

- Instructions :** - 1. All questions are compulsory.  
 2. Non programmable calculators are allowed.  
 3. Figures to the right indicate marks.

Q.1 Explain Newton's Laws of motion with examples. [8]

OR

Q.1 Describe the wood's machine and find it's expression. [8]

Q.2 What is compound pendulum? Derive an expression for it's time period. [8]

OR

Q.2 Explain moment of inertia and radius of gyration. Write Its unit and dimension [8]

Q.3 (a) Explain cardinal points for a lens system with suitable diagram. [4+4 = 8]

(b) Two thin convex lenses of focal length 12cm & 4cm are separated by distance of 8cm . Determine the position of first & second principal point & focus.

OR

Q.3 What is interference of light ? Derive an expression for a intensity in a Young's double slit experiment . [8]

Q.4 Answer the following: [1 x 4 = 4]  
 (A) Choose correct option in the following questions

i) Newton's second law is as  
 a)  $F=ma$                       b)  $P=ma$   
 c)  $E=mc$                       d)  $P=mv$

ii) Law of inertia is called ;  
 a) Newton's first Law                      b) Newton's second Law  
 c) Newton's third Law                      d) None of these

iii) The radius of gyration is denoted as ;  
 a) k                                  b) I  
 c) F                                  d) P

iv) The unit of surface energy is ;  
 a) Joule                              b) N-m  
 c) Kg-m                              d) None of these

(B)(i) Draw energy distribution curve for interference. [1]

(ii) What is chromatic aberration ? [1]

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Q.5 Derive an expression for clausius mean free path & derive an expression for work done in isothermal change. [8]

OR

Q.5 What is adiabatic change & prove that  $PV^\gamma = \text{constant}$ . [8]

Q.6 Derive an expression for intensity due to Fraunhoffer diffraction for double slit & draw it's energy distribution curve. [8]

OR

Q.6 State Brewster's law & explain in detail prism spectra & grating spectra. [8]

Q.7 What is fiber optics ? Explain its type & applications in detail. [8]

OR

Q.7 Explain the working of  $\text{CO}_2$  LASER and draw its energy level diagram. [8]

Q.8 Answer the following in short: [1 x 6 = 6]

- i) What is unit of Gas Constant ?
- ii) What is meant by isobaric process ?
- iii) What is grating element ?
- iv) What is meant by positive crystal ?
- v) Which pumping scheme is used in He-Ne laser ?
- vi) What is meant by critical angle ?

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