×10^{-3} kg of Helium. [4]

OR

Q4 a) Explain construction and working of Fission Nuclear reactor. [6]

b) Explain properties of matter waves. [4]

c) State and explain any two pros and cons of nuclear energy. [4]

Q.5 Attempt following multiple choice questions:[1x20=20 marks]

a) The unit of Loudness of sound is [1]

i)Phone ii) W/m^2

iii)N/m^2 iv) m/s

b) Sound waves with frequency more than 20000Hz are called as [1]

i)Hypersonic ii)Ultrasonic

iii)Supersonic iv)Infrasonic

c) Pain threshold for intensity level of sound is at [1]

i)12 dB ii)120 dB

iii)1200 dB iv)none of the above

d) Sound wave is a [1]

i)transverse wave ii)longitudinal wave

iii)electromagnetic wave iv)matter wave

e) Velocity of sound is [1]

i)greater than velocity of light. ii)less than velocity of light.

iii)equal to velocity of light. iv)all of the above

f) For constructive interference to occur the path difference is in the integer multiple of [1]

i) λ ii) $\lambda/2$

ii) $\lambda/3$ iv) $\lambda/4$

g) A single slit of width 10000 A.U. is illuminated by a light of wavelength 5000 A.U. The first minimum will be obtained at [1]

i)15^0 ii)45^0

iii)30^0 iv)60^0

h) The interference in thin films is due to [1]

i)division of wave front ii)division of amplitude

iii)both i) and ii) iv)none of the above

i) Formation of multiple spectra is possible using [1]

i)prism ii)grating

iii)single slit iv)all of the above

j) The colours on soap baubles are due to [1]

i) polarization ii)diffraction

iii)elusion iv)interference.

k) The energy gap between valance band and conduction band is called [1]

i) Fermi energy ii) solar energy

iii) nuclear energy iv) band gap energy.

l) Silicon and Germanium are sensitive to [1]

i) microwave radiations ii) infrared radiations

iii) heat radiations iv) all of the above.

m) The significance of zero band gap energy is [1]

i) Insulator ii) Semiconductor

iii)conductor iv) all of the above

n) Fermi function says about distribution of electrons over [1]

allowed range of

i) energy ii)temperature

iii) time iv)none of the above

o) Given that band gap energy of Silicon and Germanium is [1]
1.1eV and 0.7eV, respectively, implies that

i) conductivity of Silicon is more than conductivity of Germanium.

ii) conductivity of Silicon is less than conductivity of Germanium.

iii)conductivity of Silicon is equal to conductivity of Germanium.

iv)none of the above.

p) The Fill factor of solar cell is equal to [1]

i)Vm.Im/Voc.Isc ii) Voc.Isc / Vm.Im

iii) Vm.Im iv) Voc.Isc

q) Solar cells have become popular because [1]

i)solar energy is freely available ii)rechargeable

iii)no pollution at the place of generation. iv)all of the above.

r) To increase power o/p from solar cell, they are to be connected in [1]

i)series ii)parallel

iii)both i) and ii) iv)none of the above.

s) The working principle of Solar cell is [1]

i) photovoltaic effect. ii) photoconductive effect.

iii) photo emissive effect iv) none of the above.

t) The mismatch of solar cells may result into [1]

i) heating effect ii) producing hot spots

iii)damaging the cell iv) all of the above