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Code No: R161204 **R16** SET - 1

I B. Tech II Semester Regular Examinations, April/May - 2017
ENGINEERING PHYSICS
(Com. to CE, ME, CHEM, AE, BIO, AME, MM, PE, PCE, MET)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
2. Answering the question in **Part-A** is Compulsory
3. Answer any **FOUR** Questions from **Part-B**

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PART –A

1.	a)	Why two different light sources can't act as coherent sources?	(2M)
	b)	Why diffraction of light is not evident in daily life?	(2M)
	c)	Define O-ray and E-ray.	(2M)
	d)	How is laser different from an ordinary light?	(2M)
	e)	What is reverberation time?	(2M)
	f)	Draw (110) & (211) planes in a cubic crystal.	(2M)
	g)	Why magnetic susceptibility of dia magnetic materials is negative?	(2M)

PART –B

2.	a)	Explain the formation of Newton's rings and derive the expression for diameter of the dark rings in the reflected light. Also show that rings are not equally spaced.	(10M)
	b)	In a Newton's rings experiment, the diameters of 5^{th} and 15^{th} dark rings are 0.336cm and 0.59cm respectively. If the radius of curvature of plano-convex lens is 100cm, find the wavelength of monochromatic light. What happens to ring diameters if air film is replaced with liquid of refractive index 1.33.	(4M)
3.	a)	What is plane diffraction grating? Obtain an equation to find the wavelength of light using plane diffraction grating. What are the advantages of increasing number of lines in a grating?	(10M)
	b)	Write the differences between interference and diffraction.	(4M)
4.	a)	Explain the principle, construction and working of Nicol prism. Describe how it can be used as polarizer.	(7M)
	b)	Write the differences between spontaneous and stimulated emissions? What is the necessity of population inversion in achieving lasing action?	(7M)
5.	a)	What are ultrasonics? Explain a method with a neat diagram to produce ultrasonics.	(10M)
	b)	Explain the basic requirements of acoustically a good hall.	(4M)
6.	a)	What are Miller indices? How they are obtained? What is their importance?	(7M)
	b)	What is Nuclear fission? Explain about the chain reactions.	(7M)
7.	a)	What are ferromagnetic materials? Discuss their properties and applications.	(6M)
	b)	Calculate the expression for internal field of a dielectric material.	(8M)

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Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
2. Answering the question in **Part-A** is Compulsory
3. Answer any **FOUR** Questions from **Part-B**

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PART –A

1.	a)	Write any two applications of Newton's rings.	(2M)
	b)	Write any two differences between interference and diffraction.	(2M)
	c)	What is the difference between unpolarized and polarized light?	(2M)
	d)	What is the role of a metastable state in lasers?	(2M)
	e)	Write any two applications of ultrasonics.	(2M)
	f)	Silver has FCC structure and iron has BCC structure. Identify which one has primitive unit cell.	(2M)
	g)	Define dielectric loss and dielectric strength.	(2M)

PART –B

2.	a)	Why circular fringes are observed in Newton's rings? Explain the procedure for determination of wavelength of a monochromatic light using Newton's rings experiment. Which method (Newton's rings or Interferometer) is better to find the wavelength of monochromatic light? Why?	(10M)
	b)	Describe the method to determine refractive index of a material using Newton's rings.	(4M)
3.	a)	Explain the Fraunhoffer diffraction due to single slit. Obtain the conditions for maxima and minima.	(10M)
	b)	In the diffraction grating, what is effect of total number of lines and width of grating on the spectrum.	(4M)
4.	a)	With a neat diagram, explain the construction and working of He-Ne laser.	(10M)
	b)	Explain any two methods to produce plane polarized light.	(4M)
5.	a)	Explain in detail the Non destructive testing (NDT) using ultrosonics.	(4M)
	b)	Derive Sabine's formula for reverberation time.	(10M)
6.	a)	Derive the relation between interplanar distance and Miller indices of the planes of a cubic crystal.	(10M)
	b)	Silver has FCC structure and its atomic radius is 1.441Å. Find the spacing of (220) planes.	(4M)
7.	a)	Classify the magnetic materials in atomic point of view.	(4M)
	b)	What is dielectric breakdown? Explain different kinds of dielectric breakdown mechanisms.	(10M)

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Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
2. Answering the question in **Part-A** is Compulsory
3. Answer any **FOUR** Questions from **Part-B**

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PART –A

1.	a)	Write the principle of Superposition.	(2M)
	b)	In a Newton's rings experiment, why we choose a plano convex lens of larger radius of curvature?	(2M)
	c)	Define Mass defect and binding energy.	(2M)
	d)	What is a quarter wave plate?	(2M)
	e)	What is meant by non-destructive testing?	(2M)
	f)	Define the terms primitive and non-primitive unit cells.	(2M)
	g)	What are ferroelectrics?	(2M)

PART –B

2.	a)	Why the Newton's rings are circular and central fringe is dark? Show that fringes are unequally spaced. Explain the determination of wavelength of monochromatic light using Newton's rings experiment.	(10M)
	b)	In Michelson's interferometer 200 fringes crossed the field of view when the movable mirror is displaced through a distance of 0.0589mm. Find the wavelength of light used.	(4M)
3.	a)	Explain the Fraunhofer's diffraction due to a double slit. Explain the intensity distribution curve.	(10M)
	b)	Write the differences between Fresnel's and Fraunhoffer's diffractions.	(4M)
4.	a)	Explain the construction and working of a polarimeter.	(7M)
	b)	Describe the construction and working of Ruby laser with a neat energy level diagram.	(7M)
5.	a)	Write notes on absorption coefficient of a material and its measurement.	(7M)
	b)	Explain the production of ultrasonics by any one method.	(7M)
6.	a)	What are Miller indices? Explain their role in the crystal structures. Draw the crystal planes having Miller indices (100), (111), (211).	(10M)
	b)	Write about controlled and uncontrolled chain reactions.	(4M)
7.	a)	Explain the hysteresis of ferromagnetic materials. How it can be used to select materials for construction of permanent magnets?	(9M)
	b)	What are ferroelectric materials? How they are different from dielectric materials?	(5M)

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Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answering the question in **Part-A** is Compulsory
3. Answer any **FOUR** Questions from **Part-B**

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PART –A

1. a) Why the central fringe is dark in Newton's rings experiment? (2M)
   b) What is diffraction grating? (2M)
   c) What is difference between Polarimeter and Saccharimeter? (2M)
   d) Write any two industrial applications of ultrasonics. (2M)
   e) Lead is face centered cubic with atomic radius of 1.746Å. Calculate the interplanar spacing of (200) plane. (2M)
   f) Explain the Hysteresis of Ferro magnetic materials. (2M)
   g) Define dielectric constant and dielectric loss. (2M)

PART –B

2. a) What is thin film? Derive the expressions for maxima and minima for reflected light in case of transparent film of uniform thickness. (10M)
   b) What will happen if the plano convex lens in the Newton's rings experiment is lifted up by $\lambda/2$, where λ is wavelength of monochromatic light used? (4M)

3. a) What is resolving power of a grating? Obtain an expression for resolving power of a diffraction grating and prove that it is independent of grating element. (10M)
   b) Calculate the maximum order of diffraction possible with a plane transmission grating having 15000 lines/inch and light of wavelength 6000 Å. (4M)

4. a) Explain the principle, construction and working of Nicol prism. (6M)
   b) Explain construction and working of He-Ne laser with a neat energy level diagram. (8M)

5. a) State and explain the acoustic requirements of a concert hall. (4M)
   b) Explain the production of ultrasonics by Magnetostriction method. Write its merits and demerits. (10M)

6. a) State and derive Bragg's law. Calculate the longest wavelength that can be analyzed by rock salt crystal of spacing 2.82 Å in the first order. (10M)
   b) Distinguish between fission and fusion reactions. Explain. (4M)

7. a) Discuss temperature dependence of susceptibility of para and ferro magnetic materials. (4M)
   b) Derive Clasius-Mossoti relation. Calculate the ratio between electronic and ionic polarizability of a dielectric having ε= 4.94 and n^2=2.69. Where 'ε' is dielectric constant and 'n' is refractive index. (10M)

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