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

I B. Tech II Semester Regular/Supplementary Examinations, April/May - 2018
ENGINEERING PHYSICS
(Com. to CE, ME, CHEM, AE, BIO, AME, Min E, 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**

~~~~~~

PART –A

1. a) What are coherent sources? (2M)
b) Define Fraunhofer diffraction. (2M)
c) What is the difference between polarised and unpolarised light? (2M)
d) Define the term reverberation time. (2M)
e) What are the lattice parameters for a unit cell? (2M)
f) What is mass defect? (2M)
g) What paramagnetic materials? Give examples. (2M)

PART -B

2. a) Describe construction and working of Michelson interferometer. Explain the formation of various fringes in it. (10M)
b) Calculate the distance between successive positions of movable mirror of Michelson's interferometer giving best fringes in case of a sodium source having wavelengths 5896A^o and 5890A^o. What will be the change in path difference between two successive reappearances of the interference pattern? (4M)

3. a) Explain the resolving power of a microscope. Deduce and discuss an expression for it. (10M)
b) A microscope is used to resolve two self – luminous objects separated by a distance 4.0×10^{-5} cm. if the wavelength of light is 5461A^o, compute the numerical aperture of the objective. (4M)

4. a) Describe Nicol prism, showing clearly how it is constructed and what is its action. (10M)
b) Calculate the specific rotation if the plane of polarisation is turned through 26.4^o traversing 20cm length of 20% sugar solution. (4M)

5. a) Explain how ultrasonic waves can be produced by Magnetostriction oscillator method. Also mention its advantages. (10M)
b) Calculate the frequency of ultrasonics waves using the data: thickness of quartz plate $= 5.5 \times 10^{-3}$m. (4M)

6. a) Describe the procedure for finding the miller indices. Show that for a cubic lattice, the distance between two successive planes is given by $d = \frac{a}{\sqrt{h^2+k^2+l^2}}$. (10M)
b) The distance between (110) planes in a body cantered cubic structure is 0.203nm. What is the size of unit cell and radius of the atom? (4M)

7. a) Give the detailed discussion on various types of dielectric break down in dielectric materials. (8M)
b) Explain how the local field is calculated for a cubic structure. (6M)
~~~~~~

Code No: R161204 **R16** SET - 2

I B. Tech II Semester Regular/Supplementary Examinations, April/May - 2018
ENGINEERING PHYSICS
(Com. to CE, ME, CHEM, AE, BIO, AME, Min E, 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**

~~~~~~

PART –A

1. a) Define dielectric loss and dielectric break down. (2M)
   b) Write any two applications of Michelson's interferometer. (2M)
   c) Write Packing factor for BCC and FCC structures. (2M)
   d) Mention any two differences between fission and fusion processes. (2M)
   e) What are the differences between Piezoelectric and Magnetostriction methods? (2M)
   f) What are the characteristics of laser? (2M)
   g) Mention limitations of Nicol Prism. (2M)

PART -B

2. a) Give the theory of Newton's rings. Describe the experiment to determine the wavelength of monochromatic light using Newton's rings. (10M)
   b) In Newton rings arrangement a source is emitting two wavelengths $\lambda_1=6\times10^{-7}$m and $\lambda_2=5.9\times10^{-7}$m. It is found that n^{th} dark ring due to one wave length coincides with $(n+1)^{th}$ dark ring due to other. Find the diameter of n^{th} dark ring if the radius of curvature of the lens is 0.9m. (4M)

3. a) Explain in detail diffraction due to double slit and draw the intensity distribution curve. (8M)
   b) Calculate the missing orders in a double slit Fraunhofer diffraction pattern, if the widths of slits are 0.08×10^{-3} m and they are 0.4×10^{-3} m. (6M)

4. a) Explain the construction and working principle of He-Ne Laser with energy level diagram. What are the merits of He-Ne Laser? (8M)
   b) Deduce the between Einstein's coefficients. (6M)

5. a) What is non-destructive testing? Explain with principle how flaw in a solid can be detected by non-destructive method using ultrasonics. (8M)
   b) Derive Sabine's formula for reverberation time of a hall. (6M)

6. a) Explain phenomena of nuclear fission. Describe the physical process involved in the release of energy in the nuclear fission reaction. (7M)
   b) Distinguish between the nuclear fission and fusion reactions. (7M)

7. a) Explain the behaviour of diamagnetic, paramagnetic and ferromagnetic materials from the atomic point of view. (9M)
   b) A magnetic material shows net magnetisation of 3000A/m and induced magnetic field of 0.005 Wb/m^2. Calculate the intensity of magnetising field and permeability of the material. (5M)
~~~~~~

Code No: R161204 **R16** SET - 3

I B. Tech II Semester Regular/Supplementary Examinations, April/May - 2018

ENGINEERING PHYSICS

(Com. to CE, ME, CHEM, AE, BIO, AME, Min E, 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**

~~~~~~

PART –A

1. a) What are the conditions for sustained inference of light? (2M)
b) What is the Rayleigh criterion of resolution? (2M)
c) What are the characteristics of Laser? (2M)
d) What is magnetostriction method? (2M)
e) Define binding energy. (2M)
f) Define coordination number and atomic packing factor. (2M)
g) Write the properties of ferroelectric materials. (2M)

PART -B

2. a) Explain the construction and working of Michelson interferometer. Explain clearly the formation of circular. (8M)
b) A thin film with refractive index 1.58 for light wavelength 5890A^o is placed in one arm of a Michelson interferometer. If there is a shift 20 fringes (6M)

3. a) Qualitatively analyse the spectrum obtained when a plane diffraction grating is exposed to monochromatic light of wavelength λ. (8M)
b) A grating has 6000 lines/cm. Find the angular separation between two wavelengths of 500nm and 510nm in the 3rd order. (6M)

4. a) Describe working principle of Sacharimeter and explain how it is used in measuring the strength of a sugar solution. (7M)
b) Explain how a quarter wave plate and half wave plate could be constructed. Describe their properties. (7M)

5. a) Explain in detail how the ultrasonic pulse technique is used for non destructive testing materials. (8M)
b) Discuss magnetostriction versus piezoelectric transducers for power ultrasonic applications. (6M)

6. a) Derive Bragg's law and give its significance. (7M)
b) Explain the terms mass defect, nuclear fusion and nuclear fission. Describe the functioning of a nuclear reactor. (7M)

7. a) How magnetic materials are classified based on magnetic field? Compare their properties. Give their characteristics and examples. (10M)
b) A magnetic material has a magnetization of 2300 A/m and produces a flux density of 0.00314 wb/m^2. Calculate magnetizing force and permeability of the material. (4M)
~~~~~~

Code No: R161204 **R16** SET - 4

I B. Tech II Semester Regular/Supplementary Examinations, April/May - 2018
ENGINEERING PHYSICS
(Com. to CE, ME, CHEM, AE, BIO, AME, Min E, 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**

~~~~~~

PART –A

1. a) Define electric polarization and electric susceptibility. (2M)
   b) What are paramagnetic materials? Give one example. (2M)
   c) What are miller indices and draw the plane for (111)? (2M)
   d) Define mass defect and binding energy. (2M)
   e) Define reverberation and reverberation time. (2M)
   f) Write any two medical applications of lasers. (2M)
   g) Write the path difference for quarter wave plate and half wave plate. (2M)

PART -B

2. a) Derive cosine law. Write down the conditions for brightness and darkness in the reflected system. (8M)
   b) The diameter of the 5^{th} bright ring in Newton's ring experiment is $4x10^{-3}$m. Find the radius of curvature of the lens used, if the wavelength of light is 589nm. (6M)
3. a) Explain Rayleigh's criterion for resolution. Obtain an expression for the resolving power of a diffraction grating. (8M)
   b) A grating of width 2 inches is ruled with 15000 lines per inch. Find the smallest wavelength separation that can be resolved in 2^{nd} order at a mean wavelength of 500nm. (6M)
4. a) Explain what are the Einstein transition probabilities. Obtain a relation between Einstein transition probabilities of spontaneous and stimulated emission of radiation. (8M)
   b) Describe the construction and working of ruby laser with a neat diagram. (6M)
5. a) Write down Sabine's formula. Explain the terms involve in it and describe the units of each of them. State the limitations of the formula. (7M)
   b) Discuss the important factors that affect the acoustics of a Hall and methods to maintain good acoustics. (7M)
6. a) Derive the expression for inter planar spacing 'd' between (hkl) planes of a cubic structure. (7M)
   b) Derive Bragg's law of crystal diffraction and give its significance. (7M)
7. a) Derive an expression for internal filed in a dielectric placed in field E. (7M)
   b) Deduce Claussius - Mossotti relation. (7M)

|''|''|||''|'''|||'|
~~~~~~