

**15AC (D-3-3) Revised Syllabi of Mathematics Courses in B Sc (Pass Course):**

The Council approved the revisions in Mathematics courses of B Sc (Pass Course) Programme. Revised syllabi will be applicable from academic session 2016-17.

**15AC (D-3-4) Modifications in Syllabi of Physics Courses in B Sc (Pass Course):**

The Council approved the revised syllabi of Physics courses for B Sc (Pass Courses) Programme.

This will be effective from academic session 2016-17.

**15AC (D-4) FACULTY OF MANAGEMENT & COMMERCE**

**15AC (D-4-1) Syllabi of B Com (Hons.):**

The Council approved the syllabi of B Com (Hons) in Accounting Programme. These courses are aligned with ACCA (Association of Chartered Certified Accountants).

This will be offered from Batch 2016-19.

**15AC (D-4-2) Programme Elective (BBA):**

The Council approved the proposal of inclusion of two additional optional groups viz. Marketing and Human Resource Management as Programme Electives for BBA Programme. It was emphasized that minimum student strength as per University guidelines be maintained for running any elective programme.

These will be effective for V and VI Semester of batch 2014-17.

**15AC (D-5) FACULTY OF DESIGN**

**15AC (D-5-1) Revision in the Scheme of BFA:**

The Council approved the proposed changes in the examination scheme of BFA Programme. The revised version of the scheme will be effective from academic session 2016-17.

It was advised that a written test should be an integral component of the Practical Examination and that distribution of marks in end / in semester examination should follow the standard practice.



**1.1.2 Percentage of Programmes where syllabus revision was carried out during the last five years**

<b>B. Sc. (Pass) Physics</b>	
<b>Prior Revision</b> (Highlighted in red: removed)	<b>Post revision</b> (Highlighted in yellow: added)
<b>Reference Part format</b>	<b>Reference Part format</b>
<p>References:</p> <ol style="list-style-type: none"> <li>1. Bohm D, The Special Theory of Relativity, Benjamin, New York, (1965)</li> <li>2. Born M. , Einsteins Theory of Relativity, Dover, New York, (1962)</li> <li>3. French A.P, Special Relativity, ELBS, London, (1984)</li> <li>4. Resnik R, Relativity, New Age International, New Delhi, (1980)</li> <li>5. Smith J. H, Introduction to special Relativity, Benjamin, New York, (1965)</li> <li>6. Purcell, E M, Berkeley Physics Course, Vol.1, Mechanics, McGraw-Hill.</li> <li>7. Feynman, R P, R B Lighton and M Sands, The Feynman Lectures in Physics, Vol.1, B I Publication</li> </ol>	<p><b>Text Books:</b></p> <ol style="list-style-type: none"> <li>1. Mathur D S and Hemne P S, Mechanics, S. Chand (2000).</li> <li>2. Resnick R, Introduction to Special Relativity, John Wiley and Sons (2007).</li> <li>3. Chatterjee H L and Sengupta R, A Treatise on General Properties of Matter, New Central Book Agency (2016).</li> </ol> <p><b>Reference Books:</b></p> <ol style="list-style-type: none"> <li>1. Resnick R, Halliday D and Walker J, Principles of Physics, Wiley (2015).</li> <li>2. Upadhyaya J C, Classical Mechanics, Himalaya Pub. House, (2005)</li> <li>3. Bohm D, The Special Theory of Relativity, Benjamin, New York, (1965).</li> <li>4. French A P, Special Relativity, ELBS, London, (1984).</li> <li>5. Smith J H, Introduction to special Relativity, Benjamin, New York, (1965).</li> <li>6. Purcell E M, Berkeley Physics Course, Vol-I Mechanics, McGraw-Hill (1973).</li> <li>7. Puri S P, Special Theory of Relativity, Pearson Edu. (2013).</li> </ol>
<b>PY 1211 Oscillations and Wave Optics [2 1 0 3]</b>	<b>PY 1211 Oscillations and Wave Optics [2 1 0 3]</b>
<p>Potential well and periodic oscillations, harmonic oscillations, differential equation and its solution, kinetic and potential energy, <b>examples of simple harmonic oscillations, spring and mass system, simple and compound pendulum, torsional pendulum, LC circuit</b>, oscillations of two masses connected by a spring. Motion of two coupled oscillators, normal modes, N coupled oscillators, damped harmonic oscillator, power dissipation, quality factor, driven harmonic oscillator, transient and steady states, power absorption, resonance in systems with many degrees of freedom. Wave Optics Interference: The principle</p>	<p>Potential well and periodic oscillations, harmonic oscillations, differential equation and its solution, kinetic and potential energy, <b>applications of simple harmonic oscillations</b>, oscillations of two masses connected by a spring. Motion of two coupled oscillators, normal modes, N coupled oscillators, damped harmonic oscillator, power dissipation, quality factor, driven harmonic oscillator, transient and steady states, power absorption, resonance in systems with many degrees of freedom. Wave Optics: <b>Lasers: Laser systems: Purity of a spectral line, coherence length and coherence time, spatial coherence of a source, Spontaneous and induced emissions, Einstein's</b></p>

<p>of superposition. Two-silt interference, coherence requirement for the sources, Localized fringes; thin films and applications, Fringes of equal inclination, Newton's Ring Experiment, Michelson interferometer and its application for precision determination of wavelength, wavelength difference and the width of spectral lines. Diffraction: Fresnel and Fraunhofer diffraction, Fraunhofer diffraction due to single slit, Diffraction due to N parallel slits, intensity distribution, plane diffraction grating, reflection grating and blazed gratings. Resolving power of a grating and its comparison with resolving power of prism, Rayleigh criterion, resolving power of telescope and microscopic systems, outline of phase contrast microscopy Polarization: Double refraction and optical rotation, phase retardation plates, double image prism, Rotation of plane of polarization, origin of optical rotation in liquids and in crystals, Specific rotation, Polarimeters Lasers: <b>Laser systems: Purity of a spectral line, coherence length and coherence time, spatial coherence of a source, Einstein's A and B coefficients, Spontaneous and induced emissions, conditions for laser action, population inversion, spatial coherence and directionality, He- Ne Laser, Pulsed lasers and tunable lasers, Applications of Lasers</b></p>	<p><b>A and B coefficients, conditions for laser action, population inversion, He-Ne Laser, Pulsed lasers and tunable lasers, Applications of Lasers.</b> Interference: The principle of superposition. Two-silt interference, coherence requirement for the sources, Localized fringes; thin films and applications, Fringes of equal inclination, Newton's Ring Experiment, Michelson interferometer and its application for precision determination of wavelength. Diffraction: Fresnel and Fraunhofer diffraction, Fraunhofer diffraction due to single slit, Diffraction due to N parallel slits, intensity distribution, plane diffraction grating, reflection grating and blazed gratings. Resolving power of a grating and its comparison with resolving power of prism, Rayleigh criterion. Polarization: Malus law, Brewster's law, Double refraction, phase retardation plates, optical rotation, origin of optical rotation in liquids and in crystals. T</p>
<p><b>PY 1612 Nuclear Physics [2 1 0 3]</b></p>	<p><b>PY 1612 Nuclear Physics [2 1 0 3]</b></p>
<p>Nuclear Properties and Energy: Mass, radius, angular momentum, magnetic moment, electric quadrupole moment, parity, Coulomb scattering of a charged particle by nucleus, properties of nuclear forces, Binding energy, mass effect, Liquid drop model, semi empirical mass formula Subatomic particles: Properties of particles, classification in to leptons mesons and baryons, matter and antimatter, conservation laws (qualitative discussion) energy, momentum, angular momentum, charge, lepton number, Baryon number, Isospin, strangeness, fundamental quark structure of baryons. Particle Accelerator: Principle and working of linear accelerators cyclotron, synchrotron betatron, Electron synchrotron, Proton synchrotron Nuclear Detectors: Ionization chamber, proportional counter and Geiger counter. Nuclear Fission and Fusion: Energy release in Nuclear fission and fusion, Liquid Drop Model,</p>	<p>Nuclear Properties and Energy: Mass, radius, angular momentum, magnetic moment, electric quadrupole moment, parity, Coulomb scattering of a charged particle by nucleus (<b>Rutherford Scattering - qualitative discussion only</b>) properties of nuclear forces, Binding energy, mass effect, Liquid drop model, semi empirical mass formula. Subatomic particles: Properties of particles, classification in to leptons mesons and baryons, matter and antimatter, conservation laws (qualitative discussion) energy, momentum, angular momentum, charge, lepton number, Baryon number, Isospin, strangeness, fundamental quark structure of baryons. Particle Accelerator: Principle and working of linear accelerators -cyclotron, synchrotron, <b>discussion of relation between particle energy and radius and magnetic field,</b> Electron synchrotron, Proton synchrotron, betatron. Nuclear Detectors: Ionization chamber, proportional counter, <b>scintillation counter, Geiger counter, brief discussion on solid state detectors.</b> Nuclear Fission and Fusion: Energy release in</p>



<p>Qualitative discussion of elements of a nuclear reactor, Uncontrolled reaction, and atomic bomb, Carbon- nitrogen and proton- proton cycle.</p>	<p>nuclear fission and fusion, Liquid Drop Model, Qualitative discussion of elements of a nuclear reactor, uncontrolled nuclear reaction, Carbon-nitrogen and proton- proton cycle</p>
<p>PY 1611 Atomic and Molecular Spectroscopy [2 1 0 3]</p>	<p>PY 1611 Atomic and Molecular Spectroscopy [2 1 0 3]</p>
<p>Atomic Physics: Spectra of Hydrogen, Deuterium and alkali atoms spectral terms, doublet fine structure, screening constants for alkali spectra for s, p, d and f states, selection rules. Singlet and triplet fine structure in alkaline earth spectra, L-S and J-J couplings.</p> <p>Weak spectra: continuous X-ray spectrum and its dependence on voltage, Duane and Hunt's law. Characteristics X rays, Moseley's law, doublet structure of X-ray spectra, X-ray absorption spectra.</p> <p>Molecular Physics</p> <p>Discrete set of electronic energies of molecules, quantization of vibrational and rotational energies, and determination of internuclear distance, pure rotational and vibrational spectra. Dissociation limit for the ground and other electronic states, transition rules for pure vibration and electronic vibration spectra. Raman effect, Stokes and anti-Stokes lines, complimentary character of Raman and infrared spectra, experimental arrangements for Raman spectroscopy.</p> <p>Spectroscopic techniques: sources of excitation, prism and grating spectrographs for visible, UV and IR, absorption spectroscopy, double beam instruments.</p>	<p>Atomic spectra: Spectra of Hydrogen and Deuterium, Isotope effect and deduction of electron to Proton mass ratio, L-S coupling, Spectral terms arising from L-S coupling, Doublet fine structure of hydrogen lines; Spectra of alkali atoms, screening constants for alkali spectra for s, p, d and f states, series limits, doublet structure of alkali spectrum, spectra of helium atom, singlet and triplet series, selection rules.</p> <p>Magnetic field effect :Effect on energy levels; Gyromagnetic ratios for orbital and spin moments; Lande g factor, strong and weak field effects, illustrative cases of H, Na, and Hg. J-J couplings,</p> <p>X- ray spectra: continuous X-ray spectrum , Duane and Hunt's law, Characteristics X rays, Moseley's law, doublet structure of X-ray spectra, X-ray absorption spectra.</p> <p>Molecular Spectra: Electronic levels and quantum numbers for electronic states of diatomic molecules: singlet and triplet characters. Rational energy levels, inter nuclear distance, Vibration energy levels, force constants, isotope effect on rotational and vibration energies. Spectra of diatomic molecules: Pure rotation spectra: selection rules. Vibration rotation spectra: selection rules, P, Q, and R branches, Electronic band system, sequences and progressions.</p> <p>Raman effect: Stokes and anti-Stokes lines, complimentary character of Raman and infrared spectra.</p> <p>Emission/Absorption spectroscopy: sources, prism, grating and crystal spectrographs, Prism material useful for UV, V and IR regions, constant deviation systems. Concave grating, mountings, monochromators, resolution and dispersion in various spectrographs; sources for absorption studies in X-ray, UV, V and IR region, single-beam and double-beam instrument, detection systems , Lasers in spectroscopy</p>

**Dr. Babita Malik [MU - Jaipur]**

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**From:** Pardasani <rtpardasani@curaj.ac.in>  
**Sent:** Saturday, July 08, 2017 12:00 PM  
**To:** Dr. Babita Malik [MU - Jaipur]  
**Subject:** Re: FW: Request for approval of the changes in EVS syllabus

Dear Dr Babita Malik

Thanks for the mail. I have gone through the syllabus. In-principle it is OK and approved.  
A minor comment is that it should be splitted into three units.

Regards

On 8 Jul 2017 11:52 a.m., "Dr. Babita Malik [MU - Jaipur]" <[babita.malik@jaipur.manipal.edu](mailto:babita.malik@jaipur.manipal.edu)> wrote:


Evi

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**From:** Dr. Babita Malik [MU - Jaipur]  
**Sent:** Wednesday, July 05, 2017 11:42 AM  
**To:** 'rtpardasani@curaj.ac.in'  
**Cc:** Dr. Lalita Ledwani [MU - Jaipur]; Dr. Tanmoy Chakraborty [MU - Jaipur]; Dr. Rahul Shrivastava [MU - Jaipur]; Dr. Nitu Bhatnagar [MU - Jaipur]; Dr. Naveen Kumar Singh [MU - Jaipur]; Dr. Amarendra Kumar Sinha [MU - Jaipur]; Dr. Gopi Chand Tikkiwal [MU - Jaipur]  
**Subject:** Request for approval of the changes in EVS syllabus

Respected Sir,

In view of the UGC letter received, we have incorporated some changes in the syllabus of Environmental Science for Non BTech students. Syllabus, lesson plan of the EVS course along with its comparison with the UGC module have been attached for your reference. This is to request you to please go through these files and give your valuable suggestions/comments for the same. This has to be further put up for approval in the upcoming Academic Council meeting.

  
Thanks & Regards

Dr. Babita Malik

Multidisciplinary Nature of Environmental Studies; Natural resources (Renewable & Non Renewable Resources): Water Resources, Energy Resources, Forest Resources, Land Resources; Human Population and the Environment: Population growth, variation among nations, Population explosion – Family Welfare Programme, Environment and human health, Women and Child Welfare, Role of Information Technology in Environment; Biodiversity and its conservation: Value and Threats to biodiversity conservation, *In-situ* and *Ex-situ* conservation; Environmental pollution and control: Air pollution, Ill effects of fireworks, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution, Nuclear Hazards; Social Issues and Environment; Climate Change, Global Warming, acid rain, ozone layer depletion, Waste land reclamation, Consumerism and waste products, Environment Protection Act, Air (Prevention and Control of Pollution) Act, Water (Prevention and control of Pollution) Act, Wildlife Protection Act, Forest Conservation Act;; Field Work.

**References:**

1. Rao, P.V., *Principles of Environmental Science and Engineering*, PHI, 2008
2. De, A. K., De, A. K., *Environmental Studies*, New Age International Publishers, New Delhi, 2007
3. Bharucha, E., *Text book of Environmental Studies for undergraduate courses*, Universities Press, Hyderabad, 2<sup>nd</sup> Edition, 2013
4. Joseph, B., *Environmental Studies*, 2nd Edition, Tata McGraw Hill, 2009
5. Goel, S.L., Kumar, R., *Disaster management*, Deep and Deep publications, 2001
6. Rajagopalan, R., *Environmental Studies: From Crisis to Cure*, Oxford University Press, 2016

Prabir



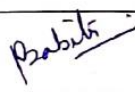
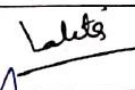
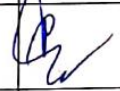
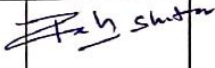
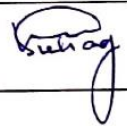
**Introduction to Environmental Studies;** Multidisciplinary Nature of Environmental Studies, Scope and Importance, concept of sustainability and sustainable development; **Ecosystems;** concept, structure and function, energy flow in an ecosystem, food chain, food webs and ecological succession, Forest, Grassland, Desert and Aquatic (Ponds, Streams, Lakes, River, Oceans, Estuaries) ecosystem; **Natural Resources (Renewable & Non Renewable Resources);** Land Resources and land use change, Land degradation, soil erosion and desertification; Deforestation; Causes and impacts due to mining, dam building on environment, forests, biodiversity and tribal populations. Water: Use and over-exploitation of surface and ground water, floods, droughts, conflicts over water (international & inter-state). Energy resources: Renewable and non-renewable energy sources, use of alternate energy sources, growing energy needs, case studies; **Biodiversity and Conservation;** Levels of biological diversity: genetic, species and ecosystem diversity; Biogeographic zones of India; Biodiversity patterns and global biodiversity hot spots, India as a mega-biodiversity nation; Endangered and endemic species of India, Threats to biodiversity: Habitat loss, poaching of wildlife, man--wildlife conflicts, biological invasions; Conservation of biodiversity: *In-situ* and *Ex-situ* conservation of biodiversity. Ecosystem and biodiversity services: Ecological, economic, social, ethical, aesthetic and Informational value; **Environmental Pollution;** Environmental Pollution: type, causes, effects, and controls; Air, Water, Soil and Noise pollution, Nuclear hazards and human health risks, ill effects of fireworks, Solid waste management: control measures of urban and industrial waste, pollution case studies; **Environmental Policies & Practices;** Climate change, global warming, ozone layer depletion, acid rain and impacts on human communities and agriculture, Environment laws; Environmental Protection Act, Air (Prevention and Control of Pollution) Act, Water (Prevention and control of Pollution) Act, Wildlife Protection Act, Forest Conservation Act; International agreements: Montreal and Kyoto protocols and Convention on Biological Diversity (CBD). Nature reserves, tribal populations and rights, and human wildlife conflicts in Indian context. **Human Communities and the Environment;** Human population growth: impact on environment, human health and welfare, Resettlement and rehabilitation of project affected persons; case studies, Disaster management: flood, earthquake, cyclone and landslides. Environmental movements: Chipko, Silent valley, Bishnois of Rajasthan, Environmental ethics: Role of Indian and other religions and cultures in environmental conservation, Environmental communication and public awareness, case studies (e.g., CNG vehicles in Delhi). **Field Work** and visit.

#### References:

1. Rajagopalan, R., Environmental Studies: From Crisis to Cure, Oxford University Press, 2016.
2. De, A. K. *Environmental Studies*, New Age International Publishers, New Delhi, 2007.
3. Bharucha, E., *Text book of Environmental Studies for undergraduate courses*, Universities Press, Hyderabad, 2<sup>nd</sup> Edition, 2013.
4. Gadgil, M., & Guha, R. *This Fissured Land: An Ecological History of India*. Univ. of California, Press, 1993.
5. Carson, R. *Silent Spring*. Houghton Mifflin Harcourt, 2002.
6. Groom, Martha J., Gary, K. Meffe, and Carl Ronald Carroll. *Principles of Conservation Biology*. Sunderland: Sinauer Associates, 2006.
7. Singh, J.S., Singh, S.P., Gupta, S.R. Ecology, Environmental Science and conservation. S. Chand Publishing, New Delhi, 2014.
8. Sodhi, N.S., Gibson, L. & Raven, P.H. (eds). *Conservation Biology: Voices from the Tropics*. John Wiley & Sons, 2013.

*Babita*

**MANIPAL UNIVERSITY JAIPUR**  
**Department of Chemistry**  
**Attendance-Board of studies (07.07.2017)**

S. No	Name	Designation	Address	Chairperson/ Members	Signatures
1.	Dr. Babita Malik	Head & Professor	Department of Chemistry, MUJ	Chairman	
2.	Prof. Lalita Ledwani	Professor	Department of Chemistry, MUJ	Member	
3.	Dr. Tanmoy Chakraborty	Associate Professor	Department of Chemistry, MUJ	Member	
4.	Dr. Rahul Srivastava	Associate Professor	Department of Chemistry, MUJ	Member	
5.	Prof. V.S. Kulhar	Professor	Department of Physics, MUJ	Nominated Member from other Department	
6.	Prof. R.T. Pardasani	Dean	School of Chemical Sciences and Pharmacy, Central University of Rajasthan, Bandarsindri, Rajasthan	External Expert Member	Recommendation received through Mail (attached)
7.	Prof. Vandana Suhag	Registrar, MUJ	Manipal University Jaipur	Ex officio Member	





		The above will be implemented on pro-rata basis.	
<b>19 AC (D-2) FACULTY OF ENGINEERING</b>			
<b>19 AC (D-2-1)</b>	Modifications in Syllabi of III & IV Semester B Tech (AE)	The Council approved the modification in revamped syllabi of following two courses of 2 <sup>nd</sup> year B Tech Programme (Automobile Engineering): a) AU1306 Theory of Automotive Engines (III Semester) b) AU1407 Automotive Chassis Systems (IV Semester)  This will be effective for the students admitted in 2016-17 onwards.	Implemented
<b>19 AC (D-2-2)</b>	Modifications in Scheme & Syllabi of V, VI & VII Semester B Tech (AE):	The Council approved the modifications in revamped scheme & syllabi of V, VI & VII Semester of B Tech Programme (Automobile Engineering).  This will be effective for the students admitted in 2015-16 onwards.	Implemented
<b>19 AC (D-3) FACULTY OF SCIENCE</b>			
<b>19 AC (D-3-1)</b>	Revised Syllabus of Environment Studies for Non-Engineering Programmes	In view of module curriculum prescribed by the UGC, the Council approved the revised syllabus of Environment Studies for Non - Engineering programmes.  This will be implemented from Academic Year 2017-18 onwards.	Implemented
<b>19 AC (D-4) FACULTY OF MANAGEMENT &amp; COMMERCE</b>			



**19AC (C-26)** Internal Quality Assurance Cell

**19AC (C-27)** UGC-NET Examination

**19AC (D) DISCUSSION & DECISION ITEMS**

**19AC (D-1) UNIVERSITY AGENDA**

**19AC (D-1-1)** Introduction of New Programme

**19AC (D-1-2)** Late Fee for Academic Registration

**19AC (D-1-3)** Accreditation of the University

**19AC (D-1-4)** Implementation of Environmental Studies as compulsory Course in UG Programmes

**19AC (D-1-5)** Online Platform for Teaching Learning Process

**19AC (D-2) FACULTY OF ENGINEERING**

**19AC (D-2-1)** Modifications in Syllabi of 3<sup>rd</sup> & 4<sup>th</sup> Semester BTech (AE)

**19AC (D-2-2)** Modifications in Scheme & Syllabi of 5<sup>th</sup>, 6<sup>th</sup> & 7<sup>th</sup> Semester B Tech (AE)

**19AC (D-3) FACULTY OF SCIENCE**

**19AC (D-3-1)** Revised Syllabus of Environment Studies for Non-Engineering Programmes

**19AC (D-4) FACULTY OF MANAGEMENT & COMMERCE**

**19AC (D-4-1)** Syllabus of M.Com (Financial Analysis) Programme

**19AC (D-4-2)** Introduction of Open Elective Course under School of Business & Commerce

**19AC (D-4-3)** Introduction of Business Research Methodology

**19 AC (D-5) FACULTY OF ARTS & LAW**

**19 AC (D-5-1)** Scheme of BA (Hons) Economics Programme

**19 AC (D-6) FACULTY OF DESIGN**

**19 AC (D-6-1)** Scheme and Syllabus of M Plan (Urban Planning)

**19 AC (D-6-2)** Open Elective Courses under School Planning & Design

**19AC (E) ANY OTHER MATTER WITH THE PERMISSION OF THE CHAIR**

## Syllabus of Environmental Science CY1120

Syllabus 2016	Revised in 2017
<p>Multidisciplinary Nature of Environmental Studies; Natural resources (Renewable &amp; Non Renewable Resources): Water Resources, Energy Resources, Forest Resources, Land Resources; Human Population and the Environment: Population growth, variation among nations, Population explosion – Family Welfare Programme, Environment and human health, Women and Child Welfare, Role of Information Technology in Environment; Biodiversity and its conservation: Value and Threats to biodiversity conservation, <i>In-situ</i> and <i>Ex-situ</i> conservation; Environmental pollution and control: Air pollution, Ill effects of fireworks, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution, Nuclear Hazards; Social Issues and Environment; Climate Change, Global Warming, acid rain, ozone layer depletion, Waste land reclamation, Consumerism and waste products, Environment Protection Act, Air (Prevention and Control of Pollution) Act, Water (Prevention and control of Pollution) Act, Wildlife Protection Act, Forest Conservation Act;; Field Work.</p>	<p><b>Introduction to Environmental Studies;</b> Multidisciplinary Nature of Environmental Studies, Scope and importance, concept of sustainability and sustainable development; <b>Ecosystems;</b> concept, structure and function, energy flow in an ecosystem, food chain, food webs and ecological succession, Forest, Grassland, Desert and Aquatic (Ponds, Streams, Lakes, River, Oceans, Estuaries) ecosystem; <b>Natural Resources (Renewable &amp; Non Renewable Resources);</b> Land Resources and land use change, Land degradation, soil erosion and desertification; Deforestation: Causes and impacts due to mining, dam building on environment, forests, biodiversity and tribal populations. Water: Use and over-exploitation of surface and ground water, floods, droughts, conflicts over water (international &amp; inter-state). Energy resources: Renewable and non-renewable energy sources, use of alternate energy sources, growing energy needs, case studies; <b>Biodiversity and Conservation;</b> Levels of biological diversity: genetic, species and ecosystem diversity; Biogeographic zones of India; Biodiversity patterns and global biodiversity hot spots, India as a mega-biodiversity nation; Endangered and endemic species of India, Threats to biodiversity: Habitat loss, poaching of wildlife, man--wildlife conflicts, biological invasions; Conservation of biodiversity: <i>In-situ</i> and <i>Ex-situ</i> conservation of biodiversity. Ecosystem and biodiversity services: Ecological, economic, social, ethical, aesthetic and Informational value; <b>Environmental Pollution;</b> Environmental Pollution: type, causes, effects, and controls; Air, Water, Soil and Noise pollution, Nuclear hazards and human health risks, ill effects of fireworks, Solid waste management: control measures of urban and industrial waste, pollution case studies; <b>Environmental Policies &amp; Practices;</b> Climate change, global warming, ozone layer depletion, acid rain and impacts on human communities and agriculture, Environment laws; Environment Protection Act, Air (Prevention and Control of Pollution) Act, Water (Prevention and control of Pollution) Act, Wildlife Protection Act, Forest Conservation Act; International agreements: Montreal and Kyoto protocols and Convention on Biological Diversity (CBD). Nature reserves, tribal populations and rights, and human wildlife conflicts in Indian context. <b>Human Communities and the Environment;</b> Human population growth: impact on environment, human health and welfare, Resettlement and rehabilitation of project affected persons; case studies, Disaster management: flood, earthquake, cyclone and landslides. Environmental movements: Chipko, Silent valley, Bishnois of Rajasthan, Environmental ethics: Role of Indian and other religions and cultures in environmental conservation, Environmental communication and public awareness, case studies (e.g., CNG vehicles in Delhi). <b>Field Work</b> and visit.</p>