CHUKWUEMEKA ODUMEWU OJUKWU UNIVERSITY, ULI
DEPARTMENT OF INDUSTRIAL PHYSICS: GENERAL PHYSICS I - PHY101
FIRST SEMESTER EXAMINATIONS 2018/2019 ACADEMIC SESSION
ANSWER ALL QUESTION. TIME ALLOWED 1 HOUR

NAME.....REGNO.....DATE.....

DEPT: .....FACULTY.....

1. Consider a ball of mass 0.20 kg travelling with velocity of 28 ms^{-1} directly towards a wall, the ball hits the wall and bounces off in the opposite direction with a velocity of 20 ms^{-1}. Find the impulse of the force
   A. 9.6 Ns B. 19.2 Ns. C. 29.6 Ns. D. 49.9 Ns.
2. A collision is defined as elastic if ;
   A. The total kinetic energy after collision is equal to that before collision.
   B. The coefficient of restitution is equal to zero.
   C. The total kinetic energy after collision is less than the kinetic energy before collision.
   D. The total kinetic energy after collision is greater than the kinetic energy before collision.
3. The angular momentum L of the particle with respect to a fixed point is defined as;
   A. $L = r \times P$. B. $L = r \times \omega r$. C. $L = r \times m$ D. $L = r \times w$
4. Find the work done by a crane when it exacts a force of 3000N on a load and lifts it 20 m.
   A. 60000 J B. 6000 J. C. 600 J. D. 60 J.
5. The energy possessed by an object as a result of its rotational motion can best be described as;
   A. Rotational kinetic energy. B. Translational kinetic energy.
   C. Translational potential energy. D. Positional potential energy.
6. Find the kinetic energy of a train of mass 300000 kg travelling at 50 m/s.
   A. 375000 kJ. B. 285000 kJ. C. 175000 kJ. D. 85000 kJ.
7. A crane lifts a load of 20,000 N through a distance of 10m in 4s. Calculate the output power of the crane.
   A. 50 kW B. 500 kW. C. 1500 kW. D. 1750 kW.
8. The centripetal force required to maintain a car moving round a circular tract is supplied by:
   A. Friction at the wheels. B. Gravity. C. Magnetic force. D. Tension.
9. A tangential force of 0.0005 N applied on a solid surface of area 20 cm^2 caused a deformation through angle of 0.007°, calculate the shear modulus?
   A. 35.7 N/m^2 B. 0.357 N/m^2 C. 3.57 N/m^2 D. 3571.4 N/m^2
10. Which of the following is true about a cohesive liquid
    A. Adheres to other substances B. Has a concave meniscus C. Has a convex meniscus D. None of these
11. In an adiabatic process
    A. Heat is generated B. Heat is absorbed C. Heat is transmitted D. Heat is constant
12. Calculate the viscous force on a liquid of surface area 2000 cm^2 flowing with velocity gradient of 0.4 s^{-1}? (Take the coefficient of viscosity = 7 Ns/m^2) A. 5600 N B. 0.56 N C. 56 N D. 560 N
13. The molar heat capacities of a gas at constant pressure and at constant volume are 137 J/kgK and 98 J/kgK respectively, calculate the adiabatic bulk modulus of the gas at 2.5 atmospheric pressure.
    A. 181194.431 N/m^2 B. 354130.875 N/m^2 C. 3.495 N/m^2 D. 1.788 N/m^2
14. The surface tension on a soap bubble is 20 N/m and the diameter is 30 cm, calculate the excess pressure inside the bubble? A. 533.3 N/m^2 B. 266.67 N/m^2 C. 5.3 N/m^2 D. 2.7 N/m^2
15. The yield point can be defined as
    A. The stress/load beyond which the material becomes elastic
    B. The stress/load from which the material becomes elastic
    C. The stress/load from which the material becomes inelastic
    D. The stress/load beyond which the material becomes inelastic.
16. A diver inside a river displaces 75 cm^3 of water of density 1000 kg/m^3, calculate the upthrust on him. (Take g=10 m/s^2) A. 0.075N B. 0.75N C.750000N D. 75000N
17. In the measurement of blood pressure, the maximum value is called
    A. Systolic B. Heart rate C. Diastolic D. Stroke volume
18. Which of the following is not a fundamental quantity?
    A. Length B Time C. Density D. Electric current
19. The accuracy of a micrometer screw gauge is.....
    A. 1.0×10^{-2} m B. 1.0×10^{-3} m C. 1.0×10^{-1} m D. 1.0×10^{-4} m
20. Which of the following is not true about the weight of a body?
    A. It varies according to position B. It is a derived quantity C. Its unit is N D. It is a scalar quantity
21. Compute the acceleration of a lorry which starts from rest and accelerates uniformly until it attains a velocity of 2 m/s in 5 seconds. A. 4.0 m/s B. 4.0 m/s^2 C. 0.4 m/s D. 0.4 m/s^2
22. Calculate the magnitude of the gravitational force between two objects of mass 90 kg and 120 kg separated by a distance of 15 m. (Take G = 6.67×10^{-11} Nm^2/kg^2).
    A. 4.2×10^{-8} N B. 3.2×10^{-8} N C. 3.2×10^{-7} N D. 2.3×10^{-9} N

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23. A ball thrown vertically under the influence of acceleration due to gravity given by 10 m/s^2. If the maximum height reached is 80m. Calculate the initial velocity of the ball.
A. 4.0 m/s B. 0.4 m/s C. 40.0 m/s D. 400.0 m/s

24. The period of oscillation is defined as the
A. Time taken for the body to reach the maximum height B. Time taken for the body to reach the reach the ground again. C. Time taken for the body to make one complete oscillation D. None of the these

25. The following are examples of simple harmonic motion except
A. Loaded test-tube floating in a liquid and set in vertical motion B. A loaded spiral-spring set into vertical motion C. Swinging pendulum bob D. A car moving from a point A to B on a straight line

26. Which of the following is not correct about the mechanical energy of the system in damped oscillation
A. It is not constant B. It decreases continuously C. It approaches zero D. It is constant

27. When a mass attached to a spiral spring is set into vertical oscillation, its acceleration will have a:
A. Varying magnitude but a constant direction. B. Constant magnitude and a constant direction.
C. Constant magnitude but a varying direction. D. Varying magnitude but a varying direction.

28. The motion of a body is simple harmonic if the:
A. Acceleration is always directed towards a fixed point. B. Path of motion is a straight line
C. Acceleration is directed towards a fixed point and proportional to its distance from the point
D. Acceleration is constant and directed towards a fixed point.

29. Which of the following correctly gives the relationship between linear speed v and angular speed ω of a body moving uniformly in a circle of radius r?
A. $v = \frac{\omega}{r}$ B. $V = \omega^2 r$ C. $v = \omega r^2$ D. $V = \omega r$

30. Find the maximum speed of a particle moving with a simple harmonic motion of period 4 seconds and amplitude 50 cm.
A. 78.5 m/s B. 0.785 m/s C. 7.85 m/s D. 785 m/s

31. The study of the quantitative relationship between heat and other forms of energy is
A. Internal energy B. Potential energy C. Thermal equilibrium D. Thermodynamics

32. A process in which the temperature of the working substance (gas) remains constant during its expansion or compression is called
A. Isentropic process B. Isobaric process C. Isochoric process D. Isothermal process

33. The total energy of a system in SHM is given by: A. $\frac{1}{2}kx^2$ B. $\frac{1}{2}kv^2$ C. Fe D. $\frac{v^2}{r}$

34. If $A = 12i - j + 5k$ and $B = -5i + 11j + 9k$. Find $A - B$.
A. $12i - 11j - 2k$ B. $17i + 12j - 4k$ C. $15i - 12j - 4k$ D. $17i - 12j - 4k$

35. The following are vector quantities except
A. Displacement B. Force C. Density D. Momentum

TICK /SHADE CORRECTLY THE BEST OPTION IN THE SPACE PROVIDED.
ERASE PROPERLY ANY INCORRECT OPTION. DOUBLE TICKING/SHADING WILL BE PENALIZED.

NAME.....REGNO:.....DATE.....

DEPT:.....FACULTY.....

1	A	B	C	D
2	A	B	C	D
3	A	B	C	D
4	A	B	C	D
5	A	B	C	D
6	A	B	C	D
7	A	B	C	D
8	A	B	C	D
9	A	B	C	D
10	A	B	C	D
11	A	B	C	D
12	A	B	C	D
13	A	B	C	D
14	A	B	C	D
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16	A	B	C	D
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26	A	B	C	D
27	A	B	C	D
28	A	B	C	D
29	A	B	C	D
30	A	B	C	D
31	A	B	C	D
32	A	B	C	D
33	A	B	C	D
34	A	B	C	D
35	A	B	C	D

Physics 101 (1)

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Suggested Solutions by Engr. Plasms

NO1

$M = 0.20kg$, $V = 28ms^{-1}$, $\underset{\rightarrow}{V} = -20ms^{-1}$

$\therefore ft = M\Delta v$

$\Rightarrow 0.20(-20) - 28)$

$\Rightarrow 0.20(-48)$

$\Rightarrow 9.60$ [A]

NO2

[A]

NO3

$L = rxp = mrv$ [A]

L = angular momentum of particle

r = radius of particle

m = mass of particle

NO4

$f = 3000N$, $h = 20m$ [A]

Work done $= fxd = 3000 \times 20$

$= 60,000J$ ans

NO5

[A]

NO6

$m = 300000$, $V = 50m/s$, but

$KE = \frac{1}{2}mv^2 \Rightarrow \frac{1}{2} \times 300000 \times 50$

$\Rightarrow 7500 KJ$ /ans

NO Correct option.

NO7

$f = 20000$, $d = 10m$, $t = 4s$

$\text{Power} = \frac{\text{work}}{t} = \frac{fxd}{t} = \frac{20000 \times 10}{4}$

$\Rightarrow 50KW$ [A]

NO8

[B]

NO9

$f = 0.005N$, $A = 20cm^2 \Rightarrow 0.002m^2$

$\theta = 0.007^0$ but

Shear modulus (G) $= \frac{F}{A\theta}$ [A]

$\therefore \Rightarrow \frac{0.005}{0.002 \times 0.007}$

$\Rightarrow 35.714 Nm^2$ //ans

NO10

[C]

NO11

[D] (22)

NO12

$S.A = 2000cm^2 \Rightarrow 0.2m^2$

$v.g = 0.4s^{-1}$

$\eta = 7 Ns/m^2$ [B]

$F = -\eta A \frac{dv}{dy} \Rightarrow 7 \times 0.2 \times 0.4$

$= 0.56 N$ /ans

NO13

$C_p = 137 J/KgK$, $C_v = 98 J/KgK$

$P = 2.5 atm$, but $\gamma = C_p/C_v = 1.4$ J/KgK

Compiled by

FOR SESA PRESIDENT

2020/2021

Physic 101

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Suggested Solutions by Exp. Plus+

NO13 Continues

also 1 atm = 101325 N/m²

∵ 2.5 atm = x

∴ x = 253312.5 N/m²

hence K = PY = 253312.5 × 1.4

= 354637.5 N/m²//

NO correct option

NO14

Surface Tension = 20 N/m [A]

diameter = 30cm ⇒ 0.3m

radius = 0.15m

P = 4T/r = 4×20/0.15 = 533.3 N/m²//

NO15

[C]

NO16

Volume = 75cm³, ρ = 1000kg/m³

upthrust = mg

but ρ = m/V ∴ m = ρV

= 1000 × 75

= 75000

also g = 10m/s²

∴ upthrust = 75000 × 10

= 750000 or

= 750KN// [C]

NO17

[C]

NO18

[A]

NO19

[B]

NO20

[B]

NO21

u = 0m/s, v = 2m/s, t = 5sec [C]

a = (v−u)/t = (2−0)/5 = 0.4 m/s²//

NO22

m₁ = 90kg, m₂ = 120kg, r = 1.5m

G = 6.67 × 10⁻¹¹ Nm²/kg²

f = Gm₁m₂/r² = 6.67 × 10⁻¹¹ × 90 × 120 / (1.5)²

f = 3.2 × 10⁻⁹ N// [B]

NO23

(25)

g = 10m/s², h = 80m, u = ?

v² = u² − 2gh ∴ u = √2gh

u = √(2 × 10 × 80) ⇒ 40m/s// [C]

NO24

[C]

NO25

[D]

NO26

[A]

PHY 101

2018/2019 Session

Suggested Solutions by Engr. Plasmo

NO 27

[A]

NO 28

[C]

NO 29

[D]

NO 30

$T = 4s$, $A = 50cm \Rightarrow 0.5m$

$V_{max} = \pm w x_m$

but $T = \frac{2\pi}{w} \therefore w = \frac{2\pi}{T}$

$= \frac{2\pi}{4}$

hence

$V_{max} = \pm \frac{2\pi}{4} \times \frac{0.5m}{1}$ [B]

$= 0.785 m/s$ //

NO 31

[D]

NO 32

[D]

NO 33

[A]

NO 34

$(12i - j + 5k) - (-5i + 11j + 9k)$

$\Rightarrow 12i - j + 5k + 5i - 11j - 9k$

$\Rightarrow 17i - 12j - 4k$ //as

[D]

NO 35

[A]