ST. PHILOMENA'S COLLEGE (AUTONOMOUS)

Affiliated to University of Mysore
Accredited by NAAC with 'B^{++}' Grade
Bannimantap, Mysore, Karnataka,
India-570015

DEPARTMENT OF PHYSICS

Academic Year 2024-25

SYLLABUS FOR OPEN ELECTIVES
(SEMESTER IV)
3 Credits: 3 Lectures + 1 Tutorial

PHYSICS FOR ALL

Time: 2 hrs./week + 01 Hr tutorial

Unit I	**Energy and Power** Explosions and energy; Energy, heat and its units; Energy table and discussions; Discussion of cost of energy; Measuring energy; Power; Different power sources; Kinetic energy.	(13 Hours)
Unit II	**Gravity, Force and Space** The force of Gravity; Newton's third law; Weightlessness; Low earth orbit; Geosynchronous satellites; Spy satellites; Medium Earth Orbit satellite; Circular Acceleration; momentum; Rockets; Airplanes, helicopters and fans; Hot air and helium balloons; angular momentum and torque.	(13 Hours)
Unit III	**Nuclei and radioactivity** Radioactivity; Elements and isotopes; Radiation and rays; Seeing radiation; The REM – The radiation poisoning; Radiation and cancer; The linear hypothesis; Different types of radiation; The half-life rule; Smoke detectors; measuring age from radioactivity; Environmental radioactivity; Glow of radioactivity; Nuclear fusion.	(13 Hours)
Unit IV	**Climate change** Global warming; IPCC; A brief history of climate; carbon dioxide; The greenhouse effect; Enhancement of Greenhouse effect; Hurricane and tornadoes; Antarctica; Fluctuations; Paleoclimate; Global warming vs Human caused global warming; Can we stop global warming?, Fossil Fuel Resources; Energy security; Energy efficiency and conservation; Bio-fuels; Nuclear, Wind and Solar power.	(13 Hours)
	References This course is extracted from the book titled "Physics and Technology for Future Presidents: An Introduction to the Essential Physics Every World Leader Needs to Know" by Richard A Muller, WW Norton and Company, 2007. (Unit-1 to 4 are from chapters 1, 3, 4 and 10, respectively).	

SPACE MISSIONS

Time: 2 hrs./week + 01 Hr tutorial

Unit 1:	**Introduction to Space Missions :** Rockets, types and their applications, Different types of orbits, Artificial satellites – basic idea and their applications, Introduction to Space Missions, Beginning of Space Missions - World and India, Applications of Space Research, Space crafts, Launching Vehicles.	**13 Hours**
Unit 2:	**National Aeronautics and Space Administration (NASA)** About NASA and its Goals, History of Creation. Foundational human spaceflight: X-15 program (1954–1968), Project Mercury (1958–1963), Project Gemini (1961–1966), Project Apollo (1960–1972), Skylab (1965–1979), Apollo-Soyuz (1972–1975). Modern human spaceflight programs: Space Shuttle program (1972–2011), International Space Station (1993–present), Constellation program (2005–2010), Commercial Crew Program (2011–present), Journey to Mars (2010–2017), Artemis program (2017–present).	13 **Hours**
Unit 3:	**Indian Space Research Organisation (ISRO)** About ISRO and its Goals, History of Creation. General Satellite Programmes: The IRS series, The INSAT series. Gagan Satellite Navigation System, Navigation with Indian Constellation (NavIC), Other satellites. Launch vehicles: Satellite Launch Vehicle (SLV), Augmented Satellite Launch Vehicle (ASLV), Polar Satellite Launch Vehicle (PSLV), Geosynchronous Satellite Launch Vehicle (GSLV). Experimental Satellites: Details and applications (Any Five) Earth Observation Satellites: Details and applications (Any Five) Communication satellites: Details and applications (Any Five)	**13 Hours**

	Self Study: Major Space Centres in the World (at least 10) – brief idea about their location, establishment, capabilities and achievements. People behind space programs – at least 2 from India. Successful Missions (Any Five). **Activities*:** • Design of working model of Rocket launching. • Preparation of report and presentation on application of satellites in agriculture, communication, weather forecasting, exploration of natural resources and Global positioning system (GPS). * Faculty may suggest any other relevant activity as well. Preparation of report and presentation onApollo 11: A Success story	
	Activities: • Preparation of report and presentation on the recent space missions of NASA. • Preparation of report on any one proposed space programmeof NASA. * Faculty may suggest any other relevant activity as well. Chandrayaan 1: Details and applications. Mars Orbiter Mission: Details and applications. **Activities:** • Preparation of report and presentation on the recent space missions of ISRO. • Preparation of report and presentation on any one proposed space programmeof ISRO. • Preparation of report and presentation on the contributions of Scientists from Karnataka to Indian Space Program and use of space technology in the local district. * Faculty may suggest any other relevant activity as well.	

FOR THE ACADEMIC YEAR 2024-25
SUBJECT – PHYSICS

BLUE PRINT
For OE Papers

Time: 02 hours 30 min **Max. Marks: 60**

Part-A

Answer any TWO questions **10 X 2=20 Marks**

1.	Concept/ understanding / application based short or long answer questions to be set.	Total three questions to be set from unit 1.	10 Marks
2.			10 Marks
3.			10 Marks

Part-B

Answer any TWO questions **10 X 2=20 Marks**

4.	Concept/ understanding / application based short or long answer questions to be set.	Total three questions to be set from unit 2.	10 Marks
5.			10 Marks
6.			10 Marks

Part-C

Answer any TWO questions **10 X 2=20 Marks**

7.	Concept/ understanding / application based short or long answer questions to be set.	Total three questions to be set from unit 3.	10 Marks
8.			10 Marks
9.			10 Marks