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**

Q. no.		Question	Marks	Distribution	DL	BT	CO
Q1	a)	Explain the construction and working of Carbon-dioxide LASER.	[6]	Construction with figure – 2+1 Working with energy level 2+1	M	K, C	5
	b)	State the characteristics of LASER beam and explain the "Directionality" in details.	[6]	State 4 characteristics – 2M Directionality – 4M	M	K, C	5
	c)	Find the intensity of a LASER beam of 20mW power, having a beam diameter of 2mm.	[4]	$I = P/(\pi d^2/4)$ $= 20\times10^{-3} / (\pi(2\times10^{-3})^2/4)$	L	A	5
Q2	a)	What is a numerical aperture? Derive an expression for it. Show that it is independent of core diameter.	[6]	What is – 1M Derive – 4M Show – 1M	M	K, C	5
	b)	State six different applications of LASER and explain any one industrial application of LASER.	[6]	State six – 3M Explain – 3M	M	K, C	5
	c)	An optical fiber has	[4]		M	A	5

		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.					
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 result.	[6]	Normalization – 3M Plot – 1+1 Interpret – 1M	M	K, C	6
	b)	Plot the Binding energy curve and discuss its significance with respect to stability of the nucleus.	[4]	Plot -1M Discuss – 3M	H	K, C	6
	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]	What – 1M $E = \Delta mc^2$	M	A	6
Q4	a)	Explain construction and working of Fission Nuclear reactor.	[6]	Construction and working – 5M diagram 1M	M	K, C	6
	b)	Explain properties of matter waves.	[4]	1 M each	M	K, C	6
	c)	State and explain any two pros and cons of nuclear energy.	[4]	1M each	M	K, C	6

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

a)		[1]	i)	M	K	1
b)		[1]	ii)	L	K	1
c)		[1]	ii)	M	K	1
d)		[1]	ii)	M	K	1

e)		[1]	ii)	M	K	1
f)		[1]	i)	M	K	2
g)		[1]	iii)	M	A	2
h)		[1]	ii)	M	K	2
i)		[1]	ii)	H	K	2
j)		[1]	iv)	M	K	2
k)		[1]	iv)	M	K	3
l)		[1]	iv)	M	K	3
m)		[1]	iii)	M	K	3
n)		[1]	i)	M	K	3
o)		[1]	ii)	H	K	3
p)		[1]	i)	M	K	4
q)		[1]	iv)	M	K	4
r)		[1]	iii)	M	K	4
s)		[1]	i)	M	K	4
t)		[1]	iv)	M	K	4