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FOR MANIPUR CLASS 11 PREPARATION

Manipur Board Class 11 Syllabus 2027 Physics

EXAM	YEAR	TYPE	SUBJECT
Manipur Class 11	2027	Syllabus	Physics

PHYSICS

THEORY

COURSE STRUCTURE

CLASS - XI

One Paper ***Times : 3 Hours*** ***70 Marks***

Unit	Contents	Marks
I	Physical World and Measurement	03
II	Kinematics	10
III	Laws of Motion	10
IV	Work, Energy and Power	06
V	Motion of System of Particles and Rigid Body	06
VI	Gravitation	05
VII	Properties of Bulk Matter	10
VIII	Thermodynamics	05
IX	Behaviour of Perfect Gas and Kinetic Theory	05
X	Oscillations and Waves	10
	Total:	**70**

Unit I: Physical World and Measurement (10 periods)

Need for measurement: Units of measurement; systems of units; SI units, fundamental and derived units. Significant figures. Dimensions of physical quantities, dimensional analysis and its applications.

Unit II: Kinematics (Periods 30)

Motion in a straight line: Speed and velocity. Instantaneous velocity. Uniformly accelerated motion, velocity-time and position-time graphs.
Relations for uniformly accelerated motion (graphical treatment). Scalar and vector quantities: position and displacement vectors, general vectors and their notations, equality of vectors, multiplication of vectors by a real number; addition and subtraction of vectors. Unit vector; Resolution of a vector in a plane, rectangular components. Scalar and vector product of vectors. Motion in a plane, cases of uniform velocity and uniform acceleration-projectile motion, uniform circular motion.

Unit III: Laws of Motion (Periods 16)

Intuitive concept of force, Inertia, Newton's first law of motion; momentum and Newton's second law of motion; Impulse; Newton's third law of motion. Law of conservation of linear momentum and its applications. Equilibrium of concurrent forces. Static and kinetic friction, laws of friction, rolling friction, lubrication.
Dynamics of uniform circular motion: Centripetal force, examples of circular motion (vehicle on level circular road, vehicle on banked road).

Unit IV: Work, Energy and Power **(Periods 16)**

Work done by a constant force and a variable force; kinetic energy, work-energy theorem, power.
Notion of potential energy, potential energy of a spring, conservative forces: non-conservative forces: motion in a vertical circle, elastic and inelastic collisions in one and two dimensions.

Unit V: Motion of System of Particles and Rigid Body **(Periods 18)**

Centre of mass of a two-particle system, momentum conversation and centre of mass motion. Centre of mass of a rigid body; centre of mass of uniform rod. Moment of a force, torque, angular momentum, law of conservation of angular momentum and its application.Equilibrium of rigid bodies, rigid body rotation and equations of rotational motion, comparison of linear and rotational motions;
Moment of inertia, radius of gyration, values of moments of inertia for simple geometrical objects (no derivation).

Unit VI: Gravitation **(Periods 14)**

Kepler's laws of planetary motion, universal law of gravitation. Acceleration due to gravity and its variation with altitude and depth. Gravitational potential energy and gravitational potential, escape velocity, orbital velocity of a satellite.

Unit VII: Properties of Bulk Matter **(Periods 28)**

Stress-strain relationship, Hooke's law, Young's modulus, bulk modulus, shear, modulus of rigidity, Poisson's ratio; elastic energy. Pressure due to a fluid column; Pascal's law and its applications (hydraulic lift and hydraulic brakes). effect of gravity on fluid pressure. Viscosity, Stokes' law, terminal velocity, streamline and turbulent flow. Critical velocity, Bernoulli's theorem and its applications.
Surface energy and surface tension, angle of contact, excess of pressure across a curved surface, application of surface tension, ideas to drops, bubbles and capillary rise.
Heat, temperature, thermal expansion; thermal expansion of solid, liquids and gases, anomalous expansion of water, specific heat capacity: Cp, Cv – calorimetry; change of state – latent heat capacity.
Heat transfer-conduction, convection and radiation, thermal conductivity, qualitative ideas of Blackbody radiation, Wien's displacement law, Stefan's law.

Unit VIII: Thermodynamics **(Periods 12)**

Thermal equilibrium and definition of temperature (zeroth law of thermodynamics). Heat, work and internal energy. First law of thermodynamics, isothermal and adiabatic processes.

Second law of thermodynamics: reversible and irreversible processes.

Unit IX: Behaviour of Perfect Gas and Kinetic Theory **(Periods 8)**

Equation of state of a perfect gas, work done on compressing a gas. Kinetic theory of gases – assumptions, concept of pressure. Kinetic interpretation of temperature; rms speed of gas molecules; degrees of freedom, law of equi-partition of energy (statement only) and application to specific heats capacities of gases; concept of mean free path, Avogadro's number.

Unit X: Oscillations and Waves **(Periods 28)**

Periodic motion – time period, frequency, displacement as a function of time, periodic functions. Simple harmonic motion (S.H.M) and its equation; phase; oscillations of a loaded spring–restoring force and force constant; energy in S.H.M.-kinetic and potential energies; Simple pendulum– derivation of expression for its time period.

Wave motion. Longitudinal and transverse waves, speed of travelling wave, displacement relation for a progressive wave. Principle of superposition of waves, reflection of waves, standing waves in strings and organ pipes, fundamental mode and harmonics, Beats.

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PHYSICS

PRACTICAL

CLASS - XI

Note : A. Every student will perform 12 experiments (6 from each section). The activities mentioned are for the purpose of demonstration by teachers only. These are not to be evaluated during the academic year. For evaluation in examination, students would be required to perform two experiments - one from each section. The report of one Activity should be submitted at the time for Examination.

B. Evaluation Scheme of Practical Examination :

Two experiments one each of the two sections :		8+8=16 Marks
Theory	2+2=4	
Observation/Data (procedure)	4+4=8	
Conclusion	1+1=2	
Accuracy of result	1+1=2	
Total	16	
Record of one Activity work and Viva base on the Activity :		5 Marks
Practical record of experiments :		5 Marks
Viva and experiments :		2+2=4 Marks
	Total	30 Marks

SECTION-A

EXPERIMENTS:

(Any 6 experiments out of the following to be performed by the students)

1. To measure diameter of a small spherical/cylindrical body using Vernier Callipers.
2. To measure internal diameter and depth of a given beaker/calorimeter using Vernier Callipers and hence find its volume.
3. To measure diameter of a given wire using screw gauge.
4. To measure thickness of a given sheet using screw gauge.
5. To measure volume of an irregular lamina using screw gauge.
6. To determine radius of curvature of a given spherical surface by a spherometer.
7. To find the weight of a given body using parallelogram law of vectors.
8. Using a simple pendulum, plot L-T and L-T^2 graphs. Hence find the effective length of a second's pendulum using appropriate graph.

9. To study the relationship between force of limiting friction and normal reaction and to find co- efficient of friction between a block and a horizotal surface.
10. To find the downward force, along an inclined plane, acting on a roller due to gravitational pull of the earth and study in relationship with the angle of inclination by plotting graph between force and sinθ.

ACTIVITIES OF SECTION - A (FOR THE PURPOSE OF DEMONSTRATION ONLY)

1. To make a paper scale of given least count, e.g. 0.2 cm.,0.5 cm.
2. To determine mass of a given body using a meter scale by Principle of moments.
3. To plot a graph for a given set of data with proper choice of scales and error bars.
4. To measure the force of limiting friction for rolling of a roller on a horizontal plane.
5. To study the variation in range of a jet of water with angle of projection.
6. To study the conservation of energy of a ball rolling down on inclined plane (using a double inclined plane).
7. To study dissipation of energy of a simple pendulum by plotting a graph between square of amplitude and time.

SECTION-B

EXPERIMENTS:

(Any 6 experiments out of the following to be performed by the students)

1. To determine Young's modulus of elasticity of the material of a given wire.
2. To find the force constant of a helical spring by plotting graph between load and extention.
3. To study the variation in volume with pressure for a sample of air at constant temperature by plotting graphs between P and V and between P and I/V.
4. To determine the surface tension of water by capillary rise method.
5. To determine the coefficient of viscosity of a given viscous liquid by measuring terminal velocity of a given spherical body.
6. To study the relationship between the temperature of a hot body and time by plotting a cooling curve.
7. To determine specific heat of a given (i) solid, (ii) liquid, by method of mixtures.
8. (i) To study the relation between frequency and length of a given wire under constant tension using sonometer.

   (ii) To study the relation between the length of a given wire and tension for constant frequency using sonometer.
9. To find the speed of sound in air at room temperature using a resonance tube by two-resonance positions.

ACTIVITIES OF SECTION - B (FOR THE PURPOSE OF DEMONSTRATION ONLY)

1. To observe change of state and plot a cooling curve for molten wax.
2. To observe and explain the effect of heating on a bi-metallic strip.
3. To note the change in level of liquid in a container on heating and interpret the observations.
4. To study the effect of detergent on surface tension by observing capillary rise.
5. To study the factors affacting the rate of loss of heat of a liquid.
6. To study the effect of load on depression of a suitably clamped meter scale loaded (i) at its end (ii) in the middle.

PRESCRIBED TEXT BOOKS:

1. Physics Part-I
Textbook for Class-XI.
Published by : NCERT, New Delhi.

2. Physics Part-II
Textbook for Class-XI
Published by : NCERT, New Delhi.

REFERENCE BOOKS:

1. Fundamental Physics
By: Dr. Gomber and K.L. Gogia
Published by : Pradeep Publications,
Jalandhar - 144008

2. New Millennium Physics for Class XI & XII
By: S.K. Sharma
Published by: S. Dinesh Sales Corporation, Jalandhar.

3. Modern's abc Physics
By: Satish K. Gupta
Published by: Modern Publishers, Jalandhar

4. Saraswati Lab Manual Physics for Class-XI (NCF 2023 Aligned)
By : Dr. R.K. Gupta & Ms. Rashika Gupta
Published by : New Saraswati House (India) Pvt. Ltd., New Delhi - 110002

5. Comprehensive Practical Physics for Class XI (New Edition)
By : J.N. Jaiswal
Published by : Laxmi Publications (P) Ltd., New Delhi - 110 002.

6. A Textbook of Practical Physics for Class XI
By: O. Kuber Singh
Published by: Writers Book Store, Paona Bazar, Imphal

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DESIGN OF QUESTION PAPER

Subject : **PHYSICS**
Paper : Theory
Class : XI
Full Mark : 70
Time : 3 Hours

1. WEIGHTAGE TO OBJECTIVES:

Objectives	Marks	Percentage
Knowledge (K)	10	15
Understanding (U)	35	50
Application (A)	21	30
Skill (S)	4	5
Total:	70	100

2. WEIGHTAGE TO FORM OF QUESTIONS:

Form of Questions	No. of Question	Time (in minutes)	Marks	Percentage
Essay/Long Answer (E/LA)	3	60	15	21
Short Answer (SA-I)	6	37	18	26
Short Answer (SA-II)	10	40	20	29
Very Short Answer (VSA)	7	21	7	10
MCQ	10	22	10	14
Total:	36	180	70	100

3. WEIGHTAGE TO CONTENT:

	UNIT/CONTENTS:	Marks	Percentage
I	Physical World and Measurement	03	05
II	Kinematics	10	14
III	Laws of Motion	10	14
IV	Work, Energy and Power	06	09
V	Motion of System of Particles and Rigid Body	06	09
VI	Gravitation	05	07
VII	Properties of Bulk Matter	10	14
VIII	Thermodynamics	05	07
IX	Behaviour of Perfect Gas and Kinetic Theory	05	07
X	Oscillations and Waves	10	14
	Total:	70	100

4. SCHEME OF SECTIONS: Nil

5. SCHEME OF OPTIONS:
1. Internal option will be given in Essay Type Question.
2. Internal option will be given in three questions of SA-I including one case study based question.

6. DIFFICULTY LEVEL:

Difficult	: 35% of the total marks
Average	: 50% of the total marks
Easy	: 15% of the total marks

Abbreviation: K(Knowledge), U(Understanding), A(Application), Skill(S), E/LA(Essay /Long Answer Type), SA(Short Answer Type), VSA(Very Short Answer Type), MCQ(Multiple Choice Question)

NOTE- (i) Two questions out of 10 (ten) questions of MCQ will be assertion & reason type question.
(ii) Only one question of SA-I will be Case Study Based question.

DESIGN OF QUESTION PAPER

Subject : PHYSICS
Paper : Practical
Class : XI
Full Marks : 30
Time : 3 Hours

Sl. No.	Forms of exercise	Nature of Exercise	Skill/Objective to be tested					Marks Allotted	Estimated Time in Minute
			O.S.	M.S	D.S.	R.S.	R.U		
1.	Short	Theory (Principle/ working formula/ illustration diagrams	0	0	1/0	3/4	0	4	40
2.	Short	Setting of instruments and using it.	0	2	0	0	2	4	20
3.	Major Experiment	Experimental procedure, tabulation, etc.	2	2	0	0	0	4	100
4.	Short	Reading of measurement	2	0	0	2	0	4	20
5.	Short	Viva-Voce	0	0	0	0	4	4	X
6.	Sessional Record	Practical Note Book	1	1	1	1	1	5	X
7.	Sessional Record	Record of one activity	1	1	1	1	1	5	X
Total			**6**	**6**	**3/2**	**7/8**	**8**	**30**	**180**

O.S.= Observational Skill, M.S.=Manipulative Skill, D.S. = Drawing Skill, R.S.= Reporting Skill, R.U.= Related Understandings.

* No fixed time is allotted for viva-voce. It is to be conducted during the course of the experiment.

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