

1E2204Roll No. 075Total No of Pages: **4****1E2204****B. Tech. II Sem. (Main/Back) Exam., May - 2019
PY – 101 Engineering Physics****Time: 3 Hours****Maximum Marks: 80
Min. Passing Marks: 28****Instructions to Candidates:**

Attempt any **five** questions including Question No. 1, which is compulsory. All questions carry equal marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly. Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL2. NIL**Q.1 Compulsory, Answer for each sub-question be given in about 25 words. [8×2=16]**

- (a) When will you observe circular fringes in Michelson Interferometer?
- (b) What is phase retardation plate in polarization?
- (c) Define resolving power of an optical instrument.
- (d) What is Bragg's Law?
- (e) Write down Schrodinger's time dependent wave equation.
- (f) Define Coherence.
- (g) What is active medium in Laser?
- (h) Differentiate between photography and holography.

[1E2204]**Page 1 of 4****[2840]**

Q.2 (a) With schematic diagram, explain the construction and working of a Michelson's Interferometer. How will you use it to measure wavelength separation between two closely spaced spectral lines say D_1 and D_2 lines of sodium lamp? [2+2+2+2=8]

(b) Write short note on anti-reflection coating in interference. [4]

(c) When movable mirror in Michelson's interferometer is moved through a distance of 0.0589mm, a shift of 200 fringes is observed. What is wavelength of light used? [4]

Q.3 (a) What is plane transmission grating? Show that the intensity of light diffracted from a plane transmission grating is given by

$$I = I_0 \left(\frac{\sin \alpha}{\alpha} \right)^2 \left(\frac{\sin N\beta}{\sin \beta} \right)^2$$

Where the symbols have their usual meanings. [2+6=8]

(b) What is optical activity? Write the laws of optical activity of optically active solution. [2+2=4]

(c) Two crossed polaroids A and B are placed in the path of light beam. In between these a third polaroid C is placed whose plane of transmission makes an angle of 30° with the plane of transmission of the polaroid A. If the intensity of the unpolarized light incident on polaroid A is 32W/m^2 , then what will be the intensity of light emerging out of polaroid B? [4]

Q.4 (a) Based on band theory of solids, distinguish between conductors, semiconductors and insulators. [3]

(b) Explain Hall effect with suitable diagram. Show that the Hall coefficient R_H is given by $R_H = -\frac{1}{ne}$ where n is number of charge carriers per unit volume. [3+4=7]

(c) The first order diffraction is found to occur at a glancing angle of 9° . Calculate the wavelength of X-ray and the glancing angle for second order diffraction if the spacing between the adjacent plane is 2.51\AA . [3+3=6]

Q.5 (a) What is Compton scattering? Explain why Compton effect is not observed experimentally for visible rays. [2+2=4]

(b) Write down the Schrödinger's wave equation for a particle of mass m trapped in one-dimensional box of side a . Solve it for energy eigen values and eigen functions. [2+3+3=8]

(c) Show that the expectation values of position and momentum of a particle in 1-D box are $a/2$ and 0 respectively. Here a is the width of the box. [2+2=4]

Q.6 (a) What is spectral purity? Derive an expression for coherence length and coherence time in term of wavelength and frequency. [2+4=6]

- (b) How does an optical fibre function in transporting electromagnetic energy? Show that the numerical aperture of a step index fibre is given by -

$$NA = n_1 \sqrt{2\Delta}$$

Where the symbols have their usual meanings.

[2+4=6]

- (c) Calculate the numerical aperture and acceptance angle of optical fibre of refractive indices for core and cladding as 1.62 and 1.52 respectively.

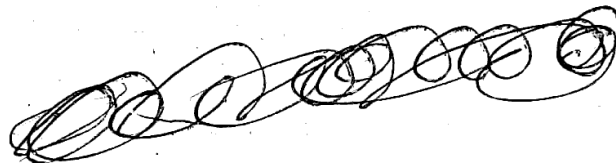
[2+2=4]

- Q.7 (a) What is meant by holography? Discuss construction and reproduction of hologram with suitable diagrams.

[2+3+3=8]

- (b) With a suitable diagram explain the construction and working of a semiconductor laser.

[4+4=8]



2E2306

2E2306

B. Tech. II Sem. (Main/Back) Exam., May - 2019
ME – 102 Basic Mechanical Engineering

Time: 3 Hours

Maximum Marks: 80
Min. Passing Marks: 28

Instructions to Candidates:

Attempt any **five** questions including Question No. 1, which is compulsory. All questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly. Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL

2. NIL

Q.1 Compulsory, Answers for each sub-question be given in about 25 words. [8×2=16]

- (a) State requirements of a good boiler.
- (b) Differentiate between centrifugal pump and reciprocating pump.
- (c) Why should the internal combustion engines be lubricated?
- (d) State the requirements of conditioned air.
- (e) What is the purpose of providing pattern allowances?
- (f) Explain the difference between forward and backward extrusion.
- (g) What are the advantages of a V-belt drive over a flat belt drive?
- (h) List the benefits of flexible manufacturing system.

[2E2306]

Page 1 of 3

[2040]

- Q.2 (a) Discuss in brief, advantages of high pressure boilers. [4]
 (b) Compare 'fire-tube' boiler with 'water-tube' boiler. [4]
 (c) Explain the working of closed cycle gas turbine with the help of neat sketch. [4]
 (d) List the type of wind mills and describe how they utilize wind energy? [4]
- Q.3 (a) Differentiate between single acting and double acting pumps. [4]
 (b) Briefly explain main components of an Internal Combustion engine. [4]
 (c) Compare 'Petrol engines' with 'Diesel engines'. [4]
 (d) Discuss various types of lubrication systems used in internal combustion engine. [4]
- Q.4 (a) Explain different types of gear trains with the help of neat sketches. [4]
 (b) What are the advantages of rope drives over belt drives? Explain in brief. [4]
 (c) Compare power transmission with gears with power transmission with belts. [4]
 (d) Discuss compound belt drive and stepped pulley drive with the help of neat sketch. [4]
- Q.5 (a) Explain vapour compression refrigeration system with the help of neat sketch. [4]
 (b) Explain important terms frequently used in air conditioning. [4]
 (c) What is a refrigerant? What are desirable properties of refrigerants? [4]
 (d) What is the difference between 'unitary air conditioning' and 'central air conditioning'? Explain in brief. [4]
- Q.6 (a) Discuss desirable properties of a good molding sand. [4]
 (b) Describe different operations in forging process. [4]
 (c) What is Brazing? Briefly explain common brazing methods? [4]
 (d) Explain any four operations that can be performed on a lathe machines with the help of neat sketches. [4]

- Q.7 (a) Why alloying elements are added to steels? Name any three alloying elements and their effect when they are added to steels. [4]
- (b) Differentiate between hardening and case hardening. List various case hardening processes. [4]
- (c) What are the functions of robot in manufacturing applications? What are the advantages of robots in manufacturing? [4]
- (d) What do you mean by Computer Numerical Control (CNC) machine? What are their advantages? [4]
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