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1B1N240150 (Pages : 4) Reg. No:.....

Name: .....

FAROOK COLLEGE (AUTONOMOUS), KOZHIKODE

First Semester B.Sc Physics Degree Examination, November 2024

PHY1CJ101 – Fundamentals of Physics

(FYUGP 2024 Admission)

Time: 2 hours Max. Marks : 70

Course Outcome Mapping Scheme

1	2	3	4	5	6	7	8	9	10
CO1	CO1	CO1	CO1	CO1	CO2	CO3	CO4	CO4	CO4
11	12	13	14	15	16	17	18	19	20
CO5	CO5	CO2	CO2	CO2	CO2	CO3	CO4	CO4	CO3

PART – A

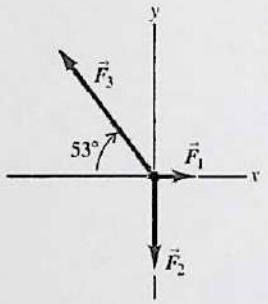
All questions can be attended.
Each question carries Three mark.
Ceiling -24 Marks

1. Can an object be in equilibrium when only one force acts on it?Explain.
2. Which feels a greater pull due to the earth's gravity: a 10 kg stone or a 20 kg stone? If you drop the two stones, why doesn't the 20 kg stone fall with twice the acceleration of the 10 kg stone? Explain.
3. When a car stops suddenly, the passengers tend to move forwardrelative to their seats. Why? When a car makes a sharp turn, the passengerstend to slide to one side of the car. Why?
4. Does Newton's second law hold true for an observer in a van as it speeds up, slows down, or rounds a corner? Explain.
5. You are driving a Porsche 918 Spyder on a straight testing track at aconstant speed of250 km/h. You pass a 1971 Volkswagen Beetle doinga constant 75 km/h. On which car is the net external force greater?
6. A woman in an elevator lets go of her briefcase, but it does notfall to the floor. How is the elevator moving?
7. Does a car's kinetic energy change more when the car speeds upfrom 10 to 15 m/s or from 15 to 20 m/s? Explain.

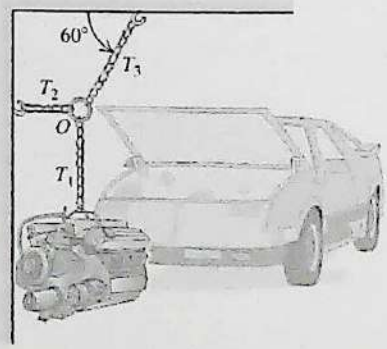
8. A baseball is thrown straight up with initial speed v_0. If air resistancecannot be ignored, when the ball returns to its initial height itsspeed is less than v_0. Explain why, using energy concepts.
9. An object is released from rest at the top of a ramp. If the ramp isfrictionless, does the object's speed at the bottom of the ramp depend onthe shape of the ramp or just on its height? Explain. What if the ramp isnot frictionless?
10. A 1.0 kg stone and a 10.0 kg stone are released from rest at the same height above the ground. Ignore air resistance. Which of these statements about the stones are true? Justify each answer. (a) Both have the same initial gravitational potential energy. (b) Both will have the same acceleration as they fall. (c) Both will have the same speed when they reach the ground. (d) Both will have the same kinetic energy when they reach the ground.

PART – B
All questions can be attended.
Each question carries six marks.
Ceiling -36 Marks

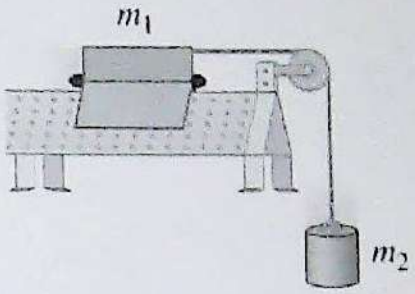
11. Three professional wrestlers are fighting over a champion's belt.Figure shows the horizontal force each wrestler applies to thebelt, as viewed from above. The forces have magnitudes $F_1 = 50$ N,$F_2 = 120$ N, and $F_3 = 250$ N. Find the x- and y-components of the netforce on the belt, and find its magnitude and direction of net force.



12. After an annual checkup, you leave your physician's office,where you weighed 683 N. You then get into an elevator that, conveniently,has a scale. Find the magnitude and direction of the elevator'sacceleration if the scale reads (a) 725 N and (b) 595 N.
13. In Figure, a car engine with weight w hangs from a chain that islinked at ring O to two other chains, one fastened to the ceiling and theother to the wall. Find expressions for the tension in each of the threechains in terms of w. The weights of the ring and chains are negligiblecompared with the weight of the engine



14. Figureshows an air-track glider with mass m_1 moving on a level,frictionless air track in the physics lab. The glider is connected to alab weight with mass m_2 by a light, flexible, nonstretching string thatpasses over a stationary, frictionless pulley. Find the acceleration ofeach object and the tension in the string.



15. You want to move a 500 N crate across a level floor. To start the cratemoving, you have to pull with a 230 N horizontal force. Once the cratestarts to move, you can keep it moving at constant velocity with only200 N. What are the coefficients of static and kinetic friction?
16. Two 25.0 N weights are suspended at opposite ends of a ropethat passes over a light, frictionless pulley. The pulley is attached to achain from the ceiling. Draw free body diagrams and find (a) the tension in the rope? (b)the tension in the chain?
17. A 75.0 kg painter climbs a ladder that is 2.75 m long and leansagainst a vertical wall. The ladder makes a 30.0° angle with the wall. (a)How much work does gravity do on the painter? (b) Does the answer topart (a) depend on whether the painter climbs at constant speed or acceleratesup the ladder?
18. You are testing a new amusement park roller coaster with anempty car of mass 120 kg. One part of the track is a vertical loop withradius 12.0 m. At the bottom of the loop (point A) the car has speed25.0 m/s, and at the top of the loop (point B) it has speed 8.0 m/s. As thecar rolls from point A to point B, how much work is done by friction?

PART - C

Answer any *one* questions.
Each question carries Ten marks.

19. Discuss conservative and non-conservative forces with examples. Differentiate them in terms of work done.Obtain the relation between force and potential energy in one dimensional motion. With the help of a hypothetical energy diagram explain different *equilibrium* points and the concept of *potentialwell*.

20. Discuss kinetic and static friction and respective coefficients with examples. What is the origin of friction. A box rests on a table, pulling force is gradually increased and box starts moving. Draw graph showing the magnitude of friction force f as a functionof magnitude of pulling force T and explain. Explain the term terminal speed for an object moving in air. Derive the relation for velocity, acceleration and position as a function of time and plot the graph for an object moving in air.

1 x 10 = 10 Marks

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1B1N240149 (Pages : 1) Reg. No:.....

Name: .....

FAROOK COLLEGE (AUTONOMOUS), KOZHIKODE

First Semester B.Sc Degree Examination, November 2024

PHY1FM105 – Physics in Daily Life

(FYUGP 2024 Admission)

Time: 1.5 hours Max. Marks : 50

Course Outcome Mapping Scheme

1	2	3	4	5	6	7	8	9	10
CO1	CO2	CO5	CO1	CO1	CO3	CO3	CO3	CO4	CO4
11	**12**	**13**	**14**	**15**	**16**	**17**			
CO6	CO5	CO3	CO3	CO4	CO6	CO3			

PART – A

All questions can be attended. Each question carries Two mark.
Ceiling -16 Marks

1. List out any four noise in kitchen.
2. What is a smoke detector?
3. How will you define resonance?
4. What are the ways in which energy get wasted in kitchen?
5. Describe the working of a spark lighter.
6. Write any two reasons for choosing willow wood to make cricket bat.
7. Why ball turn more during later days of a test match?
8. What is Hawkey technique?
9. Define power?
10. Explain Magnes effect in football.

PART – B

All questions can be attended. Each question carries six marks.
Ceiling -24 Marks

11. Explain the working principle of a refrigerator?
12. Is a pendulum clock exhibits harmonic oscillations? explain in details?
13. Discuss the difference between hard and soft pitches for pace bowling?
14. What are the techniques/methods used by fast bowlers to make the delivery difficult?
15. Write a short note on mechanics of the hard kick.

PART - C

Answer any *one* questions.
Each question carries Ten marks.

16. Illustrate the working principle of photocopier?
17. Explain the effect of topspin, backspin and sidespin in spin bowling.

1 x 10 = 10 Marks

1B1N240147 (Pages : 2) Reg. No:.....

Name: .....

FAROOK COLLEGE (AUTONOMOUS), KOZHIKODE

First Semester B.Sc Mathematics Degree Examination, November 2024

PHY1MN101 – Mechanics and Optics

(FYUGP 2024 Admission)

Time: 2 hours Max. Marks : 70

Course Outcome Mapping Scheme

1	2	3	4	5	6	7	8	9	10
CO1	CO1	CO1	CO2	CO2	CO4	CO5	CO4	CO5	CO4
11	12	13	14	15	16	17	18	19	20
CO3	CO1	CO3	CO2	CO4	CO5	CO5	CO5	CO1	CO4

PART – A
All questions can be attended.
Each question carries Three mark.
Ceiling -24 Marks

1. Suggest any three situations that obey Newton's first law of motion?
2. How will you define an inertial frame of reference with an example?
3. For a human body falling through air in a spread-eagle position, the numerical value of the constant D is about 0.25 kg/m. Find the terminal speed for a 50 kg skydiver.
4. Deduce work enrergy theorem ?
5. How will you define the concept of work?
6. State and explain the laws of Refraction?
7. Construct a diagram to find the exact location of image of a point object placed Infront of a plane mirror?
8. Explain the relationship between focal length of camera lens and angle of view?
9. Explain the phenomenon of colors in thin film?
10. Differentiate between Fresnel's and Fraunhoffer Diffraction?

PART – B
All questions can be attended.
Each question carries six marks.
Ceiling -36 Marks

11. Differentiate between conservative forces and non-conservative forces.List out the properties of work done by a conservative force?

12. A gymnast with mass m_g = 50 kg suspends herself from the lower end of a hanging rope of negligible mass. The upper end of the rope is attached to the gymnasium ceiling?
    a) What is the weight of gymnast?
    b) What force (magnitude and direction) does exert on her?
    c) What is the tension at the top of the rope?
13. State and explain the concept of law of conservation of energy?Deduce the relationship between force and potential energy?
14. Differentiate gravitational potential energy with elastic potential energy?
15. Explain Total Internal Reflection? Briefly explain one application.
16. A concave mirror forms an image, on a wall 3.00 m in front of the mirror, of a headlamp filament 10.0 cm in front of the mirror. (a) What is the radius of curvature and focal length of the mirror? (b) What is the lateral magnification? What is the image height if the object height is 5.00 mm?
17. Explain the phenomenon newtons ring with diagram? Why the center of the ring is dark?
18. Write down the expression for intensity distribution in single slit Fraunhoffer Diffraction. Evaluate the width of central maxima?

PART - C

Answer any *one* questions.
Each question carries Ten marks.

19. Deduce the expression for terminal speed of an object moving through a fluid?
20. Derive the expression for the brightness and darkness in double slit experiment? Find the expression for intensity distribution and draw the intensity distribution curve.

1 x 10 = 10 Marks

75

1B1N240148 (Pages : 2) Reg. No:.....

Name: .....

FAROOK COLLEGE (AUTONOMOUS), KOZHIKODE

First Semester B.Sc Degree Examination, November 2024

PHY1MN102 – Properties of Matter and Thermodynamics

(FYUGP 2024 Admission)

Time: 2 hours Max. Marks : 70

Course Outcome Mapping Scheme

1	2	3	4	5	6	7	8	9	10
CO2	CO1	CO1	CO1	CO2	CO4	CO4	CO3	CO3	CO4
11	12	13	14	15	16	17	18	19	20
CO2	CO2	CO1	CO5	CO5	CO3	CO3	CO3	CO2	CO5

PART – A
All questions can be attended.
Each question carries Three mark.
Ceiling -24 Marks

1. Explain why Pascal's law is used widely ?
2. .Differentiate Young's modulus with Bulk modulus?
3. State Hook's law ?
4. Define the term centre of gravity ?
5. Point out any two situation where Archimedes Principle applicable ?
6. Explain internal energy of a gaseous system.
7. Discuss the term molar specific heat.
8. Illustrate indicator diagram.
9. Obtain the work done during an isothermal process.
10. Explain a quasi-static process.

PART – B

All questions can be attended.
Each question carries six marks.
Ceiling -36 Marks

11. Water stands 12.0m deep in a storage tank whose top is open to the atmosphere. Determine the absolute and gauge pressure at the bottom of the tank ?
(Given 1atm = 1.01×10^5 Pa, Density of water = 1000 kg/m^3)

12. Find the mass and weight of the air at 20^0C in a living room with a 4.0m x 5.0m floor and a ceiling 3.0m high, and the mass and weight of an equal volume of water ?

13. A hydraulic press contains 0.25m^3(250L) of oil. Find the decrease in the volume of the oil when it is subjected to a pressure increase $\Delta P = 1.6 \times 10^7$ Pa (about 160 atm).The bulk modulus of the oil is $B = 5.0 \times 10^9$ Pa (about 5.0×10^4 atm), and its compressibility is $k = {}^1/_B = 20 \times 10^{-6} atm^{-1}$?

14. Obtain the relation between order and entropy of a system.

15. Calculate the coefficient of performance of a refrigerator working between temperatures 200K and 273K

16. Derive Mayor's relation.

17. Illustrate thermodynamic equilibrium.

18. A gas ($\sqrt{}$=1.4) of 3 m^3 volume and at a pressure of 4×10^5 N/m^2 is compressed adiabatically to a volume 0.5 m^3. Calculate the work done in the process.

PART - C

Answer any *one* questions.
Each question carries Ten marks.

19. Derive Bernoulli's equation ?

20. Obtain equation for efficiency of Carnot's engine.

1 x 10 = 10 Marks

1B1N240146 (Pages : 2) Reg. No:.....

Name: .....

FAROOK COLLEGE (AUTONOMOUS), KOZHIKODE

First Semester B.Sc Degree Examination, November 2024

PHY1MN103 – Semiconductor Physics and Electronics

(FYUGP 2024 Admission)

Time: 2 hours Max. Marks : 70

Course Outcome Mapping Scheme

1	2	3	4	5	6	7	8	9	10
CO1	CO1	CO2	CO1	CO3	CO3	CO3	CO2	CO4	CO3
11	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
CO2	CO2	CO2	CO4	CO2	CO4	CO3	CO3	CO2	CO3

Section A

[Answer All. Each question carries 3 marks] (Ceiling: 24 Marks)

1. Define conduction band, valence band and forbidden band gap.
2. Differentiate the variation of resistance between Metals and semiconductors with temperature.
3. Analyze the current flow in P type and n type semiconductors
4. Discuss the concept of breakdown voltage in a diode.
5. What do you mean by faithful amplification?
6. Define Common mode rejection ratio of an Opamp.
7. What is zero signal collector current?
8. Brief the basic logic gates with symbols and boolean expressions.
9. What is meant by mid-point biasing for a CE transistor amplifier?
10. What is a voltage follower?

Section B

[Answer All. Each question carries 6 marks] (Ceiling: 36 Marks)

11. With necessary diagrams Explain the different types of biasing in a PN junction and characteristics (VI Graph)
12. Compare the working of different types of filtering circuits used in rectification process
13. Compare the voltage and current gain in Common Base (CB), Common Collector (CC), and Common Emitter (CE) transistor configurations.
14. Explain the working of a full adder giving a neat diagram for the corresponding Logic circuit.
15. With neat diagrams analyze the working of transistor amplifier in CE configuration.
16. State De Morgan's theorem and illustrate it with a 2-input truth table.
17. Explain the working of a Zener diode as a shunt voltage regulator.
18. Describe inverting amplifier. Find the expression for its voltage gain.

Section C

[Answer any one. Each question carries 10 marks] (1x10=10 marks)

19. Describe the operation of full-wave bridge rectifier and deduce the expression for Rectification efficiency.
20. **a)** What is the purpose of transistor biasing?

    b) Explain the designing of a voltage divider biasing circuit.

    c) In the circuit shown in Figure, the operating point is chosen such that $I_C = 2mA$, $V_{CE} = 3V$. If $R_C = 2.2\ k\Omega$, $V_{CC} = 9V$ and $\beta = 50$, determine the values of R_1, R_2 and R_E. Take $V_{BE} = 0.3V$ and $I_1 = 10\ I_B$.