MAHATMA GANDHI UNIVERSITY, KOTTAYAM

MGU-UGP (HONOURS)

FIRST SEMESTER EXAMINATION

(2024 ADMISION ONWARDS)

MG1DSCPHY100 – Foundations of Physics

Duration: 1.5 hrs Maximum Marks: 50

Students should attempt at least one question from each course outcome to enhance their overall outcome attainability.

Part A

Short Answer Type Questions

Answer any **7** questions

Each question carries **2** Mark

1	What are the various problem solving strategies in physics?	[K][1]
2	Differentiate between scalar and vector quantities.	[U][1]
3	Find the displacement of a particle if its initial and final positions are 18 m and 109 m respectively.	[A][2]
4	Differentiate between acceleration and deceleration.	[K][3]
5	Why must Airshow pilots keep track of their motion relative to their audience?	[U][3]
6	Define action and reaction in the context of Newton's third law.	[K][3]
7	How does gravitational potential energy change during free fall?	[U][4]
8	Is friction classified as a conservative force? Explain.	[U][4]
9	What is the difference between positive work and negative work?	[U][4]
10	What is a comment in python programming?	[K][5]

(2x7=14)

Part B

Short Essay Type Questions

Answer any **4** questions

Each question carries **6** marks

11	Which of the following is the most precise device for measuring length and explain the reasons. a) Vernier calliper with 10 divisions on the sliding scale b) Screw gauge of pitch 1mm and 100 divisions on the circular scale.	[U][1]
12	A cheetah is found at 20 m to the east of a vehicle. At time t = 0, it begins to run due east towards its prey which is at 50 m to the east of the vehicle. During the first 2.0 s of the chase, the Cheetah's x- coordinate varies with the time according to the equation $x = 20m + (5m/s^2)t^2$. Find the Cheetah's instantaneous velocity at $t_1 = 1$ s by taking, $\Delta t = 0.1$ s, then 0.01 s and 0.001 s.	[A][2]
13	A ball is thrown vertically upwards from the top of a tall building with velocity of 20 m/s. The height from the ground level to the point where the ball is thrown is 25.0 m. a)How high will the ball travel? b) How long does it take to reach the floor? Take g = 10 m/s2.	[An][3]
14	Describe how the principle of conservation of energy applies to a system involving gravitational potential energy	[U][4]
15	What role does the angle between force and displacement play in determining the work done?	[K][4]
16	Write a Python program to determine if a given number is positive, negative, or zero.	[A][5]

(6x4=24)

Part C

Essay Type Question

Answer any **1** question

Each question carries **12** marks

17	Describe energy diagram of stable and unstable equilibrium with examples.	[U][4]
18	Explain append, indexing and slicing with suitable examples of each.	[A][5]

(1x12=12)

MAHATMA GANDHI UNIVERSITY, KOTTAYAM

MGU-UGP (HONOURS)

FIRST SEMESTER EXAMINATION

(2024 ADMISION ONWARDS)

MG1MDCPHY100 – Physics Around You

Duration: 1.5 hrs Maximum Marks: 35

Students should attempt at least one question from each course outcome to enhance their overall outcome attainability.

Part A

Multiple Choice Questions

Answer **all** questions

Each question carries **1** Mark

1 What is the unit of frequency? [U][1]

a) Newton b) Hertz c) Joule d) Pascal

2 Which of the following describes acceleration? [U][1]

a) Change in speed with time b) Change in velocity with time c) Constant velocity

d) Distance covered per second

3 What must be the angle between the applied force and displacement for doing maximum work? [U][1]

a) 0^o b) 30^o c) 45^o d) 90^o

4 Which of the following has 100 % efficiency? [U][1]

a) Electric motor b) Generator c) Real machine d) Ideal machine

5 Find kinetic energy of a 0.2 g insect when it is flying at 0.4m/s? [U][1]

Hint:Kinetic energy=$\frac{1}{2}mv^2$, where m is the mass and v is the velocity of the object.

a) 1.6×10^{-4}J b) 1.6×10^{-2}J c) 1.4 J d) 5.6×10^{-4}J

6 When particles in the medium vibrate parallel to the direction of propagation of a wave, the wave is called: [U][1]

a) Longitudinal wave b) Transverse wave c) Electromagnetic Wave d) radio waves

7 The loudness of sound is directly proportional to: [U][1]

a) Frequency b) wavelength c) Velocity d) Amplitude

8 The unit of gravitational constant G is: [U][1]

a) Nm^2/kg^2 b) kgm/s^2 c) m/s^2 d) Nm/s

9 What does a voltmeter measure? [K][2]

a) Current b) Resistance c) Voltage d) Power

10 Which of the following generates alternating voltage? [U][2]

a) Battery b) Generator c) Solar cell d) Resistor

11 The resistivity of a conductor depends on: [U][2]

a) Length b) Cross-sectional area c) Material and temperature d) Voltage

12 The power consumed by an electrical device is given by: [U][2]

a) $P = VI$ b) $P = (I^2)R$ c) $P = (V^2)/R$ d) All of the above

13 If the wavelength of electromagnetic radiation is doubled, what will happen to the energy. [U][3]

a) Doubled b) Halved c) Remains same d) Becomes zero

14 Which of the following is not transported by electromagnetic waves? [U][3]

a) Charge b) Information c) Energy d) Momentum

15 Which of the following is not a typical application of a laser? [K][4]

a) Cutting materials b) Data storage c) Thermal imaging d) Heating water

(1x15=15)

Part B

Multiple Choice Questions

Answer **all** questions

Each question carries **2** Mark

16 What is the dimensional formula for pressure? [U][1]

a) $ML^{-1}T^{-2}$ b) $M^0L^2T^{-3}$ c) ML^2T^{-1} d) ML^2T^{-2}

17 When a ball is thrown vertically upward, what is its acceleration during its motion? [U][1]

a) 0 m/s² b) 9.8 m/s² upward c) 9.8 m/s² downward d) Changes depending on the height

18 A 60 kg person climbs 5 m up a staircase. What is the work done? [U][1]
Hint: Work, W= F.S and Force F= ma
where S is the displacement and a is the acceleration.
Given acceleration due to gravity,g=9.8m/s^2
a) 2940 J b) 300 J c) 5880 J d) 1470 J

19 The speed of sound is: [U][1]

a) Slower in water than in air b) Faster in water than in air

c) Same in air and in water d) sound cannot travel in water

20 The Doppler Effect occurs when: [U][1]

a) A sound wave is reflected from a surface
b) A sound wave source is stationary
c) A sound wave source moves relative to an observer
d) The frequency of the wave decreases with time.

21 If the resistance is 10Ω and voltage is 50V, what is the current? [U][2]

Hint: Voltage, V=IR, I is the current and R is the resistance.

a)5A b)10A c)2A d)1A

22 What type of graph does Ohm's Law produce? [U][2]

a) Linear b) Exponential c) Parabolic d) Logarithmic

23 Waves in decreasing order of their wavelength are [K][3]

a) Radio waves, ultraviolet rays, visible light, X – rays
b) Radio waves, visible light, infrared rays, X- rays
c) Radio waves, infrared rays, visible light, X – Rays
d) X - rays, infrared rays, visible light, radio waves

24 If the angle of incidence is 30° and the refractive index is 1.33, calculate the angle of refraction using Snell's law. [A][3]

a) 15.67° b) 25.56° c) 22.09° d) 18.79°

25 The material in which population inversion can take place is called

a) active medium b) passive medium c) gaseous medium d) vapour medium [K][4]

(2x10=20)