I B.Sc. Physics Semester-I: Syllabus <u>2019-2020</u>

Department of Physics
PAPER I: MECHANICS& PROPERTIES OF MATTER

4 Hour/Week
Total Hours: 60

UNIT-I (10 hrs)
1. Vector Analysis
Scalar and vector fields, gradient of a scalar field and its physical significance. Divergence and curl of a vector field with derivations and physical interpretation. Vector integration (line, surface and volume), Statement and proof of Gauss and Stokes theorems.
Additional Inputs: Divergence of Curl of a Vector is Zero, Curl of Gradient of a Scalar is Zero

UNIT-II (10 hrs)
2. Mechanics of particles
Laws of motion, motion of variable mass system, Equation of motion of a rocket. Conservation of energy and momentum, Collisions in two and three dimensions, Concept of impact parameter, scattering cross-section, Rutherford scattering-derivation.
Additional Inputs : Multi Stage Rocket

UNIT-III (16 hrs)
3. Mechanics of Rigid bodies
Definition of rigid body, rotational kinematic relations, equation of motion for a rotating body, angular momentum, Euler equations and its applications, precession of a top, Gyroscope, precession of the equinoxes.
Deletions: Gyroscope
4. Mechanics of continuous media
Elastic constants of isotropic solids and their relations, Poisson's ratio and expression for Poisson's ratio in terms of y, n, k. Classification of beams, types of bending, point load, distributed load, shearing force and bending moment, sign conventions.

UNIT-IV (12hrs)
5. Central forces
Central forces, definition and examples, characteristics of central forces, conservative nature of central forces, conservative force as a negative gradient of potential energy, equatglobal ion of motion under a central force.Derivation of Kepler's laws.Motion of satellites, idea of Global Positioning System (GPS).

UNIT-V (12 hrs)
6. Special theory of relativity
Galilean relativity, absolute frames. Michelson-Morley experiment, negative result.Postulates of special theory of relativity.Lorentz transformation, time dilation, length contraction, addition of velocities, mass-energy relation.
Deletion: Addition of Velocities
REFERENCE BOOKS:

1. B. Sc. Physics, Vol.1, Telugu Academy, Hyderabad
2. Fundamentals of Physics Vol. I - Resnick, Halliday, Krane ,Wiley India 2007
3. Unified Physics, Vol. 1, S.L. Gupata & S. Guptha, Jai Prakash Nath & Co, Meerut.
4. College Physics-I. T. Bhimasankaram and G. Prasad. Himalaya Publishing House.
5. University Physics-FW Sears, MW Zemansky& HD Young,Narosa Publications, Delhi
6. Mechanics, S.G.Venkatachalapathy,Margham Publication, 2003.

Practical paper 1: Mechanics & Properties of Matter

Work load: 45 hrs
3 hrs/week

Minimum of 6 experiments to be done and recorded
1. Viscosity of liquid by the flow method (Poiseuille's method)
2. Young's modulus of the material of a bar (scale) by uniform bending
3. Young's modulus of the material a bar (scale) by non- uniform bending
4. Surface tension of a liquid by capillary rise method
5. Determination of radius of capillary tube by Hg thread method
6. Viscosity of liquid by Searle'sviscometer method
7. Bifilar suspension –moment of inertia of a regular rectangular body.
8. Determination of moment of inertia using Fly-wheel
9. Determination of the height of a building using a sextant.
10. Rigidity modulus of material of a wire-dynamic method (torsional pendulum)

Practicals   **50 marks (3 hr)**

Formula & Explanation	6
Tabular form +graph +circuit diagram	6
Observations	12
Calculation, graph, precautions & Result	6
Viva-Voce	10
Record	

Sc. Physics Semester-I,
Paper-I: MECHANICS& PROPERTIES OF MATTER

Blue Print **Module**	**Essay Questions 10 marks**	**Short Questions 5 marks**	**Marks allotted**
1. Unit - I	2	1+1Problem	30
2. Unit - II	2	1	25
3.Unit - III	2	1+1Problem	30
4.Unit -IV	2	1	25
5.Unit - V	2	1+1Problem	30
Total			140

SRI A S N M GOVERNMENT COLLEGE (A) , PALAKOL, W.G. DT
(Affiliated to Adikavi Nannaya University, Rajamahendravaram)
(Accredited with NAAC "B" Grade with 2.61 CGPA points)

I B.Sc.: Physics Semester- I (Model Paper)- (2019-20)
Paper I – MECHANICS & PROPERTIES OF MATTER

TIME: 3Hrs   **Max. Marks: 75**
SECTION-A

Answer All questions   **5x10=50M**

1. Define and describe divergence of a Vector field and give its physical significance.

   సదిశ క్షేత్రయొక్క అభిసరణంను నిర్వచించిదాని భౌతిక ప్రాముఖ్యతమివరింపుము.

   (Or)

   State Gauss and Stokes theorems. Prove Stoke's theorem.

   గౌస్ మరియు stoke's సిద్ధాంతములనునిర్వచించి stoke's సిద్ధాంతమునునిరూపించుము.

2. Explain briefly about system of variable mass and derive the equation of motion of rocket.

   చర ద్రవ్యయడగొయువనుభించి వివరించి రాకెట్ యొక్క చలనానికి సమీకరణం రాభాట్టుము

   (Or)

   Derive the expression for Rutherford Scattering angle.

   రూథర్ ఫర్డ్శీరక్షేపణకేణానికి సమీకరణం రాబట్టుము

3. Deduce Euler's equations of motion of a rigid body.

   దృడ వస్తువులనానికి యూలర్ సమీకరణాలు రాబట్టుము

   (or)

   Derive the relation between Y, n, k & σ

   Y, n, k & σ ల మధ్యసంభందం రాభట్టుము

4. Define Central force and show that central forces are conservative.

   కేంద్రీయబలాలును నిర్వచించి అపి నిత్యయత్వబలాలు అని చూపండి.

   (Or)

   State Kepler's Laws of planetary motion. Derive Kepler's First Law

   కెప్లర్రహగమన సియమాలను నిర్వచించి కెప్లరయొదటి సియమాన్సి రాబట్టండి

5. Describe Michelson Morley experiment and explain the negative result

   మైఖేల్సన్మోర్లేప్రయోగంనుపివరించి, ఋణాత్మకఖలితాన్సిపివరించండి.

   (or)

Deduce Lorentz transformation equations

లొరెంట్జ్రూపాంతర సమీకరణాలను రాభట్టండి

SECTION-B

Answer any THREE questions   3x5=15M

1. Define Curl and give its physical significance

   కర్ల్ను నిర్వచించి, దాని భౌతిక ప్రాముఖ్యతఉవరింపుము

2. Define Impact parameter and Scattering cross section.

   అభిఘాత పరామితి మరియు పరికర్షేపణమధ్యచ్ఛేదను నిర్వచించండి

3. Write about precession of equinoxes.

   విషువత్తులుటురనస్పరణం గురించి వివరించండి.

4. Describe Central forces with two examples.

   రెండు ఉదాహరణలతో కేంద్రీయబలాలను వివరించండి.

5. Derive Einstein's mass- energy relation.

   ఐనస్టీన్ద్రవ్యయదాశక్తి మధ్యసంబంధం రాభట్టండి

SECTION-C

Answer any TWO questions   2x5=10M

6. If $\bar{r}$ is a position vector at a point, show that $\nabla \cdot \bar{r} = 3$ and $\nabla x r = 0$

   ఒక బిందువ వడ్డ్ఘానుదిశ r ఐతే మరియు అని చూపుము.

7. A wire of length 3m and cross-sectional area 0.625 Sqcm is found to stretch by 0.3cm under a tension of 1200Kg. What is the Young's modulus of the material of the wire.

   వొడమ 3m, మధ్యయచ్ఛేదైకాల్యమy625 Sqcm గల ఒక తీగకు 1200Kg బరువను వ్రేలాడదీసినపుడు 0.3cm సాగినచో ఆ తీగ పదార్ధపయంగ్ గుణకము ఎంత?

8. Calculate the velocity of the rod when its length will appear 90% of its proper length

   ఒక కడ్డియొక్క సాపేక్షపొడమ దాని యొక్క సరైన పొడమలో 90% ఉంటే కడ్డియొక్క వేగము ఎంత?