Jaypee Institute of Information Technology

Integrated M.Tech. Biotechnology

Semester V

Course Descriptions

Detailed Syllabus

Lecture-wise Breakup

Course Code	15B11BT511	Semester Odd (specify Odd/Even)		Semester V Session 2018 -2019 Month from July to December
Course Name	Cell Culture Technology			
Credits	4		Contact Hours	4

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

COURSE OUTCOMES		COGNITIVE LEVELS
C310.1	Demonstrate knowledge on principles of plant and animal tissue culture.	Understand level(C2)
C310.2	Identify the requirements to construct a cell culture laboratory.	Apply level(C3)
C310.3	Apply knowledge and techniques to maintain different types of cell cultures.	Apply level(C3)
C310.4	Examine cell culture techniques for applications in different fields of biotechnology.	Analyze level(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, cellular 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	3

		cultured cells, bioreactors.	
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	Celladhesion 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 (Class Test, 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.	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

Course Code	15B11BT512	Semester ODD (specify Odd/Even)		Semester V Session 2018 -2019 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

COURSE OUTCOMES		COGNITIVE LEVELS
C311.1	Explain unit operations in downstream processing	Understand Level (C2)
C311.2	Summarize media optimization, microorganism isolation, preservation and enrichment	Understand Level (C2)
C311.3	Apply unit operation calculation to solve industrial scale problems	Apply level (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	Separation of insoluble products - Cell disruption : Physical	2

	Processing -II	methods, Chemical methods	
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** 2018 - 2019 **Month from** July to December
Course Name	**Cell Culture Lab**		
Credits	4	**Contact Hours**	2

Faculty (Names)	**Coordinator(s)**	Ms. Manisha Singh
	Teacher(s) (Alphabetically)	Ms. Manisha Singh (Coordinator) Dr. Priyadarshini Dr. Rachana Dr. Reema Gabrani Dr. Vibha Rani.

COURSE OUTCOMES		COGNITIVE LEVELS
CO571.1	Understand requirements for culturing animal cells *in vitro*	Understand Level (C2)
CO571.2	Apply the fundamental knowledge of cell culture techniques to maintain animal cell lines	Apply Level (C3)
CO571.3	Plan and perform tests for cell separation, characterization, differentiation and transformation processes in cell cultures	Understand Level (C2)
CO571.4	Demonstrate practical skills of cell culture for biotechnology applications	Apply Level (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.	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** 2018 -2019 **Month from** July to December
Course Name	FERMENTATION & DOWNSTREAM PROCESSING LAB		
Credits	1	**Contact Hours**	2

Faculty (Names)	Coordinator(s)	PROF. SUDHA SRIVASTAVA
	Teacher(s) (Alphabetically)	PROF SUDHA SRIVASTAVA

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

Module No.	Title of the Module	List of Experiments	CO
1.	Fermentation	To study diauxic growth kinetics	Understanding (C2)
2.	Removal of insoluble	Precipitation of the protein from supernatant of culture broth using TCA	Understanding (C2)
3.	Removal of insoluble	Precipitation of the protein from supernatant of culture broth using Ethanol	Understanding (C2)
4.	Removal of insoluble	Precipitation of the protein from supernatant of culture broth using PEG	Understanding (C2)

5.	Activity of biomolecule	To check the activity of enzyme amylase	Analyzing (C4)
6	Cell Lysis	To perform cell lysis using glass beads	Understanding (C2)
7.	Cell Lysis	To perform cell lysis using ultrasonication	Understanding (C2)
8.	Column Packing	To pack gel permeation column	Analyzing (C4)
9.		Exercise	Analyzing (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 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	**15B17BT573**	**Semester** ODD Semester **(specify Odd/Even)**	**Semester** V **Session** 2018 -2019 **Month from**July to December
Course Name	PLANT TISSUE CULTURE LAB		
Credits	1	**Contact Hours**	2

Faculty (Names)	Coordinator(s)	Ms. Ekta Bhatt
	Teacher(s) (Alphabetically)	Dr.AshwaniMathur Ms. Ekta Bhatt Dr.Smiriti 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 2018 -2019 Month from July to December
Course Name	IT Practice Lab		
Credits	1	Contact Hours	LTP 0 0 2

Faculty (Names)	Coordinator(s)	DrChakresh Kumar Jain
	Teacher(s) (Alphabetically)	DrChakresh 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 for features and pattern finding in DNA and Protein	Apply Level (C3)
C373.4	Make use of data structures in python programming and explore the app designing	Apply Level (C3)
C373.5	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.	CO1
2.	PERL	To understand scalars, arrays and hashes in perl and study its applications.	CO1
3.	PERL	To understand how to use loops in perl and study its applications.	CO2

4.	PERL	To understand subroutine in perl and study its applications.	CO2
5.	PERL	To understand different operators in perl and study their applications.	CO2
6.	PERL	To understand file handling in Perl and study its applications.	CO2
7.	PERL	To understand regular expressions in perl and study their applications	CO2
8.	PYTHON	Exploration of basics of Python and Installation.	CO1
9.	PYTHON	To study basic input and output function in python.	CO3
10.	PYTHON	To understand file handling in Python and study its applications.	CO4
11.	PYTHON	To understand regular expressions in python and study their applications.	CO5
12	Application	Exploration and basic of App Designing	CO4

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 2018 -2019 **Month from** July to December
Course Name	Bio-Materials Science		
Credits	4	**Contact Hours**	4

Faculty (Names)	Coordinator(s)	DrPapia Chowdhury
	Teacher(s) (Alphabetically)	DrPapia 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,	8

		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.	
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 properties influencing cell adhesion, Young's equation, annealing, quenched materials, Surface reconstruction.	5
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	8

		characteristics of different fibers;Applications of Laser and optical fibers in Biotechnology, laser as medical cutting tool.		
		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.VanVlack, 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

Course Code	17B1NMA531	Semester - Odd		Semester V Session 2018 -2019 Month from July 2018 - Dec 2018	
Course Name	Basic Numerical Methods				
Credits	4			**Contact Hours**	3-1-0
Faculty (Names)	**Coordinator(s)**	Dr. Yogesh Gupta			
	Teacher(s) (Alphabetically)	Dr. Puneet Rana Dr. Yogesh Gupta			

COURSE OUTCOMES		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, order of approximation.	02
2.	Algebraic and Transcendental Equations	Bisection Method, Regula- Falsi Method, Secant Method, Iterative method, Newton-Raphson Method, , convergence, Horner's method	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	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. Boole's and Weddle's rule, Romberg's method, Euler-Maclaurin formula, Gaussian Integration.	11
5.	System of	Gauss Elimination method, Given's method, Gauss-	05

	Equations	Seidel Method, House holder's method.	
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 fixed 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, and Tutorials)
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, 6th Ed., Pearson Education, 1999.
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 by 1st Ed., (2009) Macmillan.
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	16B1NMA531	Semester Odd (specify Odd/Even)	Semester V Session 2018 -2019 Month from July to December
Course Name	**DISCRETE MATHEMATICS**		
Credits	4	**Contact Hours**	3-1-0
Faculty (Names)	**Coordinator(s)**	Dr. Anuj Bhardwaj	
	Teacher(s) (Alphabetically)	Dr. Anuj Bhardwaj	

COURSE OUTCOMES: After the successful completion of this course, the student will be able to		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,	7

		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.	
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 grammars, Finite state machines, finite state automata, regular languages and regular expressions.	6
Total number of Lectures			**42**

Evaluation Criteria		
Components	**Maximum Marks**	
T1	20	
T2	20	
End Semester Examination	35	
TA	25 (Quiz, Assignments, Tutorials)	
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, 5th Edition, Tata McGraw-Hill, 2003.
3.	Liu, C. L., Elements of Discrete Mathematics, 2nd Edition, Tata McGraw-Hill, 1985.
4.	Kolman, B., Busby, R. C. and Ross, S., Discrete Mathematical Structures, 3rd Edition, Prentice Hall, 1996.
5.	Deo, N., Graph Theory, Prentice Hall, 1980.
6.	Grimaldi, R.P., Discrete and Combinatorial Mathematics, 4th Edition, Pearson Education, 2005.

Detailed Syllabus

Lecture-wise Breakup

Course Code	16B1NMA533	Semester - Odd (specify Odd/Even)	Semester V Session 2018 -2019 Month from July to December		
Course Name	Matrix Computations				
Credits	4		**Contact Hours**	3-1-0	
Faculty (Names)	**Coordinator(s)**	Dr. PatoKumari and Dr. AmitaBhagat			
	Teacher(s) (Alphabetically)	Dr. AmitaBhagat Dr. PatoKumari			

COURSE OUTCOMES		COGNITIVE LEVELS
After pursuing the above mentioned course, the students will be able to:		
C301-3.1	explain the basics of matrix algebra and inverse of a matrix by partitioning.	Understanding level (C2)
C301-3.2	solve the system of linear equations using direct and iterative methods.	Applying Level (C3)
C301-3.3	explain the vector spaces and their dimensions, norm of a vector and matrix.	Understanding level (C2)
C301-3.4	apply the concepts of inner product space to construct Q-R decomposition and orthonormal basis using Gram-Schmidt process.	Applying Level (C3)
C301-3.5	constructGershgorin's circles and solve eigenvalue problems including power and inverse power methods.	Applying Level (C3)
C301-3.6	analyze systems of differential and difference equations arising in dynamical systems using matrix calculus.	Analyzing Level (C4)

Module No.	Title of the Module	Topics in the Module	No. of Lectures for the module
1.	Matrix Algebra	Basics of matrices, Submatrices, rank of a matrix, Normal Form, Inverse of a matrix by Gauss Jordan Method, Inverse of a matrix by partitioning method and by elementary matrices	6
2.	Linear System of equations	Existence and uniqueness of solution for system of linear equations, Gauss elimination method, Pivoting strategies, Gauss Jacobi and Gauss Siedel method, LU decomposition, Crout's and Doolittle's method	9
3.	Vector and Inner Product Spaces	Vector spaces, Subspaces, Linearly independent and dependent set of vectors, dimension and basis of vector space, Norms of vectors and matrix, Inner product space, orthogonal and orthonormal sets, Projections, Gram-Schmidt process, Q-R decomposition	10
4.	Eigen value Problems	Eigen values and Eigenvectors, Greshgorin's circle, Power and Inverse power methods, Similar, modal and diagonalizable matrices, Quadratic, positive definite and Canonical forms	9

5.	Matrix Calculus	Powers and functions of matrices, Application to solve discrete dynamical systems, solution of initial value problems	8

Total number of Lectures	**42**

Evaluation Criteria

Components	Maximum Marks
T1	20
T2	20
End Semester Examination	35
TA	25 (Quiz, Assignments, and Tutorials)
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.	**Bronson, R**., Matrix Methods an Introduction, Academic Press, 1991.
2.	**Golub, G. H**., Matrix Computations, Johns Hopkins University Press, 1996.
3.	**Datta, K. B.**, Matrix and Linear Algebra, Prentice Hall of India, 1990.
4.	**David, W. Lewis**., Matrix Theory, World Scientific, 1991.

Course Code	16B1NMA731	**Semester** Odd **(specify Odd/Even)**	**Semester** V **Session** 2018 -2019 **Month from** July to December
Course Name	Theory of Numbers		
Credits	4	**Contact Hours**	3-1-0
Faculty (Names)	**Coordinator(s)**	Dr. Himanshu Agarwal	
	Teacher(s) (Alphabetically)	Dr. HimanshuAgarwals	

COURSE OUTCOMES		**COGNITIVE LEVELS**
C301-4.1	explain Euclid algorithm, linear Diophantine equations and prime numbers.	Explain Level (C2)
C301-4.2	solve system of linear congruences using properties of congruences.	Solve Level(C3)
C301-4.3	explain numbers of special form and number theoretic functions.	Explain Level (C2)
C301-4.4	apply the concepts of order, primitive roots and indices to solve conguences.	Apply Level (C3)
C301-4.5	apply Legendre symbol and quadratic reciprocity theorem to solve quadratic congruences.	Apply Level (C3)
C301-4.6	apply and analyse the concepts of number theory in hashing, cryptography, calendar and ISBN check digits problems.	Analyse Level (C4)

Module No.	**Title of the Module**	**Topics in the Module**	**No. of Lectures for the module**
1.	Divisibility and Primes	Division algorithm, Greatest common divisor, Euclid's algorithm, gcd as a linear combination of coprime integers, Linear Diophantine equations, primes, The	8

		fundamental theorem of arithmetic, The Sieve of Eratosthenes, Canonical prime factorization, Least common multiple, Prime number theorem(statement only), Goldbach and twin primes conjectures.	
2.	Theory of Congruences	Definitions and basic properties, Residue classes, complete residue systems, reduced residue systems, Linear congruences in one variable, Simultaneous linear congruences, Chinese remainder theorem and its applications, Linear congruences in more than one variable, Fermat's theorem, Pseudoprimes and carmichael numbers, Wilson's Theorem	8
3.	Number Theoretic Functions and Numbers of Special Form:	Greatest integer function, The number-of-divisors function, The sum-of-divisors function, Multiplicative function, The Mobius function, Mobius inversion formula, The Euler's totient function, Euler's theorem, Perfect numbers, characterization of even perfect numbers, Mersenne primes, Fermat primes	7
4.	Primitive Roots and Indices	The order of an integer, Primitive roots, Theory of indicies, Solution of non-linear congruences.	7
5.	Quadratic Residues	Quadratic residues and non-residues, Euler's Criterion, The Legendre symbol, Gauss Lemma, Quadratic reciprocity, Solution of quadratic congruences.	6
6.	Applications	Hashing functions, Cyptosystem, Calendar problem, ISBN check digits	6
Total number of Lectures			**42**

Evaluation Criteria

Components	**Maximum Marks**
T1	20
T2	20
End Semester Examination	35
TA	25 (Quiz, Assignments, Tutorials)
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.	**James Strayer**, *Elementary Number Theory*, Waveland Press,,2001
2.	**Kenneth Rosen**, *Elementary Number Theory and its Applications*, 5th Edition, 2005
3.	**I. Niven, H. Zuckerman, H. Montgomery**, *An Introduction to the Theory of Numbers*, 5th Edition, Wiley, 2013.
4.	**David M. Burton**, *Elementary Number Theory*, 7th Edition, McGraw Hill Education (India) Private Limited, 2006

Detailed Syllabus

Lecture-wise Breakup

Course Code	15B1NHS434	Semester: Odd	Semester V Session 2018 -2019
			Month from July to December

Course Name	PRINCIPLES OF MANAGEMENT		
Credits	3	**Contact Hours**	2-1-0

Faculty (Names)	Coordinator(s)	Dr. Shirin Alavi (Sector 62) and Dr. RuchiGautam (Sector 128)
	Teacher(s) (Alphabetically)	Dr. Praveen Sharma , Dr. RuchiGautam and Dr. Shirin Alavi

COURSE OUTCOMES		COGNITIVE LEVELS
C303-1.1	Describe the functions, roles and skills of managers and illustrate how the manager's job is evolving.	Understanding Level (C2)
C303-1.2	Examine the relevance of the political, legal, ethical, economic and cultural environments in global business.	Analyzing Level (C4)
C303-1.3	Evaluate approaches to goal setting, planning and organizing in a variety of circumstances.	Evaluating Level (C5)
C303-1.4	Evaluate contemporary approaches for staffing and leading in an organization.	Evaluating Level (C5)
C303-1.5	Analyze contemporary issues in controlling for measuring organizational performance.	Analyzing Level (C4)

Module No.	Title of the Module	Topics in the Module	No. of Lectures for the module
1.	Introduction to Managers and Management	Management an Overview: Introduction, Definition of Management, Role of Management, Functions of Managers, Levels of Management, Management Skills and Organizational Hierarchy, Social and Ethical Responsibilities of Management: Arguments for and against Social Responsibilities of Business, Social Stakeholders, Measuring Social Responsiveness and Managerial Ethics,	7

		Omnipotent and Symbolic View, Characteristics and importance of organizational culture, Relevance of political, legal, economic and Cultural environments to global business, Structures and techniques organizations use as they go international .	
2.	Planning	Nature & Purpose, Steps involved in Planning, Objectives, Setting Objectives, Process of Managing by Objectives, Strategies, Policies & Planning Premises, Competitor Intelligence, Benchmarking, Forecasting, Decision-Making.	5
3.	Organizing	Nature and Purpose, Formal and Informal Organization, Organization Chart, Structure and Process, Departmentalization by difference strategies, Line and Staff authority- Benefits and Limitations-De-Centralization and Delegation of Authority Versus, Staffing, Managerial Effectiveness.	7
4.	Directing	Scope, Human Factors, Creativity and Innovation, Harmonizing Objectives, Leadership, Types of Leadership Motivation, Hierarchy of Needs, Motivation theories, Motivational Techniques, Job Enrichment, Communication, Process of Communication, Barriers and Breakdown, Effective Communication, Electronic media in Communication.	4
5.	Controlling	System and process of Controlling, Requirements for effective control, The Budget as Control Technique, Information Technology in Controlling, Productivity, Problems and Management, Control of Overall Performance, Direct and Preventive Control, Reporting, The Global Environment, Globalization and Liberalization, International Management and Global theory of Management.	5
		Total number of Lectures	**28**

Evaluation Criteria

Components	Maximum Marks
T1	20
T2	20
End Semester Examination	35
TA	25 (Project: Report & 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.	Robbins, S.P. & Coulter, Mary, Management, 14th ed., Pearson , 2009
2.	Robbins, S.P. &Decenzo, David A., Fundamentals of Management, 7th ed., Pearson, 2010
3.	Principles of Management Text and Cases, Pravin Durai, Pearson ,2015

Detailed Syllabus

Lecture-wise Breakup

Subject Code	18B12HS311	Semester ODD	**Semester** 5 **Session** 2018-19
			Month from July to December
Subject Name	STRATEGIC HUMAN RESOURCE MANAGEMENT		
Credits	3	**Contact Hours**	2-1-0
Faculty (Names)	**Coordinator(s)**	Praveen Sharma (Sec-128), SantoshiSengupta (Sec-62)	
	Teacher(s) (Alphabetically)	Praveen Sharma, SantoshiSengupta	

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	4

		Indian context	
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 (Projects -Report and Viva, Oral Questions)
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.	TanujaAgarwala, 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

Detailed Syllabus

Lecture-wise Breakup

Course Code	17B1NHS531	Semester ODD (specify Odd/Even)	Semester 5 Session 2018 -2019 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

CO Code	COURSE OUTCOMES	COGNITIVE LEVELS
C303-5.1	Understand and apply the main theories in cultural management,	Applying (C4)
C303-5.2	Identify 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 choosing appropriate concepts, logic and selecting the apt IT tools.	Analyzing(C4)
C303-5.4	Application 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	▪ The Communication Process	8

	teams	▪ Language and Culture	
		▪ Non Verbal Communication	
		▪ Barriers to Cross Cultural Understanding	
		▪ Marketing and Culture	
4.	Negotiation and Decision Making	▪ Theories of Negotiation	2
		▪ Negotiation and Intercultural Communication	
		▪ Decision making in cross cultural environment	
5.	Cross Culture and Leadership	▪ Leadership and Culture	5
		▪ 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	
		Total number of Lectures	**28**

Evaluation Criteria

Components	Maximum Marks
T1	20
T2	20
End Semester Examination	35
TA	25 (Project, 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.

Lecture-wise Breakup

Course Code	16B1NHS532	Semester: Odd	Semester V Session 2018-2019
			Month from: July to December

Course Name	Planning and Economic Development		
Credits	03	**Contact Hours**	2-1-0

Faculty (Names)	Coordinator(s)	Dr. Amba Agarwal (JIIT-128), Dr. Monica Chaudhary (JIIT-62)
	Teacher(s) (Alphabetically)	Dr. Amba Agarwal, Dr. Monica Chaudhary, Mr. Manas R. Behera

COURSE OUTCOMES	COGNITIVE LEVELS
After pursuing the above mentioned course, the students will be able to:	
C303-4.1 Understand the issues and approaches to economic development.	Understanding Level (C2)
C303-4.2 Evaluate National income accounting, human development index and sustainable development.	Evaluating Level (C5)
C303-4.3 Apply an analytical framework to understand the structural characteristics of development.	Applying Level (3)
C303-4.4 Analyze the role of Macroeconomic stability & policies and Inflation in the development process.	Analyzing Level (C4)
C303-4.5 Evaluate the importance of federal development and decentralization.	Evaluating Level (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. Rostows Stages of Growth. Approaches to economic development.	2
2.	National Income Accounting	National Income Accounting, Green GNP and Sustainable development	4

3.	Indicators of development	PQLI, Human Development Index (HDI) and gender development indices.	3
4.	Demographic Features, Poverty and Inequality	Demographic features of Indian population; Rural-urban migration; Growth of Primary, Secondary and Tertiary Sector.	3
5.	Inflation and Business Cycles	Inflation. Business cycle. Multiplier and Accelerator Interaction.	4
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.	5
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	4
8.	Planning and Development	Need for planning-NitiAayog, Decentralisation, Rural and Urban local bodies.	3
Total number of Lectures			28

Evaluation Criteria

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

Recommended Reading material:	
1.	**Meier, G.M.,** Leading Issues in Economic Development, Oxford University Press, New Delhi, 1970
2.	**Todaro, M.P**., **Stephen C. Smith,** Economic Development, Pearson Education, 2017

3.	**Thirwal, A.P**., Economics of Development, Palgrave, 2011
4.	**Ghatak, S.,** An Introduction to Development Economics, Allen and Unwin, London, 1973
5.	**Ahuja, H. L.**, Development Economics, S Chand publishing, 2016

Detailed Syllabus

Lecture-wise Breakup

Course Code	17B1NHS533	Semester: Odd	Semester V Session 2018 -2019
			Month from: July to December

Course Name	Marketing Management		
Credits	3	Contact Hours	2-1-0

Faculty (Names)	Coordinator(s)	Dr. Deepak Verma
	Teacher(s) (Alphabetically)	Dr. Deepak Verma

COURSE OUTCOMES: After pursuing the above mentioned course, student will be able to:		COGNITIVE LEVELS
C304-7.1	To illustrate the fundamentals of marketing, marketing environment and market research	Understanding Level (C2)
C304-7.2	To model the dynamics of marketing mix	Applying Level (C3)
C304-7.3	To demonstrate the implications of current trends in social media marketing and emerging marketing trends.	Understanding Level (C2)
C305-7.4	To appraise the importance of marketing ethics and social responsibility	Evaluating(C5)
C305-7.5	To conduct environmental analysis, design business portfolios and develop marketing strategies for businesses to gain competitive advantage.	Creating (C6)

Module No.	Title of the Module	Topics in the Module	No. of Lectures for the module
1.	Understanding New Age Marketing	Defining Marketing For 21st Century The importance of marketing and marketing's role in	5

		business and society.	
		Introduction to Digital Marketing.	
		Online Communication Tools.	
		The Social Media-Conversations, Community and Content.	
		Affiliate Marketing and Mobile Engagement.	
		The Digital Campaigns	
2	**Marketing Environment and Market Research and insights**	Internal and external forces impacting marketers. Marketing and Customer Value. Gathering Information and Scanning the environment. Company's Micro and Macro Environment Responding to the Marketing Environment	3
3	**Strategic Planning and the marketing Process**	Explore the impact of social forces on marketing actions. Describe how technological change affects marketing. Designing the business Portfolio Discuss the Strategic Planning Process and Strategic Marketing Process.	5
4	**Consumer and Business Buyer Behavior**	Consumer Markets and consumer buyer behavior. The buying decision process. Business Markets and business buyer behavior. Discuss the modern ethical standards.	5
5	**Branding**	Brand Image, Identity and Association. Product brands and Branding decisions. Product line and mix decisions. Consumer Brand Knowledge. New Product Development and Product life cycle strategies.	4

6	**Pricing products: Pricing considerations and strategies**	Factors to consider when setting prices. New product pricing strategies. Product mix pricing strategies. Price adjustments and changes.	4
7	**The New Age Social Marketing**	Ethics and social responsibility in marketing. Ethical behavior in business. Ethical decision making. Social forces affecting marketing. Impact of culture on marketing. Discuss modern ethical standards. Importance of marketing in CSR and business sustainability.	2
		Total number of Lectures	**28**

Evaluation Criteria

Components	Maximum Marks
T1	20
T2	20
End Semester Examination	35
TA	25 (Project, Assignment and Verbal questions)
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. Kotler, Philip and Gary Armstrong, Principles of Marketing, 17th Edition, New Delhi, Pearson Education, 2017.
2. Kotler, Philip., and Kevin Lane Keller, Marketing Management, 15th Edition, New Delhi, Pearson Education, 2014.
3. Grewal D., &Levy Michael, Marketing, 5th Edition, Mc graw Hill Education (India) Private Limited 2017.
4. Winer, Russell S ., Marketing Management, 4th Edition, Prentice Hall,2014.

Detailed Syllabus

Lecture-wise Breakup

Subject Code	16B1NHS536	Semester: ODD (specify Odd/Even)	Semester: V Session: 2018-2019 Month from: July To December
Subject Name	TECHNOLOGY AND GOVERNANCE		
Credits	3	Contact Hours	(2-1-0)

Faculty (Names)	Coordinator(s)	Dr. Santosh Dev
	Teacher(s) (Alphabetically)	Dr. Santosh Dev

Co Code	Course Objective	Cognitive Level
C303-3.1	Understand the concepts and processes of governance in Indian context	Understanding (C2)
C303-3.2	Critically appraise the importance of technological intervention in governance	Evaluating (C5)
C303-3.3	Examine and appraise Digital India campaign and design solution	Creating (C6)
C303-3.4	Design technological intervention to solve society problems	Creating (C6

Module No.	Subtitle of the Module	Topics in the module	No. of Lectures for the module
1.	Introduction to the Course	What is Governance? General Introduction about the importance and usability	3
2.	Relation of Technology and Governance	The beginnings of technology Technology and society Technology and culture	4

		Technology and Economy	
		Technology and Individual	
3.	How Information Technology and the Internet Have Changed the World;	Development of technology and globalization	3
4.	E-Frameworks	A Framework for E-Government: E-Government Principals, E-Services, E-Democracy, E-Management; Strategic Planning	5
5	Digital India	What is Digital India?DeitY,Vision of Digital India,Nine Pillars of Digital India,Institutional Mechanisms at National Level, Composition of Monitoring Committee on Digital India,Challenges & Changes Needed	5
6	Governance Models	Collaborative Governance Model, Good Governance Model	2
7.	Different Uses and the Governance Analytical Framework	Governance as Process, Public Governance, Private Governance, Global Governance, Non Profit Governance, Corporate Governance.	4
8.	Different Uses and the Governance Analytical Framework	Project Governance, Environmental Governance, Internet Governance, Information Technology Governance, Regulatory Governance, Participatory Governance, Multilevel Governance, Meta-Governance and Collaborative Governance.	2
		Total number of Lectures	28

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.	Mark Bevir, *Governance: A very short introduction.*, Oxford University Press Oxford, UK (2013)
2.	Research Papers:

Alexandra Mateescu, Alex Rosenblat and danahboyd, Policy Body-Worn Cameras http://www.datasociety.net/pubs/dcr/PoliceBodyWornCameras.pdf, February 2015.

Fung, Archon; Graham Mary, Weil David, Full Disclosure: The Perils and Promise of Transparency, 2008.

Gurstein, M. B.,Open data: Empowering the empowered or effective data use for everyone? First Monday, (2011) 16(2)

Veeraraghavan, Rajesh, Introduction & Conclusion in Open Governance and Surveillance: A Study of the National Rural Employment Guarantee Program in Andhra Pradesh, India. (2015).

Li, Tania, The Will to Improve: Governmentality, Development, and the Practice of Politics. 2007

Benjamin, S., Bhuvaneswari, R., &Rajan, P., Bhoomi : ' E-Governance ', Or , An Anti-Politics Machine Necessary to Globalize Bangalore ? (2007). (January), 1-53.

Detailed Syllabus

Lecture-wise Breakup

Course Code	16B1NHS 531	Semester : Odd (specify Odd/Even)	Semester : v Session:2018 -2019 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

CO Code	COURSE OUTCOMES	COGNITIVE LEVELS
C303-2.1	Understand youth and youth culture in sociological perspectives	Understanding(C 2)
C303-2.2	Appraise the ethical, cultural& social issues concerning Youth	Evaluating(C 5)
C303-2.3	Appraise the youth culture and interprets the same	Analyzing(C 5)
C303-2.4	Analyze societal problems related to youth in the evolving society.	Evaluating(C 4)

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	6

		theories, Theories as a tool to understand Youth Culture	
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 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.	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).

Detailed Syllabus

Lecture-wise Breakup

Course Code	18B12HS612	Semester : Odd	Semester: V Session: 2018-19 Month from: July to December
Course Name	Indian Polity and Constitutional Democracy in India.		
Credits	3	Contact Hours	(2-1-0)

Faculty (Names)	Coordinator(s)	Dr. Chandrima Chaudhuri
	Teacher(s) (Alphabetically)	Dr. Chandrima Chaudhuri

CO Codes	COURSE OUTCOMES	COGNITIVE LEVELS
C303-7.1	Explain the importance of Polity and Constitution.	Understand(C2)
C303-7.2	Interpret the Fundamental Rights and Duties.	Understand (C2)
C303-7.3	Analyze the unity in diversity concept of our Nation	Analyze(C4)
C303-7.4	Analyze various concepts useful to understand the system of governance	Analyze(C4)

Module No.	Title of the Module	Topics in the Module	No. of Lectures for the module
1.	The Constituent Assembly and the	The formation of the Constituent Assembly; the philosophy of the Constitution and its main features.	8

	Constitution.	Fundamental Rights and Directive Principles.	
		Concept of Power and Politics	
		Concept of Nation- State	
2.	Federalism and Decentralization	Centre - state relations;	14
		Constitutional provisions regarding emergency and centre-state relations	
		Special provisions for some states and the fifth and sixth schedule areas	
		Third tier of government: Panchayati Raj; urban local bodies	
		Regionalism	
		Ethnicity	
		Globalizations.	
		Gender and Caste	
3.	Organs of Government	The Legislature: Parliament The Executive: President, Prime Minister and Governor The Judiciary: The Supreme Court	6
		Total number of Lectures	**28**

Evaluation Criteria

Components	Maximum Marks
T1	20
T2	20
End Semester Examination	35
TA	25 (5- attendance, 20-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.	Austin, G. (1979). *The Constituent Assembly: Microcosm in Action in The Indian Constitution: Cornerstone of a Nation.* New Delhi: Oxford University Press

2.	Bhargava,R. (2008). *Politics and Ethics of the Indian Constitution*. New Delhi: Oxford University Press
3.	Jha, S. (2008). Rights versus Representation: Defending Minority Interests in the Constituent Assembly, in R. Bhargava. (ed.), *Politics and Ethics of the Indian Constitution*, New Delhi: Oxford University Press
4.	Kapur, D.& Mehta, P.B. (ed.) (2005) *Public Institutions in India: Performance and Design*, New Delhi: Oxford University Press
5.	Shankar, B.L., & Rodrigues, V. (2011) *The Indian Parliament: A Democracy at Work*, New Delhi: Oxford University Press
6.	Manor, J. (1994). The Prime Minister and the President, in B.D. Dua, and J. Manor (eds.) *Nehru to the Nineties : The Changing Office of the Prime Minister in India*, Vancouver: University of British Columbia Press