Jaypee Institute of Information Technology

B.Tech. Biotechnology

Semester V

Course Descriptions

Detailed Syllabus
Lecture-wise Breakup

Course Code	15B11BT511	**Semester** Odd **(specify Odd/Even)**	**Semester V Session** 2020-21 **Month from** July to December
Course Name	Cell Culture Technology		
Credits	4	**Contact Hours**	4

Faculty (Names)	**Coordinator(s)**	Dr Rachana
	Teacher(s) (Alphabetically)	Dr Indira P Sarethy Dr Rachana

COURSE OUTCOMES		COGNITIVE LEVELS
CO310.1	Demonstrate knowledge on principles of plant and animal tissue culture.	C2
CO310.2	Identify the requirements to construct a cell culture laboratory.	C3
CO310.3	Apply knowledge and techniques to maintain different types of cell cultures.	C3
CO310.4	Examine cell culture techniques for applications in different fields of biotechnology.	C4

Module No.	Title of the Module	Topics in the Module	No. of Lectures for the module
1.	Plant Cell Culture: An Introduction	Definitions, history of plant cell and tissue culture	2
2.	Organization of tissue culture laboratory & basic principles	Equipments, media preparation and precautions, **c**ellular totipotency and cell differentiation, factors affecting differentiation	4
3.	Suspension cultures	Isolation of single plant cells, suspension cultures and types, measurement of growth, assessment of viability of cultured cells, bioreactors.	3
4.	Type of cultures and their applications	Direct and indirect methods of culture; seed culture, embryo culture, organ culture, callus culture, haploid and triploid production, protoplast isolation and fusion, production of virus free plants, somaclonal variation	6
5.	Somatic embryogenesis & micropropagation	Technique, applications and advances in acclimatization of tissue cultured plants.	4
6.	Industrial applications	Secondary metabolite production and bioconversions through plant cell cultures	2
7.	Introduction to animal cell culture	Advantages and limitations, Laboratory design and layout, aseptic techniques; safety and biohazards, contaminations and eradication	4

8.	Environmental factors and cell culture methods	Culture media, use of serum and serum free media, primary culture, subculture and cell lines, feeder layers; animal cell lines (suspension versus adhered cell culture), Cryopreservation	7
9.	Biology of cultured cells	Cell adhesion molécules, extra-cellular matrix, cell prolifération	2
10.	Characterization of cultured cells	Authentication, Cell morphology, karyotyping, staining, isoenzyme analysis; DNA fingerprinting and DNA profiling	3
11.	Cell separation technology	Physical properties (Density gradient centrifugation), Biological properties (Panning), FACS	3
12.	Scaling up techniques	suspension and monolayer cultures	2
		Total number of Lectures	**42**

Evaluation Criteria

Components Maximum Marks
T1 20
T2 20
End Semester Examination 35
TA 25 (…)
Total 100

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)

1.	S. S. Bhojwani and M. K. Razadan, Plant tissue culture: theory and Practice, Elsevier, 1996
2.	H. S. Chawla, Introduction to Plant Biotechnology, 3rd Edition, Science Publishers, 2009
3.	S. Narayanaswamy, Plant cell and tissue culture, Tata Mcgraw Hill, 1992
4.	M. K. Razdan, Introduction To Plant Tissue Culture, India Book House Limited, 2003
5.	R. Ian Freshney, Culture of animal cells : a manual of basic techniques, Wiley-Liss, 2005
6.	John R. W. Masters, Animal cell culture, 3rd Edition, Oxford University Press, 2000

7.	A. Mukhopadhyay, Animal Cell Technology, I.K. International, 2009

Detailed Syllabus

Lecture-wise Breakup

Subject Code	15B11BT412	**Semester : ODD**	**Semester : V Session : 2021-2022 Month from : July - Dec**
Subject Name	**Molecular Biology& Genetic Engineering**		
Credits	**3**	**Contact Hours**	**4**

Faculty (Names)	**Coordinator(s)**	1. Dr.Shalini Mani
	Teacher(s) (Alphabetically)	1. Dr.Susinjan Bhattacharya 2. Dr.Shalini Mani

COURSE OUTCOMES		**COGNITIVE LEVELS**
CO214.1	Explain the structure of nucleic acids and chromosomal organization	Understand Level (C2)
CO214.2	Summarize the fundamental concepts of central dogma of life in prokaryotes and eukaryotes.	Understand Level (C2)
CO214.3	Develop critical thinking skills from understanding of classical experiments in Molecular Biology	Apply Level (C3)
CO214.4	Distinguish the basic tools and techniques employed in genetic engineering and integrate the acquired knowledge for designing basic experiments, analyzing observations and predicting results	Analyze Level (C4)
CO214.5	Recognize importance as well as ethical and biosafety issues related to generating transgenic plants, animals and microbes	Evaluate Level (C5)

Module No.	**Subtitle of the Module**	**Topics in the module**	**No. of Lectures for the module**
1.	**Central Dogma of Molecular Biology**	Central Dogma, Chromatin, Nuclesome organization, Chromatin Remodeling,	2

2.	**Nucleic Acid Structure and Functional Elements in DNA**	DNA and RNA, Classical Models, ProkaryoticGenes, Eukaryotic Genes (Introns and Exons) Organization of Genes on EukaryoticChromosomes	3
3.	**DNA Replication, Repair and Recombination**	Replication in Prokaryotes &Eukaryotes, BreakageandReunion:Holiday; Meselson RaddingEnzymes ,Gene Conversion,DirectRepair, Excision Repair, Post-ReplicationRecombination Mediated Repair, SOSRepair. Mobile genetic elements	6
4.	**Prokaryotic RNA Trascription**	Process: Initiation, Elongation, Termination, gene regulation	5
5.	**Eukaryotic Trascription,mRNA, Processing:**	Basic Features, Methodologies, RNA PolymeraseI, RNA Polymerase IIIE. RNA Polymerase II, BasicFeatures of RNA Processing, RNA splicing,Eukaryotic mRNA Splicing:tRNA Processing: 5'-and 3'- Ends, and Intron SplicingE. rRNA Processing: Group I Introns -Ribozymes, and	8
		gene regulation Upstream Elements within thePromoter:Enhancers: Sequence Elements not in Promoter Regulation of Tissue-Specific Gene,transcription, Transcription Control by Small Molecules: Lipid-Soluble Hormones	
6.	**Genetic Code and ProteinSynthesis: Prokaryotic and Eukaryotic System**	The role of triplet codon in the translation process, Basics of Translation, Components inthe Translation Process, tRNA, Ribosomes	5
7.	**Gene manipulation: Introduction, DNA manipulative enzymes**	Restriction enzymes and other DNA modifying enzymes; Basic techniques of gene manipulation - Gel electrophoresis, Blotting and DNA transformation techniques, Polymerase Chain Reaction; Sequencing & Mutagenesis; Gene silencing	4
8.	**Vector Biology**	Cloning vectors – plasmid and phage vectors, cosmids, phagemids and other advanced vectors, Ti plasmid; Specialized vectors - shuttle vectors and expression vectors	3
9.	**Gene Cloning strategies**	Cloning of PCR products, Cloning genomic DNA (Construction of Genomic library, cDNA library, Screening Libraries with Gene Probes, Screening Expression Libraries, Positional Gene Cloning, Subtractive cloning, Functional cloning	5

10	**Genetic Manipulation of Plants and Animals**	Production of Industrially Important, Metabolites, Genetically Engineered Strains of Animals and Plants, applications in Agriculture and animal husbandry; Scope and application; Ethical and Biosafety Issues	3
		Total number of Lectures	**44**

Evaluation Criteria

Components Maximum Marks
T1 20
T2 20
End Semester Examination 35
TA 25 (Class Test-1, Assignment-1&2, Case studies 1, 2& 3) **Total 100**

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Papers, Reports, Websites etc. in the IEEE format)

1.	Molecular Biology of the Gene, fifth edition: Menlo Park, CA: Benjamin/Cummings Watson, J. D., 2008.
2.	Gene Cloning and DNA Analysis: an Introduction. Seventh edition: Oxford: Blackwell Pub, Brown, T. A. 2015.
3.	Molecular Biotechnology: Principles and Applications of Recombinant DNA, fourth edition: Washington, D.C.: ASM Press Glick, B. R., & Pasternak, J. J. 2010
4.	Recent research articles and reviews related to each module.

Detailed Syllabus

Lecture-wise Breakup

Course Code	**18B12HS311**	**Semester: Odd**	**Semester: V Session: 2020-21 Month: JULY-DECEMBER**
Course Name	**Indian Constitution and Traditional Knowledge**		
Credits	**3**	**Contact Hours**	**3(3-0-0)**

Faculty (Names)	Coordinator(s)	Dr. Chandrima Chaudhuri
	Teacher(s) (Alphabetically)	Dr. Chandrima Chaudhuri, Dr. Praveen Sharma, Dr. Santosh Dev, Ms. Shikha Kumari, Dr. Swati Sharma

CO Code	COURSE OUTCOMES	COGNITIVE LEVELS
C305.1	Demonstrate an understanding about the early Indian traditional political thought and the current Indian political scenario by knowing about the structure of government in place	Understand(C2)
C305.2	Demonstrate an understanding of the role of Indian President, Prime Minister, Governor, other members of the legislature and local governments as representatives of the common masses	Understand (C2)

C305.3 Analyze the working of Indian federalism with reference to centre-state relations — Analyze(C4)

C305.4	Analyze the impact of the contemporary challenges such as caste and gender to the working of Indian democracy	Analyze(C4)

Module No.	Title of the Module	Topics in the Module	No. of Lectures for the module

1.	The Indian Constitution	Historical Background to the Indian Constitution Salient features of the Indian Constitution Fundamental Rights (Part III of the Indian Constitution) Fundamental Duties (Part IVA of the Indian Constitution) · Directive Principles of the State Policy (Part IV of the Indian Constitution)	8
2.	Organs of the Government	· The Executive: President, Prime Minister and Governor appointment, powers and functions · The Legislature: Parliament and its components- Lok Sabha and Rajya Sabha (composition and functions) · The Judiciary: Supreme Court composition, functions, appointment and jurisdiction	8

3.	Nature of Federalism in India	· Centre-State Legislative Relations · Centre-State Administrative Relations · Centre-State Financial Relations · Special Provisions of some state and the 5th and 6th schedule	8
4.	Local Governance in India	· Urban local governance: Municipality- Structure & Functions · Rural Local governance: Panchayat-Organization and Powers · Civil Society: the participation of the people in local governance	8
5.	Traditional knowledge	· Kautilya- Theory of state · Mandala theory · Saptanga theory	6
6.	Challenges to Indian Democracy	· Caste as a critical factor in the Indian Constitution · Gender as critical to the process of Constutionalization	4

Total number of Lectures	42

Evaluation Criteria

Components Maximum Marks

T1 20

T2 20

End Semester Examination 35

TA 25 (Attendance, Quiz, Project)

Total 100

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)

1.	A.A. George, Important Judgements that transformed India, New Delhi: McGraw Hill, 2020
2.	B. Chakraborty, Indian Constitution: Text, Context and Interpretation, New Delhi: Sage Publications, 2017
3.	B.K.Sharma, Introduction to the Constitution of India, New Delhi: Prentice Hall of India, 2002
4.	M.Laxmikanth, Indian Polity, 6th edition, Noida: McGraw Hill, 2019
5.	M.P.Singh and R. Saxena, R, Indian Politics: Contemporary Issues and Concerns, New Delhi: PHI Learning, 2008

6.	R. Kangle, Arthashashtra of Kautilya, New Delhi: Motilal Publishers, 1997

Detailed Syllabus
Lecture-wise Breakup

Course Code	15B11BT413	**Semester** Odd **(specify Odd/Even)**	**Semester** V **Session** 2020 -2021 **Month from** January- June
Course Name	Bioprocess Engineering		
Credits	3	**Contact Hours**	3

Faculty (Names)	**Coordinator(s)**	Ashwani Mathur
	Teacher(s) (Alphabetically)	Dr. Ashwani Mathur

COURSE OUTCOMES		**COGNITIVE LEVELS**
C215.1	Explain design, principle and working of bioreactors	**Understand Level (C2)**
C215.2	Apply the principles of microbial growth kinetics in bioreactor	**Apply Level (C3)**
C215.3	Analyze mixing operations, mass and heat transfer in bioreactor	**Analyze Level (C4)**
C215.4	Compare culture and sterilization methods for industrial scale operations	**Evaluate Level (C5)**
C215.5	Evaluate the suitability of a given bioreactor for bioproduct development.	**Evaluate Level (C5)**

Module No.	**Title of the Module**	**Topics in the Module**	**No. of Lectures for the module**
1.	Microbial Process Development	Cell growth kinetics, Monod's kinetics, substrate utilization kinetics, Introduction to Upstream & Downstream processes, Batch, fed-batch and continuous cultivation processes, Enzyme Kinetics	6

2.	Bioreactor Systems incuding Utilities	Types of bioreactors and their applications, Cardinal Rule of bioreactor Design, Utilities of bioreactors, design equation for maximum biomass production	5
3.	Fluid Flow and Mixing	Mixing, power consumption and shear properties of rushton turbine, helical, anchor, bubble column, external loop, airlift etc. Axial and radial flow of liquid in bioreactor.	5
4.	Mass transfer	Oxygen uptake in cell culture, Oxygen transfer in Fermenters, Measurement of dissolved-oxygen concentrations, Estimation of oxygen solubility, Mass transfer correlations, Measurement of $k_l a$ & Oxygen transfer in large Vessels, scale up of bioprocesses. Heat transfer Kinetics	8
	Sterilization	Air and Media sterilization: Thermal death of micro organisms, Batch and continuous sterilization of media, Design of sterilization equipment (deterministic *vs* probabilistic approach), techniques of air sterilization, air sterilization by fibrous material.	6
	Bioreactor analysis	Ideal reactors for kinetics measurements (batch, fed batch & CSTR), Ideal rectors, Non-ideal rectors (airlift), Immobilized enzyme and cell reactor, multiphase bioreactors	6
	Case studies related applications in various biotech and biopharma industries	Process technology for production of primary metabolites, such as baker's yeast, ethanol, citric acid, amino acids, polysaccharides and plastics. Microbial production of industrial enzymes- glucose isomerase, cellulase, amylase, protease etc.. Production of secondary metabolites penicillins and cephalosporins, Production of therapeutic proteins: Monoclonal antibodies, viral vaccines	6
		Total number of Lectures	**42**

Evaluation Criteria

Components Maximum Marks
T1 20
T2 20
End Semester Examination 35
TA 25 (Class Test)
Total 100

Project based Learning: The course explains the students the design and operation of bioreactors and the physical and chemical processes that are pivotal in commercial scale operation of bioreactor. Student also learn the association between upstream and downstream processes. Student learn different modes of operating bioreactors, used in Industries and their kinetics. The scalable sterilization instruments used in bio-manufacturing industries are also explained to students. Students also learn the processes involved in bio manufacturing of commercially important

metabolites using process engineering principles.

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)	
1.	Doran, P.M., "Bioprocess Engineering Principles"
2.	Biochemical Engineering Fundamentals, Bailey and Ollis McGraw-Hill Education
3.	Stanbury P. F., Whitaker A and Hall S. J. "Principles of Fermentation Technology "Butterworth Heinemann; 2nd edition 1994.
4.	Aiba, S., Humphrey, A.E., and Millis, N.F. " Biochemical Engineering". University of Tokyo Press.
5.	Scragg, A.H., "Bioreactors in Biotechnology: A practical approach", Ellis Horwood Publications.

Detailed Syllabus
Lecture-wise Breakup

Course Code	15B11BT512	**Semester** ODD **(specify Odd/Even)**	**Semester** V **Session** 2020-21 **Month from** July to December
Course Name	FERMENTATION & DOWNSTREAM PROCESSING		
Credits	4	**Contact Hours**	4

Faculty (Names)	**Coordinator(s)**	DR. SUDHA SRIVASTAVA
	Teacher(s) (Alphabetically)	Dr. Sudha Srivastava, Dr. Vibha Gupta

COURSE OUTCOMES		**COGNITIVE LEVELS**
C311.1	Explain unit operations in downstream processing	C2
C311.2	Summarize media optimization, microrganism isolation, preservation and enrichment	C2
C311.3	Apply unit operation calculation to solve industrial scale problems	C3
C311.4	Determine an optimum fermentation and purification strategies	C5

Module No.	Title of the Module	Topics in the Module	No. of Lectures for the module
1.	**Introduction to fermentation processes**	Isolation, preservation and improvement of industrially important microorganisms	6
2.	**Media**	Media for industrial fermentations, upstream processes	5
3.	**Bioprocess Considerations**	Bioprocess Considerations for Animal cell cultures & plant cell cultures	5
4.	**Downstream Processing -I**	Strategy to recover and purify products, Filtration, centrifugation	6
5.	**Downstream Processing -II**	Separation of insoluble products - Cell disruption : Physical methods, Chemical methods	2
6.	**Downstream Processing -III**	Separation of soluble products- liquid-liquid extraction: solvent recovery, two phase aqueous extraction, Chromatography	12
7.	**Process design of Industrial Bio products**	Anaerobic bioprocesses- Ethanol and lactic acid production, Aerobic bioprocesses- Citric acid and penicillin production	6
		Total number of Lectures	**42**

Evaluation Criteria

Components Maximum Marks

T1 20

T2 20

End Semester Examination 35

TA 25 (Class Test, Assignment, Quiz)

Total 100

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)

1.	Principles of Fermentation Technology P. F. Stanbury, A. Whitaker, S. J. Hall Butterworth Heinemann,2005
2.	Bioprocess engineering M.L Schuler and F. Kargi; prentice Hall,2005

Detailed Syllabus
Lab-wise Breakup

Course Code	**15B17BT571**	**Semester - Odd (specify Odd/Even)**	**Semester** V **Session** 2020-21 **Month from** July to December
Course Name	**Cell Culture Lab**		
Credits	1	**Contact Hours**	**2**

Faculty (Names)	**Coordinator(s)**	Dr. Rachana
	Teacher(s) (Alphabetically)	Dr. Priyadarshini Dr. Rachana (Coordinator) Dr. Reema Gabrani

COURSE OUTCOMES		**COGNITIVE LEVELS**
CO370.1	Understand requirements for *in vitro* culturing of animal cells	C2
CO370.2	Apply the fundamental knowledge of cell culture techniques to maintain animal cell lines	C3
CO370.3	Identify, separate, characterize and differentiate cells for primary and continuous cell lines	C2
CO370.4	Demonstrate practical skills to apply laboratory procedures of cell culture for biotechnology investigations	C3

Module No.	**Title of the Module**	**List of Experiments**	**CO**
1.	Basic preparations and conduction for Animal Tissue Culture Lab	General Introduction and familiarization to animal tissue culture lab: Design and Equipments, learn media preparation (complete and incomplete), sterilization and associated precaution	1 and 2

2.	Identification and maintenance of cell cultures	Learn primary cell culture (cheek cells) isolation, staining and their identification, Detection of various cell culture contaminations (bacterial, fungal) through microscopic examination and Staining, qualitative analysis and differentiation between suspension and adherent cell lines using inverted microscope.	2
3.	Propagation and sub culturing of Cell Culture	Sub culturing of (Splitting and Trypsinization) suspension and adherent cell-lines, Cryo-preservation and resuscitation of Frozen Cell Lines. Differentiation of WTC parental cell line to cardiac cell line	2 and 3
4.	Counting, Estimation and Cell based assays	To learn serial dilution techniques and to calculate cell concentration in order to set up various types of assay's, using haemocytometer and calculation of cell viability in the isolated cells using Trypan blue assay, preparation of growth curve and calculation of doubling time for cell line, determination of cytotoxicity and oxidative stress of the given compound using MTT/NRU, LDH/NO etc. assay.	3 and 4

		Total number of labs = 12	

Evaluation Criteria

Components Maximum Marks

Mid-Semester lab-viva/ test 20
End-Semester lab-viva/ test 20
Day to Day performance 45
(Learning laboratory Skills and handling Laboratory Equipments, attendance)
Laboratory record 15
Total 100

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)

1.	Readings in Mammalian cell culture. R. Pollack., Cold Spring Harbour Laboratory (1981).
2.	Animal Cell Culture. R. Pollack and S. Pfeiffer, Cold Spring Harbour Laboratory (1971).
3.	Experiments with Normal and Transformed cells. R.Crowe., H. Ozer and Dr. Rifkin. Cold Spring Harbour Laboratory (1978).
4	Culture of Animal Cells. R. Ian Freshney and R. Alan., Liss. Inc. (1987).

5.	Animal cell biotechnology. Vol. I and II, R.E. Spier and J. B. Griffiths, Academic Press (1985).

Detailed Syllabus
Lab-wise Breakup

Course Code	15B17BT572	**Semester** ODD **(specify Odd/Even)**	**Semester** V **Session** 2020-21 **Month from** JULY to DECEMBER
Course Name	FERMENTATION & DOWNSTREAM PROCESSING LAB		
Credits	1	**Contact Hours**	2

Faculty (Names)	**Coordinator(s)**	Vibha Gupta
	Teacher(s) (Alphabetically)	Shalini mani Sudha Srivastava Vibha Gupta

COURSE OUTCOMES		**COGNITIVE LEVELS**
C371.1	Demonstrate separation of insoluble components	Understanding [C2]
C371.2	Apply cell lysis, protein concentration and purification techniques for isolation of desired protein	Understanding [C2]
C371.3	Design a downstream processing strategy for purification of desired molecule from culture broth	Analyzing [C4]
C371.4	Analyze the experimental result and document in a scientific manner	Analyzing [C4]

Module No.	**Title of the Module**	**List of Experiments**	**CO**
1.	**Growth of micro organism & Removal of insoluble**	Growth of *Bacillus subtilis* culture for amylase production	**CO1** [C2]

2.	Protein precipitation	Precipitation of the protein from supernatant of culture broth using ammonium sulphate	**CO2** [C2]
3.		Precipitation of the protein from supernatant of culture broth using TCA	**CO2** [C2]
4.		Precipitation of the protein from supernatant of culture broth using Ethanol	**CO2** [C2]
5.	Electrodialysis	Removal of salt from protein extracts using electrodialysis	CO2 **[C2]**
6	Activity analysis of precipitated alpha amylase	To check the activity of amylase enzyme precipitated by different methods, analyze the results and report the most efficient method	CO4 **[C4]**
7.		To perform cell lysis using glass beads	**CO2** [C2]
8.	Cell lysis	To perform cell lysis using ultrasonication	**CO2** [C2]
9.		To perform cell lysis using detergent & alkali	**CO2** [C2]

10.	Colum packing & Chromatography	To pack gel permeation column	CO2 **[C2]**
11.		Purification by using size exclusion chromatography	CO3 **[C4]**
12.		Project – Design and develop a fermented product in the lab	CO3 & CO4 **[C4]**

Evaluation Criteria

Components Maximum Marks

Mid-Semester lab-viva/ test 20
End-Semester lab-viva/ test 20
Day to Day performance 45
(Learning laboratory Skills and handling Laboratory Equipments, attendance)
Laboratory record 15

Total 100

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)	
1.	Principles of Fermentation 3rd edition Technology P. F. Stanbury, A. Whitaker, S. J. Hall Butterworth-Heinemann,2016
2.	Bioprocess engineering: Basic Concepts 3rd edition M. DeLisa, F. Kargi and M.L Schuler; prentice Hall,2017

Course Description

Course Code	**15B17BT573**	**Semester** ODD Semester **(specify Odd/Even)**	**Semester** V **Session** 2020-21 **Month from** July to December
Course Name	PLANT TISSUE CULTURE LAB		
Credits	1	**Contact Hours**	**2**

Faculty (Names)	**Coordinator(s)**	Dr. Ashwani Mathur
	Teacher(s) (Alphabetically)	Dr. Ashwani Mathur Dr. Smriti Gaur

COURSE OUTCOMES		**COGNITIVE LEVELS**
CO372.1	Relate and interpret the role of tissue culture media and it's constituents in micropropagation of ex-plants	C2
CO372.2	Show the effect of media composition and culture conditions on morphogenic responses in ex-plant	C2
CO372.3	(Perform) tests for callus culturing and synthetic seed preparation.	C5
CO372.4	Make use of *in-vitro* propagated plants to study phytocompounds.	C3

Module No.	**Title of the Module**	**List of Experiments**	**CO**

1.	**Plant Tissue Culture Media**	**Preparation of MS-media and its constituents in micropropogation of plant tissue culture**	CO372 .1 / C2
2.	Sterilization Technique	Surface sterilization of plant inoculum	CO372 .1 / C2
3.	Seed Germination	In-vitro germination of mustard seeds- Effect of phytohormones on seed germination frequency rate	CO372 .2 / C2
4.	Micropropagation	Micropropagation of nodal explant	CO372 .1 / C2
5.	Micropropagation	Induction of calli using leaf and internodal explant	CO372 .2 / C2
6	Phytocompound Estimation	Determination of total phenolic content	CO372 .4 / C3
7.	Cell culture Techniques	To develop suspension culture from callus	CO372 .3 / C5
8.	Phytocompound	Extraction of phytocompounds using different solvents	CO372.4 / C3
9	Phytocompound Estimation	Estimation of total soluble Carbohydrate content in plant extract	CO372 .4 / C3
10	Phytocompound Estimation	Estimation of total saponins content using vanillin sulphuric acid assay method	CO372 .4 / C3
11	Micropropagation	Virtual Lab: Micropropagation & Callogenesis	CO372 .2 / C2
12	Synthetic Seed Preparation	Preparation of synthetic seed using plant callus / explant	CO372 .3 / C5

Evaluation Criteria

Components Maximum Marks

Mid-Semester lab-viva/ test 20

End-Semester lab-viva/ test 20
Day to Day performance 45
(Learning laboratory Skills and handling Laboratory Equipments, attendance)
Laboratory record 15

Total 100

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)	
1.	**Introduction to Plant Cell, Tissue and Organ Culture, *In(ed)* Sunil D. Purohit, PHL Learning Pvt Ltd., 2013**
2.	Plant Tissue Culture- Technique and Experiment, *In (ed)* Roberta H Smith, Academic Press, 2013

Detailed Syllabus
Lab-wise Breakup

Course Code	15B17CI577	**Semester Odd (specify Odd/Even)**	**Semester** V **Session** 2020-21 **Month from** July to December
Course Name	IT Practice Lab		
Credits	1	**Contact Hours**	LTP 0 0 2

Faculty (Names)	**Coordinator(s)**	Dr Chakresh Kumar Jain
	Teacher(s) (Alphabetically)	Dr Chakresh Kumar Jain

COURSE OUTCOMES		**COGNITIVE LEVELS**
C373.1	Explain features of programming environment for Python and Perl	Understand Level (C2)
C373.2	Apply Perl based script for bioinformatics problem	Apply Level (C3)
C373.3	Utilize python programming for pattern finding in biological sequences and explore the app designing	Apply Level (C3)
C373.4	Examine and record the experimental observations	Analyze Level (C4)

Module No.	**Title of the Module**	**List of Experiments**	**CO**

1.	**Computer basics and Environment**	To understand different operating systems and compare them.	**C373.1 C2**
2.	PERL	To understand scalars, arrays and hashes in perl and study its applications.	C373.1 C2
3.	PERL	To understand the use of conditional statements, loops in perl	C373.1 C2
4.	PERL	To understand subroutine in perl and study its applications.	C373.2 C3
5.	PERL	To understand different operators in perl	CO2
6.	PERL	To understand file handling in Perl and study its applications.	C373.2 C3
7.	PERL	To make use of regular expressions of Perl in biological problems.	C373.2 C3
8.	PYTHON	To explore the basics of Python and Installation.	C373.1 C2
9.	PYTHON	To explore the data types, Functions and loops in python.	C373.1 C2
10.	PYTHON	To understand file handling in Python and study its applications.	C373.3 C3
11.	PYTHON	To identify the biological pattern using regular expressions and modules of python	C373.3 C3
12.	PYTHON	To perform the sequence analysis using packages	C373.4 C4

13	App designing	Exploration and basic of App Designing	C373.3 C3

Evaluation Criteria

Components Maximum Marks
Mid Viva (Written exam) 20
Final Viva (Written exam) 20
D2D (Report/Attendance/Experiment) 60

Total 100

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)	
1.	M. Model, Bioinformatics programming using Python. Sebastopol, Calif.: O'Reilly Media, 2010**.**
2.	J Tisdall, Mastering Perl for Bioinformatics, O'Reilly Media, 2003

Department of Biotechnology

Programme Name: B.Tech Biotechnology

Semester: V

Course Name & Code: Minor project-I, 15B19BT591

Course Outcomes:

At the completion of the course, students will be able to,

Sl. No.	DESCRIPTION	COGNITIVE LEVEL (BLOOM's TAXONOMY)
C350.1	Select a relevant biotechnological problem	C1
C350.2	Summarize research literature related to the identified problem	C2
C350.3	Demonstrate data analysis ability	C2
C350.4	Demonstrate verbal and written presentation and communication skills	C2

Detailed Syllabus
Lecture-wise Breakup

Course Code	16B1NPH534	**Semester: ODD**	**Semester: V Session** 2020-21 **Month from:** July to December
Course Name	Bio-Materials Science		

Credits	4	**Contact Hours**	4

Faculty (Names)	**Coordinator(s)**	Dr Papia Chowdhury
	Teacher(s) (Alphabetically)	Dr Papia Chowdhury

COURSE OUTCOMES		**COGNITIVE LEVELS**
C301-13.1	Recall basic fundamental of material structure such as crystal defects, phases etc.	Remembering (C1)
C301-13.2	Demonstrate properties of materials such as mechanical, chemical, surface, optical, magnetic etc.	Understanding (C2)
C301-13.3	Selection of materials based on their properties such as ceramic, metal, polymer, composites etc.	Applying (C3)
C301-13.4	Analyzing the applicability of different biomaterials and listing them according to the applied fields like artificial organs.	Analyzing (C4)

Module No.	**Title of the Module**	**Topics in the Module**	**No. of Lectures for the module**
1.	**Introduction to Biomaterials and their uses in medical industry**	Classification of biomaterials, Discussion about the need of biomaterials in industry, introduction of bionic man, cyborg. Types of biomaterials applied for the replacement of body parts: pacemakers, mammary prosthesis, heart valves, intracellular lenses, orthopedic implants, fixation, spinal replacement. Implant, Transplant , Prosthesis, their need availability and limitations. Basic ideas of crystal structure and bonding of materials used as biomaterials, elementary ideas of crystal defects and phase changes in biomaterials. Classification: metals, ceramics, polymers, advanced materials, nanomaterials. Length scale of material structures and their uses.	**8**

2.	Mechanical , chemical and optical Properties of Biomaterials	Modulus of elasticity, stress elongation and transfer, wear resistance, Stress-strain relationship, confined and unconfined compression, dynamic shear, pulse wave velocity, electrical and electromagnetic stimulation, stress generated potential (SGP), pulsed electromagnetic field (PEMF), Failure characteristics of materials (Yielding, plastic deformation, creep, fatigue, corrosion wear, impact fracture etc.). Degradation , whiteness and clarity of materials, role of these properties in specific materials for artificial organs Biocompatibility of materials used in artificial organs.	6
3.	Surface properties of Biomaterials	Interface, cohesion, adhesion, Surface energy, contact angles, critical surface tension, thermal treatment of materials, surface improvement (anodization), surface	5
		properties influencing cell adhesion, Young's equation, annealing, quenched materials, Surface reconstruction.	
4.	Magnetic Materials	Concept of magnetic materials used for implantation. Classification – dia-, para-, ferro-, antiferro- and ferri magnetic materials, their properties and applications; Super Paramagnetism. Magnetic Storage, biocompatible magnetic materials, basic idea of super conductivity, uses of super conducting diamagnets with focus on MRI.	5
5.	Polymers and Ceramics	Various types of Polymers and their applications (with specific examples of biopolymers); Optical/ Mechanical behavior and Processing of Polymers; Structure, Types, Properties and Applications of Ceramics; Mechanical behavior and Processing of Ceramics. Hydrolysis and its uses. Application of polymers and ceramics in organ replacement.	8
6.	Optical Materials and optical fibers, lasers	Optical materials and their properties for biomedical engineering. Concept of optical fiber and principle of total internal reflection in optical fiber. Single, multistep & graded index fiber. Numerical aperture and Attenuation coefficient. Transmission losses in optical fiber. Uses of optical fibers in medical industry: Endoscopy, Laparoscopy, capsule endoscopy, their benefits and limitations. Optical materials and optical fibers in dentistry. Propagation characteristics of different fibers; Applications of Laser and optical fibers in Biotechnology, laser as medical cutting tool.	8
		Total number of Lectures	**40**

Evaluation Criteria

Components Maximum Marks

T1 20
T2 20
End Semester Examination 35
TA 25 [2 Quiz (10 M), Attendance (10 M) and Cass performance (5 M)] **Total 100**

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)	
1.	Elements of Material Science and Engineering, L.H.Van Vlack, Addison-Wesley 1998
2.	Materials Science and Engineering - An Introduction, W. D. Callister, (Wiley)
3.	A. Beiser, Concepts of Modern Physics, Mc Graw Hill International.
4.	Biomaterials, Sujata V. Bhat, Narosa, New Delhi, 2007

Detailed Syllabus
Lecture-wise Breakup

Subject Code	**19B12HS311**	**Semester: ODD**	**Semester V Session 2020-21** **Month from** July to December
Subject Name	**ENTREPRENEURIAL DEVELOPMENT**		
Credits	**3**	**Contact Hours**	**2-1-0**

Faculty (Names)	**Coordinator(s)**	**Dr Badri Bajaj**
	Teacher(s) (Alphabetically)	**Dr Badri Bajaj**

COURSE OUTCOMES	**COGNITIVE LEVELS**

C303-8.1	Understand basic aspects of establishing a business in a competitive environment	Understand Level (C2)
C303-8.2	Apply the basic understanding to examine the existing business ventures	Apply Level (C3)
C303-8.3	Examine various business considerations such as marketing, financial and teaming	Analyze Level (C4)
C303-8.4	Assessing strategies for planning a business venture	Evaluate Level (C5)

Module No.	**Subtitle of the Module**	**Topics in the module**	**No. of Lectures for the module**
1.	Entrepreneurial perspective	Foundation, Nature and development of entrepreneurship, importance of entrepreneurs, Entrepreneurial Mind, Individual entrepreneur Types of entrepreneurs	4
2.	Beginning Considerations	Creativity and developing business ideas; Legal issues; Creating and starting the venture; Building a competitive advantage	7
3.	Developing Marketing Plans	Developing a powerful Marketing Plan, E commerce, Integrated Marketing Communications	7
4.	Developing Financial Plans	Sources of Funds, Managing Cash Flow, Creating a successful Financial Plan Developing a business plan	6
5.	Leading Considerations	Developing Team, Leading the growing company, Resources for growth	4

Total number of Lectures	**28**

Evaluation Criteria

Components Maximum Marks
T1 20
T2 20
End Semester Examination 35
TA 25 (Assignment 1, Assignment 2, Attendance) **Total 100**

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)	
1.	Robert D Hisrich, Michael P Peters & Dean A Shepherd, "Entrepreneurship" 10th Edition, McGraw Hill Education, 2018
2.	Norman M. Scarborough and Jeffery R. Cornwell, "Essentials of entrepreneurship and small business management" 8th Edition, Pearson, 2016
3.	Rajiv Roy, "Entrepreneurship", 2nd Edition, Oxford University Press, 2011
4.	Sangeeta Sharma, "Entrepreneurship Development", 1st Edition, Prentice-Hall India, 2016

Detailed Syllabus
Lecture-wise Breakup

Course Code	**16B1NHS 531**	**Semester : Odd (specify Odd/Even)**	**Semester : V Session:2020-21 Month from:** July to December
Course Name	**Sociology of Youth**		
Credits	**3**	**Contact Hours**	**(2-1-0)**

Faculty (Names)	**Coordinator(s)**	**Prof Alka Sharma**
	Teacher(s) (Alphabetically)	**Prof Alka Sharma** **Ms Shikha**

COURSE OUTCOMES	**COGNITIVE LEVELS**

C303-2.1	Understand Youth and youth culture in sociological perspectives	Understanding(C 2)
C303-2.2	Explain the ethical, cultural& social issues concerning Youth	Evaluating(C 5)
C303-2.3	Understand and interpret the youth culture	Analyzing(C 4)
C303-2.4	Analyze societal problems related to youth in the evolving society.	Evaluating(C 5)

Module No.	**Title of the Module**	**Topics in the Module**	**No. of Lectures for the module**
1.	Introduction to Youth	Meaning, characteristics, Youth for Development, Challenges faced by Youth, Youth's roles and responsibilities in society	2
2.	Youth Culture	Concept of Youth Culture	2
3.	Perspectives on Youth Culture	Functionalist, Conflict, Interactionist and Feminist Perspective on Youth Culture, Youth and Gender	3
4.	Youth Development	Principles of Youth Development, Learning theory, Constructivist theory, collaborative learning , Relationships theories, Theories as a tool to understand Youth Culture	6
5.	Socialization of Youth	Role of family, Community, religion, kin and neighborhood, Changing social structures in family, marriage, Youth and changing identities	6
6.	Emerging problems of Youth	Role and Value conflicts, Generation Gap, Career decisions and Unemployment, Emotional adjustment, Coping with pressures of living, Unequal Gender norms, Crime (Social Strain theories),	6
7.	Changing perceptive of Youth and Youth Culture in 21st century	Role of popular culture and social media, involvement of youth in major decision making institutions, Post-modernity and Youth	3
		Total number of Lectures	**28**

Evaluation Criteria

Components Maximum Marks

T1 20

T2 20 End Semester Examination 35 TA 25 (Project, Presentation, Assignment) **Total 100**

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)	
1.	Tyyskä, V. *Youth and Society: The long and winding road*, 2nd Ed., Canadian Scholars' Press, Inc. (2008).
2.	White, Rob, Johanna Wyn and Patrizia Albanese. *Youth & Society: Exploring the Social Dynamics of Youth Experience.* Don Mills, ON: Oxford University Press. (2011).
3.	Bansal, P.*Youth in contemporary India: Images of identity and social change*. Springer Science & Business Media. (2012).
4.	Furlong, Andy. *Youth studies: An introduction*. Routledge, (2012).
5.	Blossfeld, Hans-Peter, et al., eds. *Globalization, uncertainty and youth in society: The losers in a globalizing world*. Routledge, (2006).
6.	Ruhela, Satya Pal, ed. Sociology of the teaching profession in India. National Council of Educational Research and Training, (1970).
7.	Frith, S. "The sociology of youth. Themes and perspectives in sociology." Ormskirk, Lancashire: Causeway Books (1984).

Detailed Syllabus
Lecture-wise Breakup

Subject Code	18B12HS311	**Semester ODD**	**Semester** V **Session** 2020-21 **Month from** July to December
Subject Name	STRATEGIC HUMAN RESOURCE MANAGEMENT		
Credits	3	**Contact Hours**	2-1-0
Faculty (Names)	**Coordinator(s)**	Ruchi Gautam (Sec-128), Santoshi Sengupta (Sec-62)	
	Teacher(s) (Alphabetically)	Ruchi Gautam (Sec-128), Santoshi Sengupta (Sec-62)	

COURSE OUTCOMES		COGNITIVE LEVELS
C303-6.1	Understand human resource management from a strategic perspective and analyze environmental challenges that impact HRM of an organization	Analyze Level (C4)
C303-6.2	Assess the human resource needs of the organization and design recruitment and selection strategies for an organization	Evaluate Level (C5)
C303-6.3	Evaluate the processes of training and development, mentoring, performance management, compensation and reward management in an organization and design effective strategies for the same	Evaluate Level (C5)
C303-6.4	Critically assess career management system, work-life initiatives and other HRM practices of the organization	Evaluate Level (C5)

Module No.	Subtitle of the Module	Topics in the module	No. of Hours for the module
1.	Introduction	Role of HR in strategy; Evolution of SHRM; Strategic fit: Conceptual Framework; Theoretical Perspectives on SHRM; SHRM approaches in Indian context	4
2.	Strategic Human Resource Environment and Evaluation	Overview of the environment; SHRM in Knowledge Economy; HRM and Firm Performance; Rationale for HR Evaluation; Approaches to HR Evaluation	4
3.	Strategic Human Resource Planning and Acquiring	Overview of HRP; Objectives of HRP; Job Analysis and SHRM; External and Internal Influences on Staffing; Recruitment: Sources, Methods and Approaches; Selection: Methods and Approaches; Strategic Recruitment and Selection	6
4.	Training, Development, Mentor Relationships	Basic Concepts, Purposes & Significance of Training and Development; HRM Approaches; Linkage between Business Strategy and training; Process; new Developments; Concept and outcomes of mentoring; Strategic approach of Mentoring relationships	4
5.	Strategic Performance Management; Compensations and Reward Management; Career Management	Developing performance management systems; Technology and performance management; Strategic Linkage of performance management; Determinants and approaches of compensation and rewards; New Developments; Business Strategy and compensation; Career Management systems; SHRM approach to career management	6

6.	Work Life Integration and International HRM	HRD Approaches to work-life integration; Development of work-life initiatives; Strategic approach to work-life integration; External HRM; IHRM practices	4
Total number of Lectures			28
Evaluation Criteria			

Components Maximum Marks
T1 20
T2 20
End Semester Examination 35
TA 25 [Assignments (10) Project (10) Attendance (5)]
Total 100

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)	
1.	Tanuja Agarwala, Strategic Human Resource Management, 1st edition, Oxford University Press, 2007
2.	Stephen J. Perkins, Susan M. Shortland, Strategic International Human Resource Management: Choices and Consequences, Kogan Page, 2010
3.	John storey, Patrick Wright and Dave Ulrich, Strategic Human Resource Management, Routledge Taylor and Francis Group, 2009
4.	Amberg, J. J., & McGaughey, S. L. (2019). Strategic human resource management and inertia in the corporate entrepreneurship of a multinational enterprise. *The International Journal of Human Resource Management*, *30*(5), 759-793.
5.	Stewart, G. L., & Brown, K. G. (2019). *Human resource management*. Wiley.
6.	Deshati E. Social media, a strategic tool for the recruitment process. J Fin Mark. 2017;1(1):3-4.

Detailed Syllabus

Lecture-wise Breakup

Course Code	**20B13HS311**	**Semester: Odd**	**Semester: V Session: 2020-21 Month: JULY-DECEMBER**

Course Name	**Indian Constitution and Traditional Knowledge**		
Credits	**3**	**Contact Hours**	**3(3-0-0)**

Faculty (Names)	Coordinator(s)	Dr. Chandrima Chaudhuri
	Teacher(s) (Alphabetically)	· Dr. Chandrima Chaudhuri · Dr. Praveen Sharma · Dr. Santosh Dev · Ms. Shikha Kumari · Dr. Swati Sharma

CO Code	COURSE OUTCOMES	COGNITIVE LEVELS
C305.1 Demonstrate an	understanding about the early Indian traditional political thought and the current Indian political scenario by knowing about	the structure of government in place Understand(C2)

C305.2	Demonstrate an understanding of the role of Indian President, Prime Minister, Governor, other members of the legislature and local governments as representatives of the common masses	Understand (C2)
C305.3	Analyze the working of Indian federalism with reference to centre-state relations	Analyze(C4)
C305.4	Analyze the impact of the contemporary challenges such as caste and gender to the working of Indian democracy	Analyze(C4)

Module No.	Title of the Module	Topics in the Module	No. of Lectures for the module
1.	The Indian Constitution	· Historical Background to the Indian Constitution · Salient features of the Indian Constitution · Fundamental Rights (Part III of the Indian Constitution) · Fundamental Duties (Part IVA of the Indian Constitution) · Directive Principles of the State Policy (Part IV of the Indian	8

Constitution)

2.	Organs of the Government	· The Executive: President, Prime Minister and Governor appointment, powers and functions · The Legislature: Parliament and its components- Lok Sabha and Rajya Sabha (composition and functions) · The Judiciary: Supreme Court-composition, functions, appointment and jurisdiction	8
3.	Nature of Federalism in India · Centre-State Legislative Relations · Centre-State Administrative Relations · Centre-State Financial Relations · Special Provisions of some state and the 5th and 6th schedule		8

4.	Local Governance in India	· Urban local governance: Municipality- Structure & Functions · Rural Local governance: Panchayat Organization and Powers · Civil Society: the participation of the people in local governance	8
5.	Traditional knowledge	· Kautilya- Theory of state · Mandala theory · Saptanga theory	6
6.	Challenges to Indian Democracy	Indian Constitution · Gender as critical to the process of Constutionalization · Caste as a critical factor in the	4
		Total number of Lectures	42

Evaluation Criteria
Components Maximum Marks
T1 20
T2 20
End Semester Examination 35
TA 25 (Attendance, Quiz, Project)
Total 100

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)	
1.	A.A. George, *Important Judgements that transformed India*, New Delhi: McGraw Hill, 2020
2.	B. Chakraborty, *Indian Constitution: Text, Context and Interpretation*, New Delhi: Sage Publications, 2017
3.	B.K.Sharma, *Introduction to the Constitution of India*, New Delhi: Prentice Hall of India, 2002
4.	M.Laxmikanth, *Indian Polity*, 6th edition, Noida: McGraw Hill, 2019
5.	M.P.Singh and R. Saxena, R, *Indian Politics: Contemporary Issues and Concerns*, New Delhi: PHI Learning, 2008

6. R. Kangle, *Arthashashtra of Kautilya*, New Delhi: Motilal Publishers, 1997

Detailed Syllabus

Lecture-wise Breakup

Subject Code	**16B1NHS435**	**Semester : ODD**	**Semester: V Session: 2020-21** **Month: August to December**
Subject Name	**SOCIOLOGY OF MEDIA**		
Credits	**3 (2-1-0)**	**Contact Hours**	**42**

Faculty (Names)

Coordinator(s)	**Prof. Alka Sharma**	**Teacher(s) (Alphabetically)**	**Prof. Alka Sharma**

COURSE OUTCOMES		COGNITIVE LEVELS
C304-1.1	Demonstrate a basic understanding of different concepts used in the systematic study of Sociology of Media	Understanding(C 2)
C304-1.2	Examine various sociological theoretical orientation towards media and society.	Analyzing(C 4)
C304-1.3	Analyze the key issues related to the processes of Production of Media, Popular Culture and consumer culture.	Analyzing(C 4)

C304-1.4 Critically evaluate the major methods of Cultural Consumption ,Social Class & the process of construction of subjectivities and audience reception in new Media Evaluating(C 5)

C304-1.5	Create positive and critical attitude towards the use of new media and understanding of threats of Digital Age	Creating(C 6)

Module No.	Title of the Module	Topics in the Module	No. of Lectures for the module
1.	Introduction	Introduction to the Course	1
2.	Concepts and Theoretical Orientation of Sociology of Media	● Different concepts related to Sociology of media ● Functionalist Approach to the Sociology of Media ● Critical Approach to the Sociology of Media ● Symbolic Interactionist Approach to the Sociology of Media ● Different theories of Media	8
3.	Concept of Popular Culture and its critical analysis	● What is popular culture? ● Difference between 'pop' culture and 'high' culture ● What distinguishes popular culture from other kinds of culture (art, folk culture)? Is there a distinction at all anymore? ● Visualizing Society through 'pop' culture/ media ● Risks and rituals that come with Popular Culture	8

4.

New media
● Difference between tradition media and new media
● New media as technology

● New Information Technology (brief history in case of India)

5.	Media & State	● Mediatization of Society ● Free-speech Media	5
6.	Consumption of Media and Media reception	● Social Actors as Audience/ Audience as market– Theory ● Media effects: Media and representations (gender, ethnic)- the under-representation and misrepresentation of subordinate groups. ● Media and the construction of reality: media logic and cultivation analysis theory ● Information Society vs Informed Society ● Cultural Consumption and Social Class	9
7.	Media in Global Age	● Rise of Network Society- Manuel Castells ● Global Media: impact of market & state ● Global Perspectives: The world on our doorstep ● Marketing and aesthetics in everyday life	6
		Total number of Lectures	42

Evaluation Criteria

Components Maximum Marks

T1 20

T2 20

End Semester Examination 35

TA 25 (Project, Presentation and attendance) Total 100

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)	
1.	Ritzer, George, and Steven Miles. "*The changing nature of consumption and the intensification of McDonaldization in the digital age."* Journal of Consumer Culture 19, no. 1, pp 3-20, 2019.
2.	Turow, Joseph. *Media today: An introduction to mass communication*. Taylor & Francis, 2011.
3.	Curran, James. *Media and society*. Bloomsbury Publishing, 2010.
4	JA Fisher 'High Art v/s Low Art, in Berys Nigel Gaut & Dominic Lopes (eds.), *The Routledge Companion to Aesthetics*. Routledge 2001

Detailed Syllabus
Lecture-wise Breakup

Course Code	**16B1NHS434**	**Semester : ODD**	**Semester V Session 2020-21** **July - December**
Course Name	**Introduction to Contemporary Forms of Literature**		
Credits	**3**	**Contact Hours**	**3 (3-0-0)**

Faculty (Names)	**Coordinator(s)**	Dr. Monali Bhattacharya (Sector 62)
	Teacher(s) (Alphabetically)	Dr. Monali Bhattacharya (Sector 62)

COURSE OUTCOMES		**COGNITIVE LEVELS**
C303-6.1	Interpret & relate with the genres, periods, and conventional as well as experimental forms of literature as current ethical, technological and cultural reflections of society.	CL-2 Understand
C303-6.2	Apply literary and linguistic theories on the texts to identify them as cultural constructs inculcating human values in the society.	CL-3 Apply
C303-6.3	Analyze social, cultural, moral and linguistic changes in contemporary world through cloze study of select representative texts of different cultures thematically and stylistically.	CL-4 Analyse
C303-6.4	Determine the reciprocal relationship between the individual and culture individually and/or through a research based paper/poster presentation with an aim to analyze social, cultural and moral fibre of youth in multidisciplinary environment, giving holistic solutions for sustainable development of society.	CL-5 Evaluate
C303-6.5	Create literary, non-literary write-up with proper applied grammar usage, having moral and cultural significance for today's world individually and in a team.	CL-6 Create

Module No.	**Title of the Module**	**Topics in the Module**	**No. of Lectures for the module**

1.	Introducing Literary Theories	· From Formalism to Reader Response Theory: Major Terms & Concepts · Narrative Art & Narratology · Language & Style: An Introduction	12
2.	Introducing New Forms & Sub Genres Today: Features & Portions	· New Fiction: Graphic Novels, Cyberpunk · Non Fiction: Memoirs & Autobiographies, Biographies & Personal Narrative	6
3.	Spiritual Literature	*Siddhartha*- Hermen Hesse (novella)	4
4.	Travel Literature	*Eat, Pray & Love (Travelogue & cinematic adaptation)*	4
5.	Written Communication Through Non Fiction	*Diary, Blog, Travelogue*	4
6.	Commonwealth / Post Colonial Literature	*Hayavadana (Short Play)*- Girish Karnad	4
7.	European Literature	*Brave New World – Aldous Huxley (Science Fiction)*	4
8	Canadian Literature	*The Penelopiad- Margaret Atwood*	4
		Total number of Lectures	**42**

Evaluation Criteria

Components Maximum Marks

T1 20

T2 20

End Semester Examination 35

TA 25 (Assignment, Project, Class Interaction)

Total 100

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)	
1.	Margaret Atwood, 'The Penelopiad', 1st Edition, Canongate Series, Knopf, Canada, 2005.
2.	M.H. Abrams, 'A Glossary of Literary Terms'.7th Edition, Hienle & Hienle: Thomson Learning, USA, 1999.
3	Mark William Roche, 'Why Literature matters in the 21st Century', 1st Edition, Yale University Press, 2004.
4	Girish Karnad, 'Hayavadana', 1st Edition, Oxford University Press, Delhi, 1975 (30th Impression, 2012).
of5	Aldous Huxley, 'Brave New World', 1st Edition, Harper Collins, 2004.

6	Hermen Hesse, 'Siddhartha', 1st Edition. New Directions, US, 1951. For online version: https://www.gutenberg.org
7	Elizabeth Gilbert, 'Eat, Pray & Love. 1st Edition, Penguin,US, 2006.

DETAILED SYLLABUS

Lecture-wise Breakup

Course Code	**16B1NHS532**	**Semester: ODD (specify Odd/Even)**	**Semester: 5th Month from: Aug to Dec2020**
Course Name	**Planning and Economic Development**		
Credits	**03**	**Contact Hours**	**3-0-0**
Faculty (Names)			
Coordinator(s)	**Dr. Akarsh Arora**	**Teacher(s) (Alphabetically)**	**1. Dr. Akar** **2. Dr. Ama** **(amandee**

COURSE OUTCOMES		COGNITIVE LEVELS
C303-4.1	Understand the issues and approaches to economic development.	C2
C303-4.2	Evaluate National income accounting, human development index and sustainable development.	C5

C303-4.3	Apply an analytical framework to understand the structural characteristics of development.	C3
C303-4.4	Analyze the role of Macroeconomic stability & policies and Inflation in the development process.	C4
C303-4.5	Evaluate the importance of federal development and decentralization.	C5

Module No.	Title of the Module	Topics in the Module	No. of Lectures for the module
1.	Economic Development and its Determinants	Economic growth and development. Indicators of development. Approaches to economic development. Rostows Stages of Growth.	5
2.	National Income Accounting	National Income Accounting, Green GNP and Sustainable development	5
3.	Indicators of development	PQLI, Human Development Index (HDI) and gender development indices.	4
4.	Demographic Features, Poverty and Inequality	Demographic features of Indian population; Rural-urban migration; Growth of Primary, Secondary and Tertiary Sector.	5
5.	Inflation and Business Cycles	Inflation. Business cycle. Multiplier and Accelerator Interaction.	6

6.	Macro-Economic Stability & Policies	Monetary Policy. Fiscal Policy. Role of Central Bank & Commercial banks in the development of the country. Balance of payments; currency convertibility and Issues in export-import policy.	6
7.	Federal Development	The Federal Set-up - The Financial Issues in a Federal Set-up, Principles for Efficient Division of Financial Resources between Governments. Financial Federalism under Constitution. Finance Commissions in India, Terms of References and its Recommendations	6
8.	Planning and Development	Need for planning, Decentralisation, Rural and Urban local bodies.	5
		Total number of Lectures	42

Evaluation Criteria

Components Maximum Marks

T1 20

T2 20

End Semester Examination 35

TA 25 (Assignment + Quiz)

Total 100

Recommended Reading material:	
1.	Todaro, M.P., Stephen C. Smith, Economic Development, Pearson Education, 2017
2.	Thirwal, A.P., Economics of Development, Palgrave, 2011

3.	Ahuja, H. L., Development Economics, S Chand publishing, 2016
4.	Ray, Debraj, Development Economics, Oxford University Press, 2016

Detailed Syllabus
Lecture-wise Breakup

Course Code	17B1NHS531	**Semester ODD (specify Odd/Even)**	**Semester V Session** 2020-21 **Month from** July to December
Course Name	Technology and Culture		
Credits	3	**Contact Hours**	**2-1-0**

Faculty (Names)	**Coordinator(s)**	Dr Swati Sharma
	Teacher(s) (Alphabetically)	Dr Swati Sharma

COURSE OUTCOMES		**COGNITIVE LEVELS**
C303-5.1	Understand the main theories in cultural management,	Applying (C 2)
C303-5.2	Appraise technological convergence and cultural divergence, relate the differences to the literature and suggest solutions	Evaluating(C 5)
C303-5.3	Interpret and communicate effectively in physical and virtual teams by evaluating appropriate concepts, logic and selecting the apt IT tools.	Evaluating (C5)
C303-5.4	Evaluation of the theoretical knowledge to adapt to cultural differences in global work environment.	Evaluating(C 5)

Module No.	**Title of the Module**	**Topics in the Module**	**No. of Lectures for the module**

1.	Introduction	▪ Genealogy of the concept ▪ The Information Technology Revolution ▪ The concept of Network societies	5
2.	Dimensions of Culture	▪ Evolution of Culture ▪ Principal theories of Culture: Kluckholn and Strodtbeck, Hofstede, Trompenaars and Schwartz ▪ Cultural Diversity and cross cultural literacy	8
3.	Cross cultural communication in physical and virtual teams	▪ The Communication Process ▪ Language and Culture ▪ Non Verbal Communication ▪ Barriers to Cross Cultural Understanding	8
4.	Negotiation and Decision Making	▪ Theories of Negotiation ▪ Negotiation and Intercultural Communication ▪ Decision making in cross cultural environment	2
5.	Cross Culture and Leadership	▪ Leadership and Culture ▪ Theories of Culture centric leadership and their Global Relevance ▪ Developing Competencies for Global citizens ▪ Women as International Leaders ▪ Cross Cultural Training ▪ Ethical Guidelines for Global Citizens	5
		Total number of Lectures	**28**

Evaluation Criteria

Components Maximum Marks
T1 20
T2 20
End Semester Examination 35
TA 25 (Project, Assignment and Oral Viva)
Total 100

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)

1.	Maidenhead.Riding the Waves of Culture: Understanding Cultural Diversity in Business (2012).3rd edition. McGraw Hill.
2.	Edgar, Andrew and Peter Sedgwick (eds.) Key concepts in Cultural Theory. London. Routledge.1999
3.	Gerard Bannon, J. (red.). Mattock, Cross-cultural Communication: The Essential Guide to International Business.2003

4.	Grossberg, L., C. Nelson and P. Treichler (eds.) Cultural Studies. London. 1992
5.	Robertson, Ronald. Globalization: Social theory and global culture, London: Sage, 1992.
6.	Madhavan,S., Cross Cultural Management: Concepts and Cases(2nd Ed),Oxfor University Press 2016.
7.	Coyle,D., The Culture Code: The Secrets of Highly Successful Groups, Bantam, 2018

Discrete Mathematics (16B1NMA531)

Course Description

Course Code	**16B1NMA531**	**Semester Odd**	**Semester V Session 2020-21 Month from Aug 2020- Dec 2020**			
Course Name	**Discrete Mathematics**					
Credits	**3**	**Contact Hours**	**3-0-0**			
Faculty (Names)	**Coordinator(s)**	**Dr. Anuj Bhardwaj**				
	Teacher(s) (Alphabetically)	**Dr. Anuj Bhardwaj**				
will be able to	**COURSE OUTCOM successful completion**					**COGNITIVE LEVELS**
C301-1.1	explain partial order relations, Hasse diagram, lattices and recursive functions.					Understanding Level (C2)

C301-1.2	solve the difference equations using generating function and Z transform.	Applying Level (C3)
C301-1.3	explain the propositional and predicate calculus to check the validity of arguments.	Understanding Level (C2)
C301-1.4	demonstrate graphs, digraphs, trees and use it to solve the different problems of graph theory.	Applying Level (C3)
C301-1.5	illustrate various algebraic structures and their properties.	Understanding Level (C2)

C301-1.6 explain the theory of formal languages and solve the related problems of automata. Applying Level (C3)

Module No.	Title of the Module	Topics in the Module	No. of Lectures for the module
1.	Relations and Lattices	Relations and their composition. Pictorial representation, matrix and graphical representations. Equivalence relations and partitions. Partial ordered relations and Hasse diagram. Lattices.	5
2.	Functions	Functions and Recursively defined functions, generating functions, solution of recurrence relations by generating function. Z transforms, solution of difference equations by Z transform.	8
3.	Propositional Calculus	Propositions- simple and compound. Basic logical operators. Implication. Truth tables. Tautologies and contradictions. Valid arguments and fallacy. Propositional functions and quantifiers.	4

4.	Graphs	Graphs and related definitions, subgraphs, isomorphism, paths and connectivity. Eulerian graph and Konigsberg problem. Hamiltonian graph. Labelled and weighted graphs. Tree Graphs Minimum spanning Tree (Prim's algorithm). Graph colorings. Four color problem.	7
5.	Directed Graphs	Trees, Digraphs and related definitions. Rooted trees. Algebraic expressions and Polish notation. Sequential representation. Adjacency matrix. Path matrix. Shortest path. Linked representation of directed graphs. Binary trees.	5
6.	Algebraic Structures	Groups- definitions and examples, order of elements, subgroup, condition for subgroups. Quotient groups, Lagrange theorem and applications, Rings, integral domains and Fields- definition and examples.	7

7. Languages and Grammars Strings (words) and languages, grammars, types of 6	grammars, Finite state machines, finite state automata, regular languages and regular expressions.	

Total number of Lectures	42

Evaluation Criteria

Components Maximum Marks

T1 20

T2 20

End Semester Examination 35

TA 25 (Quiz, Assignments, Tutorials, PBL)

Total 100

Recommended Reading material:	
1.	Lipschutz, S. and Lipson, M., Discrete Mathematics, 2nd Edition, Tata McGraw-Hill, 1997.
2.	Rosen, K. H., Discrete Mathematics and its Application, 7th Edition, Tata McGraw-Hill, 2011.
3.	Liu, C. L., Elements of Discrete Mathematics, 2nd Edition, Tata McGraw-Hill, 1998.
4.	Kolman, B., Busby, R. C. and Ross, S., Discrete Mathematical Structures, 6th Edition, Prentice Hall, 2018.
5.	Deo, N., Graph Theory, Prentice Hall, 2004.
6.	Grimaldi, R.P., Discrete and Combinatorial Mathematics, 5th Edition, Pearson Education, 2011.

Basic Numerical Methods (17B1NMA531)

Course Description

Course Code	**17B1NMA531**	**Semester - Odd**	**Semester V Session 2020-21** **Month from Aug 2020- Dec 2020**
Course Name	**Basic Numerical Methods**		
Credits	**3**	**Contact Hours**	**3-0-0**

Facul (Name		**Coordinator(s)**		**Dr. Lokendra Kumar and Dr. Pankaj Kumar Srivastava**				
		Teacher(s) (Alphabetically)		**Dr. Lokendra Kumar, Dr. Trapti Neer, Dr. Pankaj Kumar Srivastava, Dr. DCS Bisht**				
OU								**COGNITIVE LEVELS**
After pursuing the above mentioned course, the students will be able to:								
C301-5.1	explain the concepts of approximation and errors in computation.							Understanding level (C2)
C301-5.2	construct numerical methods for algebraic and transcendental equations and their convergence.							Applying Level (C3)
C301-5.3	outline the methods of interpolation using finite differences and divided difference formulas.							Understanding level (C2)

C301-5.4 make use of numerical differentiation and integration. Applying Level (C3)

C301-5.5	solve the system of linear equations using direct and iterative methods.		Applying Level (C3)
C301-5.6	solve ordinary differential equations using different numerical methods.		Applying Level (C3)
Module No.	Title of the Module	Topics in the Module	No. of Lectures for the module

1.	Approximation and Errors in Computation	Errors, relative error, absolute error, error in series approximation.	02
2.	Algebraic and Transcendental Equations	Bisection Method, Regula- Falsi Method, Secant Method, Iterative method, Newton-Raphson Method, convergence.	07
3.	Interpolation	Finite Differences, Relation between difference operators, Newton's Forward and Backward Interpolation, Gauss Backward Interpolation, Bessel's and Sterling's central difference operators, Laplace Everett's formula, Newton's divided difference formula, Lagrange's interpolation formula.	08
4.	Numerical Differentiation and Integration	Derivatives using Newton's Forward and Backward Interpolation, Bessel's and Sterling's central difference operators, Maxima and minima of a tabulated function. Trapezoidal, Simpson's, Boole's and Weddle's rules, Euler-Maclaurin formula.	11
5.	System of Linear Equations	Gauss Elimination method, LU decomposition method, Gauss-Seidel Method.	05
6. Numerical Solution of Ordinary Differential Equations		Picard's method, Euler's method, Modified Euler's method, Fourth order Runge-Kutta method, Milne's method for first order, second order and simultaneous differential equations, Finite-Difference Method	09
Total number of Lectures			42

Evaluation Criteria Components Maximum Marks T1 20 T2 20 End Semester Examination 35 TA 25 (Quiz, Assignments, Tutorials, PBL) Total 100

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)

1.	C. F. Gerald and P.O. Wheatley, Applied Numerical Analysis, 7th Ed., Pearson Education, 2004.
2.	M. K. Jain, S. R. K. Iyengar and R. K. Jain, Numerical Methods for Scientific and Engineering Computation, 6th Ed., New Age International, New Delhi, 2014.
3.	R. S. Gupta, Elements of Numerical Analysis, 2nd Ed., Cambridge University Press, 2015.
4.	S.D. Conte and C. deBoor, Elementary Numerical Analysis, An Algorithmic Approach, 3rd Ed., McGraw-Hill, New York, 1980.

Detailed Syllabus

Lecture-wise Breakup

Course Code	**16B1NPH535**	**Semester: ODD**	**Semester: 5th Session: 2020 -2021** **Month from July 20 to December 21**

Course Name	**NUCLEAR SCIENCE AND ENGINEERING**		
Credits	**3**	**Contact Hours**	**3+1**

Faculty (Names)

Coordinator(s)	**Manoj Tripathi**	**Teacher(s) (Alphabetically)**	**Manoj Tripathi**

COURSE OUTCOMES		**COGNITIVE LEVELS**
C301-14.1	Relate terminology and concepts of nuclear science with various natural phenomenon and engineering applications.	Remembering (C1)
C301-14.2	Explain various nuclear phenomenon, nuclear models, mass spectrometers, nuclear detectors, particle accelerators. and classify elementary particles.	Understanding (C2)
C301-14.3	Solve mathematical problems for various nuclear phenomenon and nuclear devices.	Applying (C3)
C301-14.4	Analyze the results obtained for various physical problems and draw inferences from the results.	Analyzing (C4)

Module No.	Title of the Module	Topics in the Module	No. of Lectures for the module

1.	Nuclear Constituents and their properties, Nuclear Forces	Rutherford scattering and estimation of nuclear size, Constituents of the nucleus and their properties, Nuclear Spin, Moments and statistics, Magnetic dipole moment, Electric quadruple moment. Nuclear forces, Two body problem - Ground state of deuteron, Central and non-central forces, Exchange forces: Meson theory, Yukawa potential, Nucleon-nucleon scattering, Low energy n-p scattering, Effective range theory, Spin dependence, charge independence and charge symmetry of nuclear forces, Isospin formalism.	07
2.	Nuclear Models	Binding energies of nuclei, Liquid drop model: Semi-empirical mass formula, Mass parabolas, Prediction of Nuclear stability, Bohr-Wheeler theory of fission, Shell model, Spin-orbit coupling. Magic numbers, Angular momenta and parities of nuclear ground state, Magnetic moments and Schmidt lines, Collective model of a nucleus.	05
3.	Nuclear decay and Nuclear reactions Alpha decay, Beta decay, Pauli's Neutrino hypothesis- Helicity of neutrino, Theory of electron capture, Non-conservation of parity, Fermi's theory, Gamma decay: Internal conversion, Multipole transitions in nuclei, Nuclear isomerism, Artificial radioactivity, Nuclear reactions and conservation laws, Q-value equation, Centre of mass frame in nuclear Physics, Scattering and reaction cross sections, compound nucleus, Breit-Wigner one level formula	08

4.	Interaction of nuclear radiation with matter	Interaction of charge particles with matters: Bohr's ionization loss formula and estimation of charge, mass and energy. Interaction of electromagnetic radiation with matter, Linear absorption coefficient. Nuclear particle detectors and neutron counters.	07
5.	Accelerator and reactor Physics	Different types of reactors, tracer techniques, activation analysis. Radiation induced effects and their applications: Accelerators: Linear accelerators, Van de Graff generator, LINAC, Cyclotrons, Synchrotons, Colliders.	06
6.	Cosmic radiation and Elementary Particles	Cosmic radiation: Discovery of cosmic radiation, its sources and composition, Latitude effect, altitude effect and east west asymmetry, secondary cosmic rays, cosmic ray shower, variation of cosmic intensity and Van Allen radiation belt. Elementary particles: Classification of particles, K-mesons, Hyperons, particles and antiparticles, fundamental interactions, conservation laws, CPT theorem, resonance particles and hypernucleus, Quark model.	07
		Total number of Lectures	40

Evaluation Criteria

Components Maximum Marks

T1 20

T2 20

End Semester Examination 35

TA 25 [2 Quiz (10 M), Attendance (7 M) and PBL & Cass performance (8 M)]

Total 100

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)

1.	K.S. Krane, 1987, Introductory Nuclear Physics, Wiley, New York.
2.	I. Kaplan, 1989, Nuclear Physics, 2nd Edition, Narosa, New Delhi.

3. B.L. Cohen, 1971, Concepts of Nuclear Physics, TMH, New Delhi.

4.	R.R. Roy and B.P. Nigam, 1983, Nuclear Physics, New Age International, New Delhi.
5.	H.A. Enge, 1975, Introduction to Nuclear Physics, Addison Wesle, London.
6.	Y.R. Waghmare, 1981, Introductory Nuclear Physics, Oxford-IBH, New Delhi.

7.	R.D. Evans, 1955, Atomic Nucleus, McGraw-Hill, New York.

Detailed Syllabus
Lecture-wise
Breakup

Course Code	**16B1NHS433**	**Semester: Odd**	**Semester Session 2020 -2021** **Month from August to Dec 2020**
Course Name	**Financial Management**		
Credits	**3**	**Contact Hours**	**3 (3-0-0)**

Faculty (Names)

Coordinator(s)	**Dr. Mukta Mani (Sec-62)** **Dr. Sakshi Varshney (Sec-128)**	**Teacher(s) (Alphabetically)**	**Dr. Mukta Mani (Sec-** **Dr. Sakshi Varshne** **Dr. Shirin Alavi (Se**

COURSE OUTCOMES		**COGNITIVE LEVELS**
C303-3.1	Analyze the time value of money in taking investment decisions.	Analyze (Level 4)
C303-3.2	Contrast the various forms of business organizations and evaluate their financial performance.	Evaluate (Level 5)

C303-3.3	Evaluate investment projects using capital budgeting techniques	Evaluate (Level 5)

C303-3.4 Apply the concept of cost of capital into evaluation of investment projects Apply (Level 3)

C303-3.5	Evaluate the leverage capacity of a business and its application in selection of long term sources of finance.	Evaluate (Level 5)
C303-3.6	Understand the practical considerations for managing working capital requirement in a firm.	Understand (Level 2)

Module No.	**Title of the Module**	**Topics in the Module**	**No. of Lectures for the module**
1.	Introduction	Basic financial concepts-Meaning of Accounting, Accounting Concepts and Conventions, Introduction to Double Entry system and Accounting equation, Definition and Objectives of Financial management, Finance functions and Role of Finance manager	4

2.	Time value of Money	Compounding, Discounting, Annuity, Perpetuity, Loan Amortization	6
3.	Analysis of Financial Statements	Understanding of Balance Sheet and Income Statements, Ratio Analysis, Interpretation, Importance and limitations	7

4. Capital Budgeting:
Principle
Techniques
Nature of Capital Budgeting, Evaluation

Techniques: Discounting (NPV, IRR etc.) and Non-discounting

Techniques (payback, ARR etc)

5

5.	Long Term Sources of Finance	Definition, types, advantages and disadvantages	3
6.	Concept and measurement of cost of capital	Definition, measurement of specific costs, computation of Overall Cost of Capital,	4
7.	Cash Flows for Capital Budgeting	Identification and determination of relevant cash flows	5

8.	Leverages and Capital structure decision and Working Capital Management	Break Even Analysis, Operating, Financial and combined leverage, Capital structure EBIT EPS analysis, Concept of working capital management, Practical Considerations in Working capital management	5
9.	Project presentations		3
		Total	42

Evaluation Criteria	
Components	Maximum Marks

T1 20

T2	20
End Term	35
TA	25 (Project, Class Participation)
Total	100

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)

1.	Khan, M.Y. and Jain, P.K., *Financial Management: Text, Problems and Cases*, 5th ed, Tata McGraw Hill, 2007.
2.	Chandra, P., *Financial Management Theory and Practice*, 6th ed., Tata McGraw Hill, 2004.
3.	Pandey, I.M., *Financial management*, 9th ed, Vikas Publishing House Pvt Ltd, 2006
4.	Van Horne, J.C. and Wachowicz, J.M., *Fundamentals of Financial Management*, 11th ed, Pearson Education, 2001
5.	Kishore, R.M., *Financial Management*, 6th ed, Taxmann, 2007.