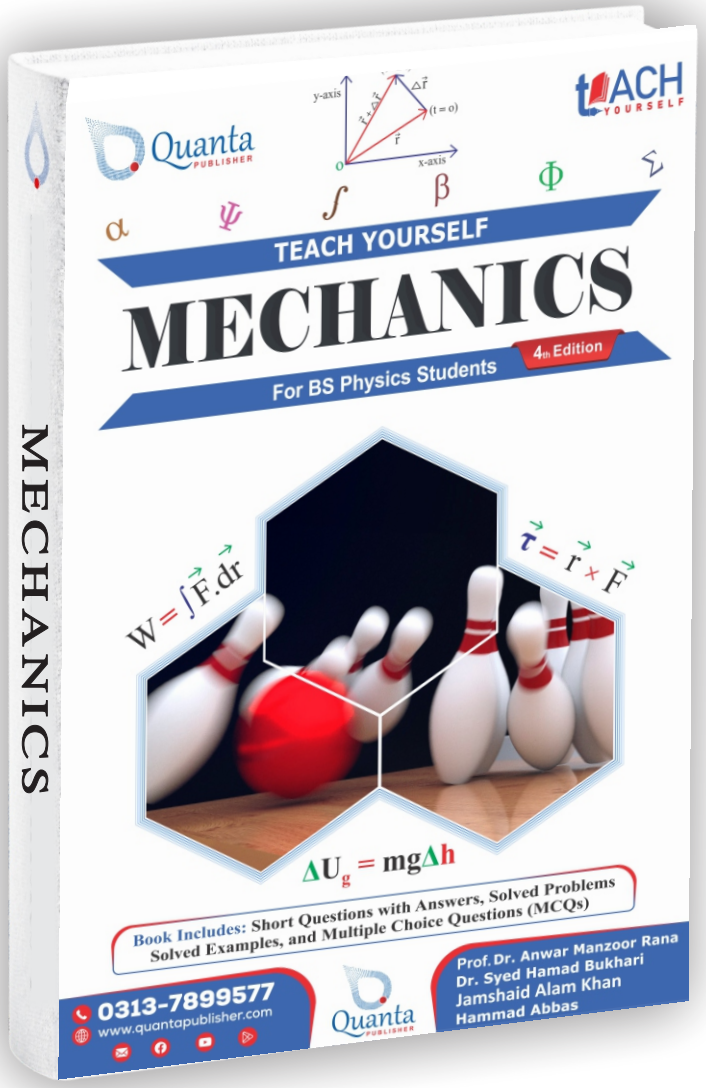
Quanta PUBLISHER

BS Physics

PAST PAPERS



For Online Order

0313-7899577

www.quantapublisher.com

BOOK PRICE Rs: 650/-

Examination: BS (FINAL TERM) | Subject: PHYS 101 (MECHANICS-1)
SEMESTER: 1 | Session: 2018-22
Maximum Marks: 60 | Time Allowed: 150 min.

Q.1: Encircle or tick ✓ the correct answer. (1 x 12 = 12)

i) **Force of Kinetic Friction**, in general, is ---------- the **Force of Static Friction**.
a) smaller than, b) larger than, c) equal to, d) None of these.

ii) The **Terminal speed** v_T of a falling object such as raindrop is given by:
a) $v_T = \frac{mg}{b}(1 - e^{-\frac{b}{m}})$, b) $v_T = gt$, c) $v_T = \frac{mg}{b}$, d) $v_T = mgt$

iii) Volume of a **Parallelepiped** is given by:
a) $\vec{A}(\vec{B} \times \vec{C})$, b) $\vec{A} \times (\vec{B} \times \vec{C})$, c) $(\vec{A} \times \vec{B}) \times \vec{C}$, d) None of these.

iv) **Angle of Banking** is independent of
a) Velocity, b) Mass, c) Radius of Curvature, d) Acceleration

v) **Curl of Gradient of a Scalar Function** is equal to:
a) Zero, b) Unity, c) Infinity, d) None of these.

vi) The **Ratio of Time Periods** of a **Conical Pendulum** and a **Simple Pendulum** is:
a) 2π, b) $\cos\theta$, c) $(\cos\theta)^{1/2}$, d) $(\cos\theta)^2$

vii) **Coriolis Force** is an example of:
a) Normal Force, b) Frictional Force, c) Coulomb Force, d) Pseudo Force.

viii) If the net external **Force** on a system of particles is zero, then the **Center of Mass** of the system moves with constant ----------:
a) Acceleration, b) Velocity, c) Momentum, d) Power

ix) If net **Force** acts on a particle during a given interval, the change in **Momentum** during that time interval is known as:
a) Impulse, b) Power, c) Energy, d) Momentum

x) The property of a body that determines its resistance to change in its motion is:
a) Inertia, b) Rigidity, c) Deceleration, d) Mass

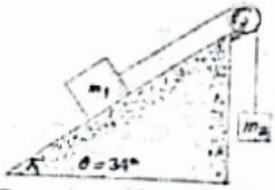
Q.2: Briefly describe to write short answers. (2 x 6 = 12)

i) Differentiate between **Elastic** and **In-Elastic Collisions**.
ii) Do the **Action** and **Reaction Forces** act on the same body? Describe briefly.
iii) **Gradient of a Scalar function** is a **Vector**. Why?
iv) If three vectors $\vec{A}, \vec{B}, \vec{C}$ are **mutually perpendicular** to each other, show that their **Vector Triple Product is zero**.
v) Show that $\nabla \cdot \vec{r} = 3$.
vi) Distinguish between **VISCOUS DRAG** and **AERODYNAMIC DRAG**.

Q.3: a) State and prove **STOKES THEOREM.** (07)

b) Verify **STOKES THEOREM** for $\vec{A} = (2x - y)\hat{i} - yz^2\hat{j} - y^2z\,\hat{k}$, where surface S is the upper half of the Sphere $x^2 + y^2 + z^2 = 1$ and C is its boundary. (05)

Q.4: a) A block of mass m_1 = 9.5 kg slides on a plane inclined at an angle of 34°. The block is attached by a string to a second block of mass m_2 = 2.6 kg. The system is released from rest. Find the **acceleration** of the block and the **Tension** in the string. Take into account a **frictional force** between block and plane and use the values μ_s=0.24 and μ_k=0.15. (04)



b) Describe **HOOKE's LAW.** Apply this **Law** to calculate the **Work Done** by a **Mass-Spring** system ignoring any **Frictional Forces**. Also calculate its **POTENTIAL ENERGY.** (08)

Q.5: a) What do you mean by **DRAG FORCE?** Discuss the motion of a raindrop under the action of **Drag Force** and find its **TERMINAL SPEED.** (06)

b) State and prove the **Work-Energy Theorem.** (04)

c) Find **Curl** of $\vec{A} = xz^3\hat{i} - 2xy^2z\hat{j} + 2xyz^4\hat{k}$ at point (1, -1, 1). (02)

BS-Sd-18-22-2nd.

B.S.PHYSICS SEMESTER IST (FALL 2018-19) SESSION 2018 - 2022

COURSE CODE PHY-301 COURSE TITLE : MECHANICS-I

FACULTY: SCIENCE & TECNOLOGY MARKS 44 TIME 2 : 00 Hours

NOTE : ATTEMPT ALL QUESTIONS

QUESTION 2	(a)	Find an angle for which projectile has maximum range.	2
	(b)	Explain the collision in centre of mass reference system. Discuss applications obtaining velocities in centre of mass frame.	8
	(c)	A Toyota car of mass 2210 Kg is moving along a straight road at 105 km/h. It is followed by a Honda car with mass 2080 Kg moving at 43.5 km/h. How fast is the centre of mass of two cars moving?	5
QUESTION 3	(a)	Define Gauss's Divergence Theorem.	2
	(b)	What is meant by rotor? Find an expression for tangential speed of a man on the wall of the rotor.	8
	(c)	You are riding a toboggan down an icy run to a frozen lake and you accelerates 80 Kg Combination of you & toboggan from 1 m/s to 2 m/s .How much power does you require in 2 second.	5
QUESTION 4	(a)	What is meant by pseudo forces?	2
	(b)	Calculate centre of mass of i)uniform solid rod ii) uniform solid Hemisphere	7
	(c)	A roller coaster slowly lifts a car filled with passengers to a height of 25 m from which it accelerates downhill. With what speed the car reach the bottom?	5

GOVERNMENT COLLEGE UNIVERSITY, FAISALABAD

Affiliated Colleges Semester Examinations

Roll No:_____

BS Programme: Fall Semester 2019-20 **Semester:** I, **BS Chemistry**

Course Code: Phy-301 **Course Title:** Mechanics-1

Time Allowed: 20:00 Min. **Max. Marks:**36 **Cr. Hr.** 4(3-1)

FINAL TERM EXAMINATION

Note: ***Attempt all the questions.***

➢ ***Q No. 1*** ***MULTIPLE CHOICE QUESTIONS*** ***(12 × 1 = 12)***

Note: Tick one of the given options. Cutting or over-writing will not be obliged with any mark.

Sr.#	Statement	A	B	C	D
1	The velocity of projectile at maximum height is:	Zero	Maximum	Minimum	None of these
2	Which is same for all particles on a rotating rigid body:	v	θ	a	S
3	Waves transport from one place to another:	Energy	Momentum	Matter	Both of A and B
4	A force of 10 N makes an angle of 90 ° with x-axis. Its x-component is:	10 N	5 N	20 N	0 N
5	When a freely falling body attains the terminal velocity, then its acceleration will be equal to:	Zero	g	Maximum	$\frac{g}{2}$
6	The unit of time rate of change in momentum is:	Kg m s^{-1}	N S	N	S
7	For oscillating mass spring system, which is correct:	$\omega^2 = \frac{m}{k}$	$\omega^2 = \frac{k}{m}$	$\omega^2 = mk$	$\omega^2 = m + k$
8	In simple harmonic motion, at mean position:	P.E. is maximum	K.E. is maximum	Total energy is maximum	Total energy is minimum
9	If the source of waves as well as the observer are moving in the same direction with same velocity, the Doppler's shift will be:	Zero	Maximum	One	Neither maximum nor minimum
10	The distance between a node and very next anti-node is:	λ	λ/2	λ/4	2λ
11	Equation of continuity is based on law of conservation of :	Momentum	Energy	Mass	Charge
12	Which one of these is a type of mechanical waves:	Sound waves	Light waves	X-rays	γ-rays

BS Programme: Fall Semester 2019-20 **Semester:** I, **BS Chemistry**

Course Code: Phy-301 **Course Title:** Mechanics-I

Time Allowed: 01: 40 Hrs. **Max. Marks:**36 **Cr. Hr.** 4(3-1)

FINAL TERM EXAMINATION

Q(2): (a)- Define gradient of a scalar function. Show that grad $\phi = \nabla\phi$ **(4)**

(b)- Show that the magnitude a A × B is equal to the area of parallelogram having A and B as two adjacent sides. **(2)**

(c)- If ϕ is a scalar function then prove that curl (grad ϕ) = 0 **(2)**

Q(3): (a)- State equation of continuity. Derive an expression for it. **(4)**

(b)- Write four properties of stationary waves. **(2)**

(c)- Find the angle of projection of a projectile for which its maximum height is equal to its range. **(2)**

Q(4): (a)- What is Doppler's effect? Discuss Doppler's change in frequency when both of the source as well as the observer are moving:

(i)- Towards each other

(ii)- Away from each other. **(4)**

(b)- What is the difference between constructive and destructive interference? **(2)**

(c)- An ambulance emitting a whine at 1602 Hz overtakes and passes a cyclist pedaling a bike at 2.63 ms^{-1}. After being passed, the cyclist hears a frequency of 1590 Hz. How fast is the ambulance moving? (The speed of sound at 20°C is 343 ms^{-1}.) **(2)**

BS Programme: Fall Semester 2019-20 Semester: I, BS Chemistry

Course Code: PHY-301 Course Title: Mechanics-I

Time Allowed: 01: 40 Hrs. Max. Marks:36 Cr. Hr. 4(3-1)

FINAL TERM EXAMINATION

Q(2): (a)- Define gradient of a scalar function. Show that grad $\phi = \nabla\phi$ (4)

(b)- Show that the magnitude a $\mathbf{A} \times \mathbf{B}$ is equal to the area of parallelogram having **A** and **B** as two adjacent sides. (2)

(c)- If ϕ is a scalar function then prove that curl (grad ϕ) = 0 (2)

Q(3): (a)- State equation of continuity. Derive an expression for it. (4)

(b)- Write four properties of stationary waves. (2)

(c)- Find the angle of projection of a projectile for which its maximum height is equal to its range. (2)

Q(4): (a)- What is Doppler's effect? Discuss Doppler's change in frequency when both of the source as well as the observer are moving:

(i)- Towards each other

(ii)- Away from each other. (4)

(b)- What is the difference between constructive and destructive interference? (2)

(c)- An ambulance emitting a whine at 1602 Hz overtakes and passes a cyclist pedaling a bike at 2.63 ms^{-1}. After being passed, the cyclist hears a frequency of 1590 Hz. How fast is the ambulance moving? (The speed of sound at 20°C is 343 ms^{-1}.) (2)

GOVERNMENT COLLEGE UNIVERSITY, FAISALABAD
Affiliated Colleges Semester Examinations

Roll No._____

Programme: BS Physics (1st) Final Fall Semester 2019-20

Course Code: PHY-301 Course Title: Mechanics-I

Time Allowed: 20 Minutes Objective Marks:12 Cr. Hr. 3(3-0)

NOTE: Question No.1 is compulsory and its all parts carry equal marks, please attempt the answer on same paper and return it to the center superintendent with in the time allowed.

OBJECTIVE

Q. No. 1: Encircle the correct Option. Cutting or Erasing results into Zero mark. [12 x 1 = 12]

i) Kilowatt hour is the unit of
a-Power b-Work c-Acceleration d-Momentum

ii) The force in motion of rocket is
a-conservative b- variable c-non-conservative d- none

iii) Rocket equation is used to determine
a- increase b-decrease c- no effect d- constant

iv) In elastic collision K.E and momentum
a- not conserved b- conserved c-constant d- none

v) Newton's first law is also called
a- Law of moment b-Law of inertia c-Moment d-Inertia

vi) Product of mass and velocity is
a- impulse b- distance c- momentum d- velocity

vii) The commercial unit of electric energy
a-Kilowatt hour b-watt c-joule d-none

viii) Motion of projectile is ..... dimensional.
a- One b- Two c- Three d- Four

ix) Torque has zero value if the angle between r and F is
a- 0 degree b-30 degree c-90 degree d-60 degree

x) In projectile motion, the vertical component of velocity
a- remains constant b- varies c-increases with time d- becomes zero

xi) The velocity dependent forces are
a- Conservative forces b- variable forces c- Non-conservative forces d- none

xii) The angular momentum is
a- Vector quantity b- scalar quantity c- both d- None

Programme: BS Physics (1st) Final Fall Semester: 2019-20

Course Title: Mechanics-I Course Code: PHY-301 Cr. Hr. 3(3-0)

Time Allowed: 2 Hrs. Subjective Marks: 24

SUBJECTIVE

Attempt All Questions. Each question carry equal Marks. [6 x 4 = 24]

Q. No. 2: (a) State and prove Stokes theorem? (03)

(b) If A, B and C are vectors then Show that A . (B x C) = B . (C x A) = C . (A X B) (03)

Q. No. 3: (a) What is a rotor? Find an expression for tangential speed of a man on the wall of the rotor. (03)

(b) A circular curve of highway is designed for traffic moving at 60 Km/h. If the radius of curve is 150 m. What is the correct angle of banking of the road? (03)

Q. No. 4: (a) What is conservative and non-conservative force? Prove that elastic restoring force is conservative force? (04)

(b) Define Kilo Watt Hour. Prove that 1 Kwh = 3.6×10^6 J. (02)

Q. No. 5: (a) Explain elastic collision in one dimension. (03)

(b) What is center of mass? Calculate center of mass of solid uniform road. (03)

SINCE 1920

Govt. Emersion College Multan

Department of physics

Mid term exam	BS 1st Semester
MECHANICS (PHYS -101)	Prof. Hammad Abbas
Time 1:30hr	Marks 30

Note: Attempt all questions:

Q1: describe briefly: (2*10=20)

1) Differentiate between scalar field and vector field with examples?
2) What are the level surfaces, give example?
3) Differentiate between surface and line integral?
4) Why unit vectors have no units?
5) Show that $\cos^2 A+\cos^2 B+\cos^2 C = 1$
6) How conical pendulum is defined?
7) What do you mean by banking of the curves?
8) Define fictitious forces, give examples?
9) Is it possible to round a curve with zero acceleration?
10) State the Gauss's Divergence theorem?

Extensive:

Q2: State the Stokes theorem and derive its relations? (5)

Q3: Define projectile, derive the equations for its trajectory and time of flight when friction is neglected? (5)

Govt. Emerson College Multan
Department of Physics
Exam : Mid term

BS- Physics
Subject: Physics
Course Code: PHYS- 101
Total Marks: 30

Semester: 1st
Course Title: Mechanics - I
Credit hours : 3
Time Allowed: 1 hr 30 min

Q: 1 Attempt all short questions all questions carry equal marks. 12

i) Why do unit vectors $\hat{i}$, $\hat{j}$ and $\hat{k}$ have no units?
ii) Do Commutative and associative law apply to vector subtraction ?
iii) Can a scaler product be a negative quantity? Explain by an example.
iv) Is it possible to be accelerating if you are traveling at constant speed? Is it possible to round a curve with zero acceleration?
v) What is Pseudo force? Explain by an example?
vi) what is the equation of Trajectory of Projectile, what does this equation represents?

Extensive

2

a) State and explain Gradient of Vector field, give its physical significance and derive its formula. 6

b) Find the volume of parallelepiped having vectors $\vec{A}$, $\vec{B}$ and $\vec{C}$ as its edges where $\vec{A} = \hat{i} + 2\hat{j}$, $\vec{B} = 4\hat{j}$, $\vec{C} = \hat{j} + 3\hat{k}$. 3

3

a) Define and explain Terminal Speed derive its formula for free falling water droplet of mass "m" and discuss the result at "t" equal to infinity(∞) 6

b) A ball is thrown from a cliff with initial velocity 15 m/s at an angle of 20^{O} below horizontal. Find its horizontal and vertical components of displacement after 2 s.

3

SERVICE BEFORE SELF
SINCE 1920

GOVT. EMERSON COLLEGE, Multan

Mid Term Exam	*BS 1st Semester Physics (2018-22)*
Paper	*Mechanics (PHYS-101)*
Teacher	*Hammad Abbas*
Time 1:30hr	*Marks 30*

Q1: Describe briefly: *(2*6=12)*

(a) State the Gauss's theorem for the divergence?

(b) What do you mean Del (∇) operators and how can you describe in different vectors and scalar operations?

(c) Why do unit vectors have no units, give the examples?

(d) Three vectors lie in a same plane, what would be the orientation for zero resultant?

(e) What do you mean by scalar and vector fields, give the examples?

(f) What is the gradient of a scalar field, give the examples?

Extensive:

Q3: (a) Derive the relation for vector triple product and describe physically also

(b) Write the spherical and cylindrical coordinates in term of the Cartesian coordinate system? (7+

Q4: State the Stokes theorem and derive its relation for the line integral? (8)

Best of luck

Subject: Mechanics-II (PHY-302) **Class: BS (Physics) (2nd Sem...**

Instructions

(i) Question paper consists of two parts (objective & subjective)
(ii) Understanding of the question is the part of paper.
(iii) Don't write anything except your name and roll No on question paper.
(iv) **Answer the respective questions according to the given sequence otherwise credit will not be given.**

Name: [redacted]

Roll No: [redacted]

SUBJECTIVE PART **Allowed time: 150 Minutes**

Marks: 30

Q. No. 2: Explain the followings in detail. **(3+3 Marks)**

(i) Surface Tension
(ii) Bernoulli's equation

Q. No. 3:

(a) Compute the angular acceleration for the fly wheel, where $\varphi = at + bt^3 - ct^4$ is the function of angular displacement. **(3 Marks)**

(b) Two objects of mass m_1 and m_2 attached with the mass less rod of length **R** at position r_1 and r_2 so that $r_1 + r_2 = R$. Show that the moment of inertia about center of mass is equal to $I = \frac{m_1 m_2}{m_1 + m_2} R^2$. **(3 Marks)**

Q. No. 4: **(4 Marks)**

(a) State & prove Kepler's Law of periods.

(b) Earth is orbiting around the Sun with the time period $T = 3.15 \times 10^7$ sec and radius $r = 1.5 \times 10^{11}$ m. Compute the mass of Sun. **(2 Marks)**

Q. No. 5: **(3 Marks)**

(a) Differentiate between the Parallel and perpendicular axis theorem.

(b) Compute the rotational inertia of a thin uniform rod about an axis perpendicular to its length and passing through its center. **(3 Marks)**

Q. No. 6:

(a) A solid Cylinder of mass (M) and radius (R) starts from rest and rolls without slipping down on an inclined plane of length (L) and height (h). Find its acceleration, speed of its centre of mass and the force of static friction needed for rolling of this cylinder **(4 Marks)**

(b) What are the two conditions necessary for combined translational & rotational motion? **(2 Marks)**