Reg. No. ☐☐☐☐☐☐☐☐☐☐

BSCPHC 153

Credit Based II Semester B.Sc. Degree Examination, September 2022
(2018-2019 and Earlier Batches)
PHYSICS
General Physics – II

Time : 3 Hours   Max. Marks : 80

Instructions :   *1) Answer questions from **all** Units.*

   *2) Answer to the multiple choice questions should be written in **first** page of the answer book **only**.*

   *3) **Scientific** calculator are allowed.*

PART – A

1. Answer the following questions by choosing the most appropriate
   answer :   **(10×1=10)**

   i) The ratio of lateral strain to linear strain within the elastic limits for a
      material is
      a) Young's modulus   b) Rigidity modulus
      c) Bulk modulus   d) Poisson's ratio

   ii) Stroke's law applicable only to
      a) Viscous force   b) Non viscous force
      c) Pure liquids   d) Solutions

   iii) Two photons travel in opposite directions in vacuum. The velocity of one
       photon with respect to another is
      a) 2C   b) Zero
      c) C   d) C^2

   iv) Is earth an inertial frame ?
      a) Yes   b) No
      c) Approximately yes   d) None of these

   v) Inertial frame of reference is the one
      a) A frame at rest   b) A frame with uniform velocity
      c) A frame which is unaccelerated   d) All of these

vi) Parsec is equal to

   a) 3.2 light years   b) 32 light years

   c) 0.32 light years   d) 320 light years

vii) At the time of big bang the universe was in the state of

   a) Low density and high temperature

   b) Low density and low temperature

   c) High density and low temperature

   d) High density and high temperature

viii) H-R diagram is plot of

   a) Luminosity versus temperature

   b) Mass versus colour

   c) Absolute magnitude versus composition

   d) Parallax versus radius

ix) Newton's formula for the velocity of sound was based on assumption that changes in the gas are

   a) Isothermal   b) Isobaric

   c) Isochoric   d) Adiabatic

x) In case of damped vibration, amplitude of the vibrating body

   a) Increase with time   b) Decay with time

   c) Remains constant   d) None of the above

2. Answer **any five** of the following :   **(5×2=10)**

  i) State Hooke's law. Explain it with a graph.

  ii) Define rigidity modulus. Mention the general expression for it.

  iii) Mention any two characteristics of fictitious force.

  iv) What is the principle adopted in Michelson-Morley experiment to detect ether ?

  v) State and explain virial theorem.

  vi) Write the equation for simple harmonic motion.

PART – B

Unit – I

3. a) Derive the expression for work done in stretching a wire. **4**

   b) Derive Poiseuille's formula for the steady rate of flow of liquid in a horizontal capillary tube. **6**

OR

4. a) What is viscosity ? Define coefficient of viscosity. Obtain the dimensional formula for the coefficient of viscosity. **4**

   b) Derive an expression for the bending moment of a beam. **6**

5. a) A cube of aluminum of side 0.1 m is subjected to a shearing force 100 N. The top surface of the cube is displaced by 0.01 cm with respect to bottom. Calculate the shearing stress, shearing strain and modulus of rigidity. **5**

OR

   b) Calculate the mass of water flowing in 15 minute through a tube of 0.001 m diameter and 0.5 m long, if there is a constant pressure head of 0.2 m. The coefficient of viscosity of water is 0.82×10^{-3} Nsm^{-2}. **5**

Unit – II

6. a) Obtain relativistic expression connecting energy and momentum. **4**

   b) Write Lorentz transformation equations. Deduce the expression for time dilation. **6**

OR

7. a) Explain Galliean invariance of space. **4**

   b) Obtain the relativistic law of addition of velocities. Show that the law reduces to classical law of addition of velocities at low speeds. **6**

8. a) With what velocity should a rocket moves so that every year spent on it corresponds to 4 years on earth ? **5**

OR

   b) Calculate the percentage change in length of the rod when it moves with velocity of 0.8 C along its length. **5**

Unit – III

9. a) Explain briefly dark matter and dark energy. **4**

    b) Explain Doppler effect of light and Hubble's law. **6**

OR

10. a) Write a note on supernova and pulsars. **4**

    b) Based on big bang model, explain the evolution of the universe. **6**

11. a) Calculate the luminosity of a star of radius 20000 km and temperature 10000 K. Given $\sigma = 5.67 \times 10^{-8}$ W m^{-2}K^{-4}. **5**

OR

    b) The apparent magnitude of a star situated at a distance of 8.57 light year is −1.46. Calculate its absolute magnitude. Given 1PC = 3.261 y. **5**

Unit – IV

12. a) Discuss the formation of stationary waves for the transverse vibration in a stretched string. **4**

    b) Obtain the expression for the velocity of longitudinal wave in a fluid. **6**

OR

13. a) Derive the differential equation of wave motion. **4**

    b) State Fourier theorem and explain how Fourier coefficients can be evaluated. **6**

14. a) A plane wave travelling through a medium is given by $y = 0.02 \, sn(2\pi t - 0.04\pi \, x)$ meter. Find the wavelength, wave frequency and wave velocity. **5**

OR

    b) A stretched wire emits note of frequency 35 Hz. When the tension is increased by 0.5 kg wt the frequency of the fundamental note raises to 40 Hz. Find the initial tension and length of the wire. Given linear density of the wire is 1.33×10^{-2} kgm^{-1}. **5**

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