SYLLABUS- OPEN ELECTIVE-1 FOR 6TH SEMESTER STUDENTS OF CSE,IT, ECE and AI&DS

OAS351 SPACE SCIENCE **L T P C 3 0 0 3**

COURSE OBJECTIVES:

- To outline the space environment and their effects.
- To extend the origin of universe and development.
- To classify the galaxies and their evolution.
- To interpret the variable stars in the galaxies.
- To explain theory of formation of our solar system.

UNIT I INTRODUCTION 9

Introduction to space science and applications – historical development – Space Environment-Vacuum and its Effects, Plasma & Radiation Environments and their Effects, Debris Environment and its Effects - Newton's Law of gravitation – Fundamental Physical Principles.

UNIT II ORIGIN OF UNIVERSE 9

Early history of the universe – Big-Bang and Hubble expansion model of the universe – cosmic microwave background radiation – dark matter and dark energy.

UNIT III GALAXIES 7

Galaxies, their evolution and origin – active galaxies and quasars – Galactic rotation – Stellar populations – galactic magnetic field and cosmic rays.

UNIT IV STARS 10

Stellar spectra and structure – stellar evolution – Nucleo-synthesis and formation of elements – Classification of stars – Harvard classification system – Hertsprung-Russel diagram – Luminosity of star – variable stars – composite stars (white dwarfs, Neutron stars, black hole, star clusters, supernova and binary stars) – Chandrasekhar limit.

UNIT V SOLAR SYSTEM 10

Nebular theory of formation of our Solar System – Solar wind and nuclear reaction as the source of energy – Sun and Planets: Brief description about shape size – period of rotation about axis and period of revolution – distance of planets from sun – Bode's law – Kepler's Laws of planetary motion – Newton's deductions from Kepler's Laws – correction of Kepler's third law – determination of mass of earth – determination of mass of planets with respect to earth – Brief description of Asteroids – Satellites and Comets.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

On successful completion of this course, the student will be able to

CO1:Obtain a broad, basic knowledge of the space sciences.

CO2:Explain the scientific concepts such as evolution by means of natural

selection, age of the Earth and solar system and the Big-Bang.

CO3:Describe the main features and formation theories of the various types of observed galaxies, in particular the Milky Way.

CO4:Explain stellar evolution, including red giants, supernovas, neutron stars, pulsars, white dwarfs and black holes, using evidence and presently accepted theories;

CO5:Describe the presently accepted formation theories of the solar system based upon observational and physical constraints;

TEXT BOOKS:

1. Hess W., "Introduction to Space Science", Gordon & Breach Science Pub; Revised Ed., 1968.
2. Krishnaswami K. S., "Astrophysics: A modern Perspective", New Age International, 2006.

REFERENCES:

1. Arnab Rai Choudhuri, "Astrophysics for Physicists", Cambridge University Press, New York, 2010.
2. Krishnaswami K. S., "Understanding cosmic Panorama", New Age International, 2008.

OCE351 ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT L T P C 3 0 0 3

COURSE OBJECTIVE:

- To impart the knowledge and skills to identify, assess and mitigate the environmental and social impacts of developmental projects

UNIT I INTRODUCTION **9**

Impacts of Development on Environment – Rio Principles of Sustainable Development- Environmental Impact Assessment (EIA) – Objectives – Historical development – EIA Types – EIA in project cycle –EIA Notification and Legal Framework–Stakeholders and their Role in EIA– Selection & Registration Criteria for EIA Consultants

UNIT II ENVIRONMENTAL ASSESSMENT **9**

Screening and Scoping in EIA – Drafting of Terms of Reference,Baseline monitoring, Prediction and Assessment of Impact on land, water, air, noise and energy, flora and fauna - Matrices – Networks – Checklist Methods - Mathematical models for Impact prediction – Analysis of alternatives

UNIT III ENVIRONMENTAL MANAGEMENT PLAN **9**

Plan for mitigation of adverse impact on water, air and land, water, energy, flora and fauna – Environmental Monitoring Plan – EIA Report Preparation – Review of EIA Reports – Public Hearing-Environmental Clearance Post Project Monitoring

UNIT IV SOCIO ECONOMIC ASSESSMENT **9**

Baseline monitoring of Socio economic environment – Identification of Project Affected Personal – Rehabilitation and Resettlement Plan- Economic valuation of Environmental impacts – Cost benefit Analysis-

UNIT V CASE STUDIES **9**

EIA case studies pertaining to Infrastructure Projects – Real Estate Development - Roads and Bridges – Mass Rapid Transport Systems - Ports and Harbor – Airports - Dams and Irrigation projects - Power plants – CETPs- Waste Processing and Disposal facilities – Mining Projects.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

The students completing the course will have ability to

CO1:carry out scoping and screening of developmental projects for environmental and social assessments

CO2:explain different methodologies for environmental impact prediction and assessment

CO3:plan environmental impact assessments and environmental management plans

CO4:evaluate environmental impact assessment reports

TEXTBOOKS:

1. Canter, R.L, “Environmental impact Assessment “, 2nd Edition, McGraw Hill Inc, New Delhi,1995.
2. Lohani, B., J.W. Evans, H. Ludwig, R.R. Everitt, Richard A. Carpenter, and S.L. Tu, “Environmental Impact Assessment for Developing Countries in Asia”, Volume 1 – Overview, Asian Development Bank,1997.
3. Peter Morris, Riki Therivel “Methods of Environmental Impact Assessment”, Routledge Publishers,2009.

REFERENCES:

1. Becker H. A., Frank Vanclay,“The International handbook of social impact assessment” conceptual and methodological advances, Edward Elgar Publishing, 2003.
2. Barry Sadler and Mary McCabe, “Environmental Impact Assessment Training Resource Manual”, United Nations Environment Programme, 2002.
3. Judith Petts, “Handbook of Environmental Impact Assessment Vol. I and II”, Blackwell Science New York, 1998.
4. Ministry of Environment and Forests EIA Notification and Sectoral Guides, Government of India, New Delhi, 2010.

OEE351 RENEWABLE ENERGY SYSTEM L T P C 3 0 0 3

COURSE OBJECTIVES:

- To Provide knowledge about various renewable energy technologies
- To enable students to understand and design a PV system.
- To provide knowledge about wind energy system.
- To Provide knowledge about various possible hybrid energy systems
- To gain knowledge about application of various renewable energy technologies

UNIT I INTRODUCTION 9

Primary energy sources, renewable vs. non-renewable primary energy sources, renewable energy resources in India, Current usage of renewable energy sources in India, future potential of renewable energy in power production and development of renewable energy technologies.

UNIT II SOLAR ENERGY 9

Solar Radiation and its measurements, Solar Thermal Energy Conversion from plate Solar Collectors, Concentrating Collectors and its Types, Efficiency and performance of collectors,. Direct Solar Electricity Conversion from Photovoltaic, types of solar cells and its application of battery charger, domestic lighting, street lighting, and water pumping, power generation schemes. Recent Advances in PV Applications: Building Integrated PV, Grid Connected PV Systems,

UNIT III WIND ENERGY 9

Wind energy principles, wind site and its resource assessment, wind assessment, Factors influencing wind, wind turbine components, wind energy conversion systems (WECS), Classification of WECS devices, wind electric generating and control systems, characteristics and applications.

UNIT IV BIO-ENERGY 9

Energy from biomass, Principle of biomass conversion technologies/process and their classification, Bio gas generation, types of biogas plants, selection of site for biogas plant, classification of biogas plants, Advantage and disadvantages of biogas generation, thermal gasification of biomass, biomass gasifies, Application of biomass and biogas plants and their economics.

UNIT V OTHER TYPES OF ENERGY 9

Energy conversion from Hydrogen and Fuel cells, Geo thermal energy Resources, types of wells, methods of harnessing the energy, potential in India. OTEC, Principles utilization, setting of OTEC plants, thermodynamic cycles. Tidal and wave energy: Potential and conversion techniques, mini- hydel power plants and their economics.

TOTAL: 45 PERIODS

OURSE OUTCOMES:

At the end of the course students will be able to:

CO1: Attained knowledge about various renewable energy technologies

CO2: Ability to understand and design a PV system.

CO3: Understand the concept of various wind energy system.

CO4: Gained knowledge about various possible hybrid energy systems

CO5: Attained knowledge about various application of renewable energy technologies

REFERENCES

1. Twidell & Wier,**'**Renewable Energy Resources' CRC Press(Taylor & Francis).
2. Tiwari and Ghosal/ Narosa,'Renewable energy resources'.
3. D.P.Kothari, K.C.Singhal,'Renewable energy sources and emerging technologies', P.H.I.
4. D.S.Chauhan, S.K. Srivastava, 'Non – Conventional Energy Resources', New Age Publishers, 2006.
5. B.H.Khan, 'Non – Conventional Energy Resources', Tata Mc Graw Hill, 2006.

OMA351 GRAPH THEORY **L T P C 3 0 0 3**

COURSE OBJECTIVES

- To understand the graph models and basic concepts of graphs.
- To study the characterization and properties of trees and graph connectivity.
- To provide an exposure to the Eulerian and Hamiltonian graphs.
- To introduce Graph colouring and explain its significance.
- To provide an understanding of Optimization Graph Algorithms.

UNIT I INTRODUCTION TO GRAPHS 9

Graphs and Graph Models – Connected graphs – Common classes of graphs – Multi graphs and Digraphs – Degree of a vertex – Degree Sequence – Graphs and Matrices – Isomorphism of graphs.

UNIT II TREES AND CONNECTIVITY 9

Bridges – Trees – Characterization and properties of trees – Cut vertices – Connectivity

UNIT III TRAVERSABILITY 9

Eulerian graphs – Characterization of Eulerian graphs – Hamiltonian graphs – Necessary condition for Hamiltonian graphs – Sufficient condition for Hamiltonian graphs

UNIT IV PLANARITY AND COLOURING 9

Planar Graphs – The Euler Identity – Non planar Graphs – Vertex Colouring – Lower and Upper bounds of chromatic number.

U**NIT V OPTIMIZATION GRAPH ALGORITHMS 9**

Dijkstra's shortest path algorithm – Kruskal's and Prim's minimum spanning tree algorithms – Transport Network – The Max-Flow Min-Cut Theorem – The Labeling Procedure – Maximum flow problem.

TOTAL: 45 PERIODS

COURSE OUTCOMES

At the end of this course, the student will be able to
CO1:Apply graph models for solving real world problem.
CO2:Understand the importance the natural applications of trees and graph connectivity.
CO3:Understand the characterization study of Eulerian graphs and Hamiltonian graphs.
CO4:Apply the graph colouring concepts in partitioning problems.
CO5:Apply the standard optimization graph algorithms in solving application problems.

TEXT BOOKS

1. Gary Chatrand and Ping Zhang, “Introduction to Graph Theory”, Tata McGraw – Hill companies Inc., New York, 2006.
2. Ralph P. Grimaldi, “Discrete and Combinatorial Mathematics, An applied introduction" Fifth edition, Pearson Education, Inc, Singapore, 2004.

REFERENCES

1. Balakrishnan R. and Ranganathan K., “A Text Book of Graph Theory”, Springer – Verlag, New York, 2012.
2. Douglas B. West, “Introduction to Graph Theory”, Pearson, Second Edition, New York, 2018.