ZIAUDDIN UNIVERSITY
EXAMINATION BOARD

EXAMINATION MATERIAL ZUEB - 2022

PHYSICS XI

SECTION "B" CONSTRUCTED RESPONSE QUESTION (CRQ)

CHAPTER 1: The Scope of Physics

TOPICS	SUB TOPICS
Contribution to physical sciences by Islamic world	Al-Khwarzmi Omer Khayyam Ibn – al – Haitham Al Razi Abu-Rehan Al – Beruni Yakoob Bin Ishaq Al Kindi Ibn–e-Sina
Measurement and the system of units	----------
Basic S.I units	❖ Time ❖ Electric current ❖ Thermodynamic temperature ❖ Luminous Intensity ❖ Amount of substance
Dimension	❖ Length
	❖ Electric current
	❖ Mass
	❖ Time
	❖ Temperature
	❖ Luminous Intensity
	❖ Amount of substance
Significant figure	----------

Short Questions:

1. Write down the contributions of Al-Razi and Al-Khwarizmi in Physical science.
2. Write down the dimensions of the following;
   - Gravitational Constant
   - Angular Momentum
   - Luminous Intensity

3 Show that following equation are dimensionally correct.

a) $s=vit+1/2at2$

b) $F=G \frac{m_1 m_2}{r^2}$

c) $V=\sqrt{T/\mu}$

d) $T=2\pi\sqrt{m/k}$

CHAPTER 2: Scalar and Vector

TOPICS	SUB TOPICS
Addition of vectors	Analytical determination of resultant of two vector and it's direction.
Types of vectors	❖ Unit vector ❖ Free vector ❖ Position Vector ❖ Null Vector
Properties of vector	❖ Commutative law ❖ Associative law
Resolution and composition by rectangular components	----------
Addition of vectors by rectangular components	----------
The Dot product	❖ Scalar product of two vectors ❖ Commutative law for dot product ❖ Distributive law for dot product
The cross product	❖ Properties of vector product

Short Questions:

1. Explain two scalar product and vector product. Also describe its important characteristics.
2. Cross product with example.
3. Type of vectors with mathematical representation.
4. Describe Addition of vector by rectangular component method.
5. Show that $\vec{A}\ (\vec{B} + \vec{C}) = \vec{A}.\vec{B} + \vec{A}.\vec{C}$
6. Find the projection of A 2 -2 j + K onto direction of B = UI – 3j + 7k
7. Two sides of tringle are formed by rector A = 2i – 3j – k and B = I + 4j – 2k
8. Prove that:- (A-B) + ([A x B]) = A2 B2
9. Show that: - AX B = - (B X A)
10. Two vector A and B are such that [AI = 3 IB] = 4 A.B = -5 find
    a) Angle b/w A and B
    b) The length [A + B] and d [A – B]

CHAPTER 3: Motion

TOPICS	SUB TOPICS
Equations of uniformly accelerated rectilinear motion	❖ $V_f = V_i + at$ ❖ $S = V_i t + ½ a t^2$ ❖ $Vf^2 = Vi^2 + 2 a S$
Motion of bodies connected by a string	Case # I When both the bodies move vertically Case # II When one body moves vertically and the other moves on a smooth horizontal surface
Momentum of a body	❖ Law of conservation of momentum ❖ Elastic collision in one dimension
The Inclined Plane	----------

Short Questions:

1. Define the laws of motion with mathematical representation. (All three LAWs)
2. State law of conservation of momentum.
3. Define friction and its types.
4. Derive an expression for acceleration of a body sliding down on frictionless inclined plane also show that two bodies sliding down on friction inclined plane have same acceleration.
5. State and prove law conservation of linear momentum.
6. A car is waiting at traffic signal when its turn green the car start ahead with constant acceleration 2m/s2 at same time a bus traveling with constant speed 10m/s overtake & passes the car
   (a) How far beyond its starting point will car overtake bus?
   (b) How fast will the car be moving?

   Numerical: Refer to TEXT BOOK= 2, 3, 5,11,12,13,14
7. A car start from **rest and is moving** with constant acceleration during 6^{th} second of its motion it cover a distance of 36meters. Find the acceleration of car.

CHAPTER 4: Motion and two dimensions

TOPICS	SUB TOPICS
Projectile Motion	❖ Maximum Height of the projectile ❖ Range of the projectile ❖ The maximum Range
Uniform circular motion	❖ Relation between angular and linear quantities ❖ Centripetal acceleration

Short Questions:

1. Define the projectile notion with example.

2. Define Angular displacement, velocity and acceleration, also give mathematical representation.
3. Show that RMAX = 4HMAX
4. Show that the range of the projectile is the same for $\theta = 45^o + \alpha$ and $\theta = 45^o - \alpha$
5. Define angular velocity. Derive the relation $v=r\omega$ ' or $a=r\alpha$
6. A driver leap from a tower with an initial horizontal velocity component of 7m/s and upward.. Velocity component of 3m/s. Find the component of her position velocity after 1 sec
7. NUMERICAL:= TEXT BOOK :- Q6,7, 8, 9, Q11, Q12.

CHAPTER 5: Torque, Angular Momentum and Equilibrium

TOPICS	SUB TOPICS
Torque	----------
Equilibrium	❖ First condition of an equilibrium ❖ Second condition of an equilibrium
Angular Momentum	❖ Conservation of angular momentum of a particle

Short Questions:

1. Define equilibrium and its types with relatable example.
2. Explain Second condition of Equilibrium by mathematical representation.
3. Write down the Law of conservation of angular momentum of a particle and also derive the expression.
4. Drive the formula due to couple
5 A practical of mass 400 gm calories in a circular orbit reclaim 20 CM all a late 1.5 ref/sec evaluate angular momentum of practical with respect to center of orbit,

6 NUMERICAL TEXT BOOK Q8

CHAPTER 6

1 Derive the expression for Variation "g" with altitude
2 How artificial gravity is created in spacecraft derive the formula for spinning frequency of space craft to provide artificial gravity

NUMERICAL:= TEXT BOOK = Q 2, 4 , 5, 6, 7

CHAPTER 7: Work, Power and Energy

TOPICS	SUB TOPICS
Work done against gravitational force	❖ Work done is independent to the path ❖ Work done in a close path is equal to zero
Absolute P.E	----------

Law of conservation of energy	----------

Short Questions:

1. How work can be done against the gravitation, explain using mathematical expression.
2. Write down the Law of conservation of energy with explanation.
3. Derive work-energy equation
4. What is conservative field ? prove that conservative field is gravitational field.
5. NUMERICAL:= TEXT BOOK Q1 , Q,5, Q6, Q7.

CHAPTER 8: Wave, Motion and Sound

TOPICS	SUB TOPICS
Characteristics of SHM	❖ The connection between uniform circular motion and SHM ❖ Velocity of a particle moves in a uniform circular motion
Energy in waves	----------
Standing Waves	----------
Fundamental frequency and Harmonics	❖ Frequency of first harmonic ❖ Frequency of second harmonic ❖ Frequency of third harmonic ❖ Frequency of n^{th} harmonic
Speed of sound waves	----------
Doppler's Effect	❖ When the listener is moving and source is at rest ❖ When the source is moving and the listener is at rest ❖ When both the source and listener are moving

Short Questions:

1. Write down the characteristics of SHM.
2. What is stationary wave? On what factors does the frequency of stationary wave in a stretched string depend?
3. Define the following terms.
   a) Intensity of Sound. b) Loudness c) Intensity Level d) Quality of Sound
4. Show that projection of a particle executing uniform circular motion is S.H.M
5. Define intensity of sound and loudness give web Fechner law and explain intensity level with its unit .

NUMERICAL: Text book 1, 3, 4, 5, 7, 8

CHAPTER 9: Nature of Light

TOPICS	SUB TOPICS
Young's double slit	----------
Interference of thin film	----------
Newton's Ring	----------
Diffraction	❖ Fresnel Diffraction ❖ Fraunhofer Diffraction
Diffraction Grating	----------

Short Questions:

1. What do you mean by interference of light? Give the conditions of interference of light wave.
2. Write short notes on any two of the following.
   a) Wave front and Huygens's principle
   b) Polarization of light.
   c) Diffraction grating
   d) Interference in the thin films.
   e) Michelson Interferometer.
3. What is diffraction? Differentiate between Fresnel and Fraunhofer diffraction.

TEXT BOOK ;= All numerical are Important and Included

CHAPTER 10: Geometrical Optics

TOPICS	SUB TOPICS
Combination of lenses	----------
The thin lens formula	----------
Magnifying Glass	----------
Compound Microscope	----------
Telescope	❖ Astronomical Telescope ❖ Galilean Telescope

Short Questions:

1. Obtain the thin lens formula for the convex lens.
2. Define the linear magnification process by mathematical expression.
3. Two thin convex lenses of focal length. f1 & f2 are placed in contact. Derive the formula for focal length combination.

TEXT BOOK;= All Numerical are Important and Included.