

Lesson Plan (Year 2023- 24)
B.Sc. 1st year (Botany)
Microbial Diversity and Plant Pathology

S. No	Month	Unit/ Paper	Proposed Syllabus	Topic
1	September	Unit I Paper I	Microbial Techniques & instrumentation: Microscopy- Light phase contrast scanning and transmission electron microscopy, staining techniques for light microscopy Common equipment of microbiology lab and principle of their working - autoclave, oven. laminar air flow centrifuge, colorimetry spectrophotometry, electrophoresis immobilization methods, fermentation and fermenters	<ul style="list-style-type: none"> ● Microscopy ● Laboratory equipment ● Laminar air flow ● Centrifuge ● Autoclave ● Colorimetry ● Spectrophotometry ● Electrophoresis ● Fermentation
2	October	Unit II Paper I	Microbial world: Cell structure of Eukaryotic and prokaryotic cells, Gram positive and Gram-negative bacteria. Structure of bacteria. Bacterial growth curve, factors affecting growth of microbes, Sporulation, reproduction, recombination in bacteria. Viruses general characteristics. Structure of viruses. Bacteriophages and TMV. Lytic and Lysogenic cycles, viroid, Prions & Mycoplasma. phytoplasma, actinomycetes and their economic uses. Applied Microbiology: Food fermentations and food produced by microbes. Production of antibiotics, enzymes, alcoholic beverages. Lactic acid and Acetic acid production. Antigen, antibody and production of monoclonal antibodies (Hybridoma techniques)	<ul style="list-style-type: none"> ● Bacteria ● Viruses ● Bacteriophages ● Viroid ● Prions ● Mycoplasma ● Phytoplasma ● Applied microbiology ● Hybridoma techniques ● Production of antibiotic, Enzymes ● Alcoholic beverages ● Lactic acid and acetic acid production
3	November	Unit III	Phycology: General characteristic features, classification and range of thallus. organization Classification and life cycle-	<ul style="list-style-type: none"> ● Algae- General characters, Range of thallus, reproduction. Nostoc,

		Paper I	Volvox, Oedogonium, Chara, Vaucheria, Ectocarpus and polysiphonia. Economic importance of algae- Role of algae in soil fertility, , algae as biofertilizer, blue green algae and nitrogen economy of soil, algae as biofuel.	Gloeocapsa, Volvox, Oedogonium, Vaucheria, Chara, Ectocarpus, Polysiphonia. Fungi: General characteristics structure, cell wall composition, nutrition and reproduction in fungi. <ul style="list-style-type: none"> ● Fungi- Saprolegnia, Albugo, Aspergillus, ● Peziza, Agaricus, Ustilago, Puccinia, Alternaria, Cercospora, VAM fungi
4	December	Unit IV Paper I	Mycology Mushroom Cultivation. Lichenology & Mycorrhiza: General characteristic features, Economic importance and Classification of fungi Distinguishing characters of Myxomycota: General characters of Mastigomycota : Phytophthora and Albugo, Zygomycota - Rhizopus and Mucor Ascomycota - Saccharomyces, Penicillium, Peziza. Basidiomycota - Ustilago, Puccinia, Agaricus. Deuteromycota - Colletotrichum, Fusarium, Alternaria. Heterothallism, Physiological specialization. Heterokaryosis & Parasexuality. Mushroom cultivation - Button and Oyster mushroom. General account of lichens, reproduction and significance. Mycorrhiza - ectomycorrhiza and endomycorrhiza and their significance.	Fungi: General characteristics structure, cell wall composition, nutrition and reproduction in fungi. <ul style="list-style-type: none"> ● Fungi- Phytophthora , Albugo, Aspergillus, Rhizopus, Mucor ● Peziza, Agaricus, Ustilago, Puccinia, Alternaria, Colletotrichum, Fusarium, ● VAM fungi ● Parasexuality ● Heterothallism ● Heterkaryosis ● Mushroom cultivation ● Mycorrhiza ● Lichens
5	January	Unit V Paper I	Plant Pathology: Disease concept, Symptoms, Etiology, Primary and secondary inoculum. Pathogenesis, Koch's Postulates. Mechanism of infection and predisposing factors. Disease recurrence, Defense mechanism physical and biochemical. Disease Resistance. Systemic fungicides Organomercurials and sulphur containing fungicides. Diseases and Control: Symptoms, Causal organism, Disease cycle and Control	<ul style="list-style-type: none"> ● Plant pathology ● Mechanism of infection ● Defense mechanism ● Disease control ● Early & Late Blight of Potato, Damping of seedling ● False Smut of Rice ● Brown spot of rice ● Black Stem Rust of Wheat. Alternaria spot and White rust of Crucifers. ● Red Rot of Sugarcane, ● Wilting of Arhar,

			<p>measures of Early & Late Blight of Potato, Damping of seedling, False Smut of Rice, Brown spot of rice, Black Stem Rust of Wheat. Alternaria spot and White rust of Crucifers. Red Rot of Sugarcane, Wilting of Arhar, Mosaic disease on tobacco and cucumber, yellow vein mosaic of bhindi, Citrus Canker, Little leaf of brinjal. Disease management. Quarantine organization and integrated plant disease management. Biological control</p>	<ul style="list-style-type: none">• Mosaic disease on tobacco and cucumber,• yellow vein mosaic of bhindi,• Citrus Canker,• Little leaf of brinjal. Disease management.• Quarantine organization and integrated plant disease management. Biological control
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B.Sc. 1st year (Botany)
Bryophytes, Pteridophytes, Gymnosperms, Palaeobotany &
Angiosperm

S. No.	Month	Unit/ Paper	Proposed Syllabus	Topic
1	September	Unit I Paper II	Introduction to Archegoniates & Bryophytes: Unique features of archegoniates Bryophytes: General characteristic features and Affinities, adaptations to land habit. Range of thallus organization, Classification (up to family), morphology anatomy and reproduction of Riccia , Marchantia , Anthoceros and Sphagnum . (Developmental details not to be included) Economic importance of bryophytes..	Bryophyta: General Characteristics <ul style="list-style-type: none"> • Bryophyta- Riccia, Marchantia, Pellia, Anthoceros, Sphagnum
2	October	Unit II Paper II	Pteridophytes: General characteristic features and affinities. Classification(up to family) with examples. Heterospory and seed habit, stelar evolution, economic importance of Pteridophytes. Morphology, anatomy and life cycle of Psilotum, Lycopodium, Selaginella, Equisetum, Pteris and Marsilea.	Pteridophytes: Heterospory, Seed Habit, Stellar system, Apospory and Apogamy, Telom Theory, Azolla as biofertilizer. Psilotum, Lycopodium Selaginella, Equisetum, Pteris, Marsilea
3	November	Unit III Paper II	Gymnosperms: Classification and distribution of gymnosperms. Salient features of Cycadales, Ginkgoales, Coniferales and Gnetales their examples, structure and reproduction: economic importance. Morphology anatomy and life cycle of Cycas Pinus and Ephedra.	Gymnosperms: General characteristics <ul style="list-style-type: none"> • Cycas, Pinus and Ephedra.
4	December	Unit IV Paper II	Palaeobotany: General account, Geological time scale. Brief account of process of fossilization & types of fossils and their study techniques: Fossil plants: Rhynia, Williamsonia Cycadeoidea. Contribution of Prof. Birbal Sahni.	Palaeobotany: Geological time scale, Fossil Fossil Gymnosperms- Rhynia, Williamsonia Cycadeoidea
5	January	Unit V Paper II	Angiosperm Morphology (Stem, Roots, Leaves, Flowers and Inflorescence) Morphology and modifications of root Stem leaf and bud. Types of inflorescences: flowers, flower parts, fruits and types of placentation; Definition and types of seeds.	<ul style="list-style-type: none"> • Root • Stem • Leaf • Flower • Inflorescence

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Lesson Plan (2023–24)
B.Sc. II year (Botany)
Paper I

Plant taxonomy, Economic botany, Plant anatomy, Embryology

S. No	Month	Unit/ Paper	Proposed syllabus	Topic
1	August	Unit I Paper I	Bentham and Hooker system of classification. Binomial nomenclature, International code of nomenclature for algae, Fungi and Plant(IUCN), Typification, Numerical taxonomy and Chemotaxonomy. Preservation of plant material and herbarium techniques. Important botanical gardens and Herbarium of India, Kew Botanical garden England.	<ul style="list-style-type: none"> ● Plant Taxonomy: Bentham & Hooker system of classification. ● Binomial nomenclature ● Herbarium
2	September	Unit I Paper I	Bentham and Hooker system of classification. Binomial nomenclature, International code of nomenclature for algae, Fungi and Plant(IUCN), Typification, Numerical taxonomy and Chemotaxonomy. Preservation of plant material and herbarium techniques. Important botanical gardens and Herbarium of India, Kew Botanical garden England.	<ul style="list-style-type: none"> ● Binomial nomenclature ● Technical terms related to plant taxonomy ● Botanical garden

3	October	Unit II Paper I	Systematic position: Distinguishing characters and economic importance of the following families, Ranunculaceae, Magnoliaceae, Brassicaceae, Rosaceae, Papaveraceae, Caryophyllaceae, Rutaceae, Cucurbitaceae, Apiaceae, Rubiaceae, Apocynaceae, Asclepiadaceae, Solonaceae, Malvaceae, Convolvulaceae, Orchidaceae, Acanthaceae, Verbenaceae, Lamiaceae, Asteraceae, Fabaceae, Euphorbiaceae, Poaceae, and Liliaceae.	<ul style="list-style-type: none"> • Systematic Position, Economic importance of following families, Ranunculaceae, Magnoliaceae, Cucurbitaceae, Rosaceae, Rubiaceae, Convolvulaceae, Orchidaceae, Verbenaceae, Lamiaceae, Asteraceae, Fabaceae, Poaceae, Liliaceae.
4	November	Unit III Paper I	Economic Botany: Botanical name, family, part used and uses of the following economically important plants, fiber yielding plants, Cotton, Jute, sunhemp, Coir. Timber yielding Plants: Sal, Teak, Shishum and Pine. Medicinal Plants: Kalmegh, Ashwagandha, Ghritkumari, Giloy, Bramhi, Sarpgandha. medicinal plants of C.G. Food Plants. Food plants: Pearl millet, Buck of wheat, Sorghum, Soyabean, Gram, Ground Nut, Sugarcane and potato. Fruit plants: Pear, peach, Litchi. Spices: Cinnamon, Turmeric, Ginger, Asafoetida & cumin. Beverages: Tea, Coffee. Rubber. Cultivation of important flowers: Chrysanthemum, Dahelia, Biodiesel plants Jatropha, pongamia. Ethanobotany in context of C.G	<ul style="list-style-type: none"> • Economic botany: Cereals producing Plants • Fibers yielding plants • Timber yielding plants • Medicinal plants • Biodiesel plants • Ethnobotany in context of Chhatisgarh
5	December	Unit IV Paper I	Plant anatomy: Root and shoot apical meristems theories of root and shoot apex organization, Permanent tissues. Anatomy of root, leaf, stem of dicot and monocot, secondary growth in root and stem. Anatomical anomalies in the primary structure of stems (Nyctanthes, Boerhavia, casuarina). Anomalous Secondary growth in Draceana, bignonia, laptadenia.	<ul style="list-style-type: none"> • Plant Anatomy. • Root and shoot apical meristems. • root and shoot apex organization. • Anatomy of root, leaf, stem of dicot and monocot. • Secondary growth.
6	January	Unit V Paper I	Embryology: Flower is a reproductive organ, anther, microsporogenesis, types of ovule, megasporogenesis, development of male and female gametophyte, pollination, self incompatibility, Fertilization, endosperm, polyembryony, apomixes and parthenocarpy.	<ul style="list-style-type: none"> • Embryology • Flower • Anther • Microsporogenesis • ovule, • megasporogenesis • male and female gametophyte

				<ul style="list-style-type: none"> • pollination • Fertilization, • endosperm, • polyembryony, • apomixes and parthenocarpy.
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Lesson Plan (2023–24)
B.Sc. II year (Botany)
Paper II
Ecology and Plant physiology

	Month	Unit/ Paper	Proposed syllabus	Topic
1	August	Unit I Paper II	Introduction and scope of ecology, Environmental and ecological factors, soil formation and soil profile, Liebig's law of minimum, Shelford's law of tolerance, morphological and anatomical adaptation in hydrophytes, xerophytes and epiphytes.	Introduction of Environment Ecology ecological factors soil
2	September	Unit I Paper II	Introduction and scope of ecology, Environmental and ecological factors, soil formation and soil profile, Liebig's law of minimum, Shelford's law of tolerance, morphological and anatomical adaptation in hydrophytes, xerophytes and epiphytes.	<ul style="list-style-type: none"> • Liebig's law of minimum. • Shelford's law of tolerance. • Hydrophytes • morphological and anatomical adaptation in hydrophytes. • Xerophytes • morphological and anatomical adaptation in Xerophytes • epiphytes.

				<ul style="list-style-type: none"> • morphological and anatomical adaptation in • epiphytes.
3	October	Unit I Paper II	<p>Population and community characteristics, Raunkiaers life forms, Populations interactions, Succession, ecotone and edge effect, ecological niches, Ecotype, Ecads, Keystone species.</p> <p>Concept of ecosystem, trophic levels, flow of energy in ecosystem, food chain, Food web. Concept of ecological pyramids.</p> <p>Biogeochemical cycles: carbon cycle, nitrogen cycle and phosphorus cycle.</p>	<ul style="list-style-type: none"> • Ecosystem • Structure and function of Ecosystem • Population ecology • Community ecology • Populations interaction • Succession. • ecotone and edge effect, ecological niches • Ecotype, Ecads, Keystone species. • Concept of ecosystem • Biogeochemical cycles
4	November	Unit I Paper II	<p>Plant water relationship: Diffusion, permeability, osmosis, imbibition, plasmolysis, osmotic potential and water potential, Types of soil water, water holding capacity, wilting, absorption of water, theories of ascent of sap, mineral nutrition and absorption, Deficiency, symptoms, Transpiration, stomatal Movements, significance of transpiration, Factors affecting transpiration, Guttation.</p>	<ul style="list-style-type: none"> • Plant water relationship • Absorption of water • Ascent of sap • Mineral nutrition & absorption • Transpiration • Stomatal movements • Transpiration • Guttations
5	December	Unit I Paper II	<p>Photosynthesis: Photosynthetic apparatus and pigments, Light reaction mechanism of ATP synthesis. C3, C4, CAM pathway of carbon reduction, Photorespiration, factors affecting Photosynthesis.</p> <p>Respiration: Aerobic and anaerobic respiration, Glycolysis, Krebs cycle, Factors affecting respiration, R.Q.</p>	<p>Photosynthesis: Photosynthetic apparatus and pigments, Light reaction mechanism of ATP synthesis. C3, C4, CAM pathway of carbon reduction Photorespiration.</p> <p>Respiration: Aerobic and anaerobic respiration Glycolysis Krebs cycle Factors affecting respiration R.Q.</p>
6	January	Unit I Paper II	<p>Plant growth hormones: Auxin, Gibberellin, Cytokinin, Ethylene, and abscisic acid. Physiology of flowering, Florigen of concept, Photoperiodism and vernalization. Seed dormancy and seed germination, Plant movementp</p>	<p>Plant growth hormones: Auxin, Gibberellin, Cytokinin, Ethylene, and abscisic acid. Physiology of flowering, Florigen of concept</p>

				Photoperiodism and vernalization. Seed dormancy and seed germination, Plant movement
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Lesson Plan (2023-24)

B.Sc. III year (BOTANY)

Paper I

Analytical technology, Plant pathology, Experimental Embryology, Elementary biostatistics, Environmental pollution and conservation

S. No	Month	Unit/ Paper	Proposed syllabus	Topic
1	August	Unit I Paper I	Structure, principal and application of analytical instrumentation Chromatography techniques, oven, incubator, Autoclave, Centrifuge, Spectrophotometer.	<ul style="list-style-type: none"> Biochemistry Biophyscis Chromatography: Partition Chromatography Paper Chromatography Adsorption Chromatography
2	September	Unit I Paper I	Structure, principal and application of analytical instrumentation Chromatography techniques, oven, incubator, Autoclave, Centrifuge, Spectrophotometer.	<ul style="list-style-type: none"> Chromatography Gas Chromatography Thin layer Chromatography Column Chromatography Hot Air oven Incubator
3	October	Unit II	Plant tissue culture techniques, growth media, Totipotency, Protoplast culture, somatic	<ul style="list-style-type: none"> Plant tissue culture Growth media,

		Paper I	hybrids, Cybrids, micropropagation, somaclonal variations, haploid culture. Analytical techniques: microscopy- Light microscope, Electron microscope.	Totipotency, Protoplast culture, somatic hybrids, Cybrids, micropropagation, somaclonal variations, haploid culture. <ul style="list-style-type: none"> • Analytical techniques: Microscopy- Light microscope, Electron Microscope
4	November	Unit III Paper I	General principal of plant pathology, general symptoms of fungal, bacterial and viral diseases, mode of infection, diseases resistance and control measures, plant quarantine. A study of epidemiology and etiology of following plant diseases. Rust diseases of wheat, Tikka diseases of groundnut, Red rot of sugarcane, Bacterial blight of rice, Yellow vein mosaic of bhindi, Little leaf of brinjal.	<ul style="list-style-type: none"> • Plant Pathology • general symptoms of fungal • bacterial and viral diseases • mode of infection, • diseases resistance and control measures, • plant quarantine. • Epidemiology Tikka diseases of groundnut, Red rot of sugarcane, Bacterial blight of rice, Yellow vein mosaic of bhindi, Little leaf of brinjal.
5	December	Unit IV Paper I	Introduction to pollution, greenhouse gases, Ozone depletion, DO, BOD, COD. Biomagnification, Eutrophication, Acid precipitation, Phytoremediation, Plant indicators, Biogeographical zones of India, Concept of biodiversity, CBD, MAB, National parks and biodiversity hot spots, Conservation strategies, Red data books, IUCN threat categories, invasive species, Concept of sustainable development.	<ul style="list-style-type: none"> • Environmental pollution • Environmental problems • Plants indicators • Biogeographical region of india • Biodiversity and its conservation • CBD, MAB, invasive and endemic species. •
6	January	Unit V Paper I	Elementary Biostatistics: Introduction and application of biostatics, Measure of central tendencies- mean, mode, Median. Measures of dispersal – standard deviation, standard error.	<ul style="list-style-type: none"> • Biostatistics • Central tendencies • Dispersion •

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Lesson Plan (2023-24)

B.Sc. III year (BOTANY)

Paper II

Genetic, Molecular biology, Biotechnology and biochemistry

S.No.	Month	Unit/ Paper	Proposed syllabus	Topic
1	August	Unit IV Paper II	Protein chemical composition: primary, secondary and tertiary structure of protein. Carbohydrate: General account of monosaccharide, oligosaccharide polysaccharide Fat: Structure and properties of fats and fatty acids, synthesis & breakdown	<ul style="list-style-type: none"> • Biomolecules • Amino acids • Protein • Structure of protein
2	September	Unit IV Paper II	Protein chemical composition: primary, secondary and tertiary structure of protein. Carbohydrate: General account of monosaccharide, oligosaccharide polysaccharide Fat: Structure and properties of fats and fatty acids, synthesis & breakdown	<ul style="list-style-type: none"> • Carbohydrates • monosaccharide, oligosaccharide polysaccharide

3	October	Unit V Paper II	Enzymes: Nomenclature and classification, component of enzymes, theories of enzyme action, enzyme kinetics, allosteric enzymes, isozymes, abzymes, Ribozymes, Factors affecting enzyme activity.	<ul style="list-style-type: none"> • Enzymes: Nomenclature and Classification, • Enzyme action, enzyme kinetics (Michaelis – menten constant) Allosteric enzymes,
4	November	Unit I Paper II	Cell and cell organelles, organization and morphology of chromosome, Giant Chromosomes, Cell division, Mendal's law, gene interactions, linkage and crossing over, chromosomal aberration, polyploidy, sex linked inheritance, sex determination, cytoplasmic inheritance, gene concept: cistron, muton, recon.	<ul style="list-style-type: none"> • Cell and cell organelles • Mendel's law • Linkage • Sex determination • Gene concept
5	December	Unit II Paper II	Nucleic acids, structure and forms of DNA and RNA, DNA/RNA as genetic material, replication of DNA, biochemical and molecular basis of mutation, genetic code and its properties, mechanism of transcription and translation in prokaryotes, regulation of gene expression, operon model.	<ul style="list-style-type: none"> • Nucleic Acid • Mutation • Genetic code and protein synthesis • Regulation of gene expression
6	January	Unit III Paper II	Recombinant DNA, Enzymes in recombinant DNA technology, cloning vectors(Plasmid, Bacteriophage, Cosmids, phagemids) gene cloning, PCR , Application of biotechnology. G.M. Plants, Monoclonal antibodies	<ul style="list-style-type: none"> • Genetic Engineering and Biotechnology: scope & importance • Recombinant DNA technology • Application of technology

अंतर्राष्ट्रीय ओज़ोन दिवस के अवसर पर आज दिनांक 16 सितम्बर 2022 को श्री कुलेश्वर महादेव शासकीय महाविद्यालय गोबरा नवापारा में ओज़ोन संरक्षण जागरूकता कार्यक्रम का आयोजन किया गया. इस अंतर्राष्ट्रीय समस्या का प्रभावी परिचय वनस्पति विज्ञान विभाग की सहायक प्राध्यापक सुश्री पुष्पलता कँवर ने दिया. इस अवसर पर महाविद्यालय के प्राचार्य श्री एस. आर. वड्डे ने कहा कि ओज़ोन परत संरक्षण की आवश्यकता से सभी भलीभाँति परिचित हैं परन्तु छोटा छोटा प्रयास ही यदि सभी के द्वारा किया जाए तो पर्यावास संरक्षण प्रभावी रूप से किया जा सकता है. भूगोल के सहायक प्राध्यापक श्री पीयूष कान्त भारद्वाज ने वायुमंडल के स्वरूप और इसमें ओज़ोन परत की स्थिति के बारे में विस्तार से जानकारी दी. उन्होंने एक वृत्तचित्र के प्रदर्शन के माध्यम से इसके रासायनिक क्षरण के कारणों और इसके संरक्षण के उपायों के बारे में बताया. ओज़ोन संरक्षण से संबंधित प्रश्नोत्तरी प्रतियोगिता का आयोजन किया गया

जिसमें बीएससी प्रथम वर्ष के छात्र विजेता रहे. इस प्रतियोगिता में निर्णायक की भूमिका प्राणीशास्त्र विभाग की सहायक प्राध्यापक डॉ रजिया सुल्ताना ने निभाई.

संयोजक
निर्णायक पुष्पलता कँवर
डॉ रजिया सुल्ताना

प्राचार्य
श्री एस आर वड्डे



राज्य विश्वविद्यालय के निधन से राजनीतिक गलियारों में भी शोक दिव्यजो

श्री कुलेश्वर महादेव शासकीय महाविद्यालय में ओज़ोन संरक्षण पर हुई कार्यशाला

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CHHATTISGARH NATIONAL EDUCATION RAJYU STATE TOP NEWS TRENDING

By Nikhil Vishwakarama September 16, 2022 27 0

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समाचार

अंतरराष्ट्रीय ओज़ोन दिवस के अवसर पर राज्य विश्वविद्यालय के शासकीय महाविद्यालय गौबरा नवापारा में ओज़ोन संरक्षण जागरूकता कार्यक्रम का आयोजन किया गया।

News

अंतरराष्ट्रीय ओज़ोन दिवस के अवसर पर गौबरा नवापारा के शासकीय कुलेश्वर महादेव महाविद्यालय में ओज़ोन संरक्षण जागरूकता कार्यक्रम का हुआ आयोजन

By Mr. Ranajit Mishra - 4pm, 16th September 2022



आज अंतरराष्ट्रीय ओज़ोन दिवस है और इस मौके पर गौबरा नवापारा के कुलेश्वर महादेव शासकीय महाविद्यालय में ओज़ोन संरक्षण जागरूकता कार्यक्रम का आयोजन किया गया। कार्यक्रम का उद्देश्य ओज़ोन परत संरक्षण और पर्यावरण संरक्षण को लेकर था।



राजपुर। अंतरराष्ट्रीय ओज़ोन दिवस के अवसर पर आज श्री कुलेश्वर महादेव शासकीय महाविद्यालय गौबरा नवापारा में ओज़ोन संरक्षण जागरूकता कार्यक्रम का आयोजन किया गया। इस अंतरराष्ट्रीय सम्मेलन का प्रभावी परिणाम व्यवस्थापि विज्ञान विभाग कि सहयोग प्राध्यापक सुभाषिता कौर ने दिया।

भैयाजी ये भी देखें : पूर्व मंत्री मूलतः का नज़, राजधानी अब सुरक्षित नहीं, अपराधियों का...

उन्होंने ओज़ोन परत के क्षरण के कारकों और इससे उत्पन्न समस्याओं के बारे में बताया। उन्होंने माटियाल समझौते के



