# M.Sc. PHYSICS
## FOURTH SEMESTER
## CONCEPT OF PHYSICS
## MSP-405 (MDC)

(Use separate answer scripts for Objective & Descriptive)

**Duration : 3 hrs.** Full Marks : 70

## [ PART-A : Objective ]

**Time : 20 min.** Marks : 20

***Choose the correct answer from the following:*** *1×20=20*

1. We are bound to live on earth due to the force of:
   a. gravitation b. repulsion
   c. acceleration d. friction

2. Force of attraction between two particles under gravitational field is directly proportional to the_____ of their masses.
   a. addition b. subtraction
   c. product d. division

3. The influence, under which the velocity of a body changes is:
   a. inertia b. acceleration
   c. force d. torque

4. According to Newton's law of motion, Force = _____× acceleration.
   a. mass b. pressure
   c. weight d. volume

5. With increase in mass of planets, the escape velocity:
   a. increases b. decreases
   c. remain constant d. none of theses

6. The unit of gravitational constant is:
   a. $N$ b. $Nm^2$
   c. $\frac{Nm^2}{kg}$ d. $\frac{Nm^2}{kg^2}$

7. Planets in our solar system moves around the Sun under_____ force in different orbits.
   a. gravitational b. coulomb
   c. nuclear d. none of these

8. If the particles of a medium vibrate in the direction perpendicular to the propagation of the wave, then the wave is called:
   a. transverse b. longitudinal
   c. both of these d. none of these

9. Sound cannot travel in:
   a. metals b. air
   c. water d. vacuum

10. Nodes and antinodes are created in:
    a. progressive waves — b. standing waves
    c. both of these — d. none of these

11. Elephant can hear sound of the range:
    a. 20-20000 Hz — b. >20 Hz
    c. < 20000Hz — d. both (a) and (b)

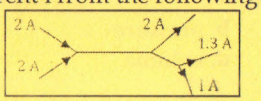
12. If a wave has time period T=20 sec., its frequency is:
    a. 5 Hz — b. 2 Hz
    c. 0.5 Hz — d. 0.05 Hz

13. If A and B are the sizes an object and its image, respectively, formed in front of a mirror, then the magnification (m) is given by:
    a. A/.B — b. B/A
    c. A×B — d. A+B

14. When ray of light transmits from a rare to a denser medium, it:
    a. bends towards the normal — b. bends away from the normal
    c. follows the normal — d. doesn't bend

15. If the resistances P = 10 Ω, Q = 10 Ω, R = 12 Ω, the value of resistance S, in balanced condition of Wheatstone bridge is:
    a. 12Ω — b. 24Ω
    c. 10Ω — d. 0Ω

16. Calculate the current i from the following circuit.




    a. 1 A — b. 1.3 A
    c. 1.7 A — d. 3.7 A

17. According to Kirchhoff's 2nd law:
    a. $\sum E = \sum iR$ — b. $\sum \Delta V = 0$
    c. Both a and b — d. None of these

18. Potentiometer measures potential more accurately because
    a. It uses sensitive galvanometer for null deflection.
    b. It uses high resistance potentiometer wire.
    c. It measures the potential in the closed circuit.
    d. It measures the potential in the open circuit.

19. A perfect black body:
    a. also emits radiation — b. don't emit radiation
    c. is an ideal concept — d. options a and c are true

20. The experimental results of black body radiation was well satisfied by:
    a. Wein's radiation formula — b. Rayleigh-Jeans law
    c. Kirchhoff's law — d. Planck's law

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## ( PART-B : Descriptive )

**Time : 2 hrs. 40 min.** **Marks : 50**

[ Answer question no.1 & any four (4) from the rest ]

1. Write short notes on five (5) path breaking scientific discoveries. 10

2. Explain briefly the Newton's laws of motion. Write the limitations of Newton's law. 4+6=10

3. **(a)** What you mean by (i) transverse wave and (ii) longitudinal wave? 2+4+4=10
   **(b)** Define: (i) Amplitude, (ii) Time Period, (iii) Frequency, and (iv) Wavelength of a wave.
   **(c)** Give the relation between speed (v), frequency (f) and wavelength (λ) of a wave. If a musical instrument produces a frequency 440 Hz, and wavelength 78.4 cm, calculate the speed of the sound in (m/s).

4. What do you mean by ultrasound? State its features. Explain briefly, any three applications of ultrasound. 2+4+4=10

5. State the principle of potentiometer. Determine the potential difference of a cell of 10 mA is flowing through a potentiometer wire of length 4 m and resistance 4 Ω, find the potential gradient of the potentiometer wire. 5+5=10

6. What is Lorentz force? Write the characteristics of electromagnetic waves. 3+7=10

7. **(a)** Write the laws of reflection. Establish the relation between principal focus (F) and radius of curvature (R). 5+1+4=10
   **(b)** An object is placed between two plan mirrors inclined at 30° to each other. How many images do you expect to see?
   **(c)** A candle is hold at 3 cm away from a concave mirror of radius of curvature 24 cm. At what distance the image to be formed?

8. Discuss the origin of Quantum Mechanics. How a perfect black body can be designed? Discuss the spectral distribution of black body radiation. 5+1+4=10

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