Jaypee Institute of Information Technology

B.Tech. Biotechnology

Semester VI

Course Descriptions

Detailed Syllabus

Lecture-wise Breakup

Course Code	15B11BT611	**Semester** Even	**Semester VI Session** 2020-21 **Month from** January- June
Course Name	Comparative & Functional Genomics		
Credits	4	**Contact Hours**	4

Faculty	**Coordinator(s)**	1. Dr. Vibha Rani

(Names)	Teacher(s) (Alphabetically)	1. Dr. Chakresh Kumar Jain

COURSE OUTCOMES		COGNITIVE LEVELS
CO1	Explain the fundamental concepts of functional genomics, transcriptomics and proteomics	Understand (C2)
CO2	Apply advanced techniques for improved diagnostics and therapeutics	Apply (C3)
CO3	Categorize different bioinformatics tools related to genomics and proteomics	Apply (C3)
CO4	Integrate and infer the bioinformatics data obtained through genomics studies	Analyze (C4)

Pre-requisite
[10B11BT511]- Introduction to Bioinformatics

Module No.	Subtitle of the Module	Topics in the module	No. of Lectures for the module
1.	Genes and Genomes	Basics structure of gene and organization in prokaryotic to eukaryotic, features of genome structure and complexity, evolutionary conservation, type of model organism, their structure number of genes sequencing status, type of maps genetic linkage maps, physical maps, techniques used to map their significance relation with human genome	3
2.	Whole Genome Sequencing Technologies	Human genome project fact sheet, techniques used for sequencing (shot gun sequencing), mapping techniques (BAC, YAC), genome assembly problems	2
3.	Genome Annotation i.e. Mining Genomic Sequence Data	Sequential annotation, structural annotations, prediction of gene and their elements like ORF finder, promoter region ,LDA method, functional genomics, Dijkstra's algorithm, application in functional correlation	3
4.	Haplotyping: Concepts and Applications	Basics of haplotyping and its application in disease	2

5.	Pharmacogenomics: Concepts and Applications in Healthcare	Basics of phylogenomic, methods used and application, Basics of pharmecogenomics and relation with disease, personalized medicine	4
6.	SNP Technologies: Platforms & Analysis	SNP structure, techniques, prevalence and application in population genetics	3
7.	Gene Silencing Mechanisms	RNAi, non coding RNAs, Structure and biogenesis difference between SiRNA, MiRNAs, protein involve in RISC, prediction rule set, CRISPER	3
8.	Gene Cloning and Expression Platforms	Introduction: Gateway technology; Microarrays; SAGE; GIS	3
9.	DNA Protein Interactions	General; CHIP assay, EMSA; Library screening; DNA foot-printing; south western analysis; one hybrid assay	5
10.	Phage display	introduction; peptide display; antibody display; phage and phagemid system	4
11.	Protein-protein Interactions	Ribosome display; tandem affinity purification; Yeast two hybrid system, GST pull Down	4
12.	Quantitative proteomics	MALDI-TOF; LC-MS-MS, ICAT method; 2-D technology; Biomarkers; protein arrays	6
		Total number of Lectures	**42**

Evaluation Criteria

Components Maximum Marks

T1 20

T2 20

End Semester Examination 35

TA 25 (Assignment-1&2, Home Assignment, Quiz and case studies) **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. M. Lesk. *Introduction to Genomics*. United Kingdom (UK): Oxford University Press, 2007.
2.	T.A. Brown. Genomes-3. United Kingdom (UK): Oxford University Press, 2007.
3.	D. C. Liebler and J. R. Yates. *Introduction to Proteomics*. New York, USA: Humana Press, 2002.
4.	Protein-Protein Interactions, Methods and Applications, Editors: Meyerkord, Cheryl L., Fu, Haian (Eds.), 2015

5.	N. C. Jones and P. A. Pevzner. *Introduction to Bioinformatics Algorithms (Computational Molecular Biology)*. Massachusetts, USA: MIT Press, 2004.
6.	DNA-Protein Interactions, Principles and Protocols, Editors: Leblanc, Benoît P., Rodrigue, Sebastien (Eds.), 2015

Detailed Syllabus

Lab-wise Breakup

Course Code	15B17BT671	**Semester: EVEN**	**Semester VI Session** 2020-21 **Month from** January to June
Course Name	**Comparative and Functional Genomics Lab**		
Credits	1	**Contact Hours**	3

Faculty (Names)	**Coordinator(s)**	Prof. Sudha Srivastava
	Teacher(s) (Alphabetically)	Dr. Manisha Singh, Dr. ShaziaHaider, Dr. Sonam Chawla, Prof. Sudha Srivastava Dr.Vibha Gupta, Prof. Vibha Rani,

COURSE OUTCOMES		**COGNITIVE LEVELS**
C374.1	Explain the basic concept of genes and genome using various databases	Understand Level (C2)
C374.2	Compare and analyze functional genomic and proteomic data using computational tools	Analyze Level (C4)
C374.3	Utilize the acquired knowledge of gene expression technologies	Analyze Level (C3)
C374.4	Apply and analyze cloning and expression of gene of interest	Analyze Level (C4)

Module No.	Title of the Module	List of Experiments	CO
1-4	Basic skills of transcriptomics	RNAase free water preparation and DEPC treatment of labware	**CO2**
		RNA isolation from plant tissues	**CO2**
		Quality assessment of isolated RNA	**CO4**
		Primer designing for quantitative RT-PCR	**CO2**
5-9	Basic skills of	Induction and expression of recombinant proteins	**CO2**
	proteomics	SDS-PAGE analysis of differential expression of recombinant proteins	**CO4**
		SDS-PAGE analysis of differential-------- contd.	**CO4**
		Gel densitometry using ImageJ	**CO4**
		Western blotting for expressed protein confirmation	**CO2**
10-12	Analysis of molecular interactions	To interpret the protein- protein interaction using STRING	**CO 3**
		Visualization of molecular interaction network and identification of crucial gene(s) using Cytoscape	**CO 1**
		Identification of clusters/Modules in a network	**CO3**

Evaluation Criteria

Components Maximum Marks

Mid Term Exam 20

End Term Exam 20

Day to Day 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.	Keith Wilson, John Walker. ―Principles and Techniques of Practical Biochemistry‖. Cambridge University Press, 2000
2.	https://vlab.amrita.edu/?sub=3&brch=187&sim=1331&cnt=1 (Western blotting)
3	http://vlab.amrita.edu/index.php?sub=3&brch=273&sim=1501&cnt=1 (Primer designing)
4	http://vlab.amrita.edu/?sub=3&brch=186&sim=319&cnt=1(Polyacrylamide gel electrophoresis)
5	Design of experiments, principle and the expected outcome and related literature will be provided to the student

Programme Name: B.Tech Biotechnology

Semester: VIth

Course Name & Code: Minor Project II (15B19BT691)

Course Outcomes:

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

Sl. No.	DESCRIPTION	COGNITIVE LEVEL (BLOOM's TAXONOMY)
C351.1	Outline the specific biotechnological problem and explain the related scientific approaches	Understanding level (Level 2)
C351.2	Summarize the literature related to the specified topic	Understanding level (Level 2)
C351.3	Analyze and demonstrate team effort in presentation and data analysis	Analysing level (Level 4)
C351.4	Organize the data and develop scientific report writing skills	Applying level (Level 3)

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Lecture-wise Breakup

Course Code	16B1NBT631	**Semester** EVEN **(specify Odd/Even)**	**Semester** VI **Session** 2020-21 **Month from** January to June

Course Name	BIOECONOMICS		
Credits	4	**Contact Hours**	4

Faculty (Names)	**Coordinator(s)**	DR. ASHWANI MATHUR
	Teacher(s) (Alphabetically)	DR. ASHWANI MATHUR

COURSE OUTCOMES		**COGNITIVE LEVELS**
C330-2.1	Relate and summarize biological products as economic resources	Understanding (Level 2)
C330-2.2	Demonstrate understanding of economic pronciples for biological resources and develop the concept of sustainability	Understanding (Level 2)
C330-2.3	Make use of neoclassic economic theories and bioeconomic principles to find a robust solution to biotechnological and sustainability issues	Applying (Level 3)
C330-2.4	Apply the knowledge of bioeconomic principles and SWOT analysis technique for developing sustainable solution and profit maximization from fisheries and agricultural sectors	Applying (Level 3)

Module No.	**Title of the Module**	**Topics in the Module**	**No. of Lectures for the module**
1.	Introduction to bioeconomics	Bio-economics- Concept, Development of Economics and Bioscience (Concept of resource economics for scarcity of biological resources), Bioresource elasticity, Evolution and Development of Economics and Biology (Charles Darwin and the evolutionary paradigm)	5
2.	Bioeconomics and thermodynamics	Thermodynamic analysis and thermo economics, Exergy cost, Exergetic efficiency, Concepts of Sadi Carnot, Rudolf Clausius and Thermodynamics, John Stuart Mill's concept of steady state in nature, 1st and 2nd Laws of Thermodynamics applied to economics, economic processes and elasticity, entropy and utility, Energy analysis and economic evaluation	5
3.	Bioeconomics and sustainability	Benefits and challenges of knowledge-based bioeconomy, sustainable food security (Europe and African Perspective), Development of resource (agricultural) efficient bioeconomy, Social and economic challenges for bioeconomy	5

4.	SWOT analysis of Bioeconomy	Rationale and criteria for SWOT analysis of Bioeconomies, Formulation of theory using mathematical models, Role of econometric tools in analysis.	5
5.	Generic bioeconomic mathematical models	Bioeconomic Models- Dynamic resource harvesting model, Dynamic optimization model, Demand-limited bionomic equilibrium, Growth and aging- The cohert model	6
6.	Ecological bioeconomics and bioeconomy for agriculture	Forestry model, Regulation of renewable resource harvesting, Investing in agriculture harvesting capacity,	6
7.	Fisheries bioeconomics and mathematical models.	Inherent characteristic of fish stocks, The multi-cohert model for fisheries, The system science approach in fisheries bioeconomics	6
8.	Introduction to bioeconomics	Bio-economics- Concept, Development of Economics and Bioscience (Concept of resource economics for scarcity of biological resources), Bioresource elasticity, Evolution and Development of Economics and Biology (Charles Darwin and the evolutionary paradigm)	5
		Total number of Lectures	43

Evaluation Criteria

Components Maximum Marks
T1 20
T2 20
End Semester Examination 35
TA 25 (Assignment, Class Test-1/MCQ)
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.	Sundar I. " Introduction to Bioeconomics", Global Research Publication, New Delhi, India, 2011
2.	Demirel, Y. "Nonequlibrium Thermodynamics- Transport and rate processes in Physical, Chemical and Biological Processes", Elsevier
3.	Antoine Missemer. Nicholas Georgescu-Roegen and degrowth. European Journal of the History of Economic Thought, Taylor & Francis (Routledge), 2017, 24 (3), pp.493-506.
4.	Virgin, I., and Morris, J.E. "Creating sustainable bioeconomies", (Taylor and Francis Group), USA, 2016

5.	Clark, C.W. "Mathematical bioeconomics", John Wiley & Sons, USA, 2010

Detailed Syllabus

Course Code	**16B1NBT632**	**Semester** EVEN **(specify Odd/Even)**	**Semester** VI **Session** 2020-21 **Month from** January to June
Course Name	**Antimicrobial resistance**		
Credits	4	**Contact Hours**	4

Faculty (Names)	**Coordinator(s)**	DR. Vibha Gupta
	Teacher(s) (Alphabetically)	DR. Vibha Gupta

Course Outcome:

Upon completion of the course students will be able to:

S. No. Course Outcomes Cognitive levels C331-1.1 Explain the importance of antimicrobials and emerging resistance **C2** C331-1.2 Describe the biological mechanisms of antibiotic resistance **C2** C331-1.3 Analyze antimicrobial susceptibility tests **C4** C331-1.4 Support Antibiotic stewardship **C5 Pre-requisite : NA**

Module No.	**Subtitle of the Module**	**Topics in the module**	**No. of Lectures for the module**
1.	Course overview	Basic overview of antibiotic resistance; Importance of optimizing antimicrobial usage for maintaining cost-effective therapies	2

2.	Antimicrobial Classes	Discovery and History of antibiotics, importance of antibiotics, Different classes of antimicrobials (bacterial, Viral & fungal) and their mode of action	6
3.	Mechanisms of Resistance	Molecular mechanisms of Resistance; Emergence and spread of resistance; Microbial resistance – a global issue	6
4.	Techniques for detection of resistance	Antimicrobial susceptibility tests; methods for detecting antimicrobial resistance; Obtaining good results; interpretation of antimicrobial susceptibility results; genomic analysis tools to detect resistance genes	10
5.	New antimicrobial approaches	Alternative therapies to antibiotics – phage therapy, probiotics, vaccines, etc.	7
6.	Antimicrobial Stewardship	Roles and responsibilities of different stakeholders in antimicrobial stewardship (including physician, pharmacist, microbiologist, hospital administrators); Case studies - Antimicrobial stewardship strategies by WHO, ICMR etc.	10
Total number of Contact hours			**41**

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.	KaterynaKon and Mahendra Rai "Antibiotic Resistance: Mechanisms and New Antimicrobial Approaches" Academic press 2016
2.	CARD - Comprehensive Antibiotic Resistance Database (https://card.mcmaster.ca/) site for information on publicly available resistance genes and related information.
3.	Research papers and Reports provided as per the course content.

Detailed Syllabus

Lecture-wise Breakup

Course Code	16B1NBT633	**Semester Even (specify Odd/Even)**	**Semester** VI **Session** 2020-21 **Month from** January to June
Course Name	INSTRUMENTATION TECHNIQUES IN BIOTECHNOLOGY		

Credits 0	**4**	**Contact Hours**	**4**

Faculty (Names)	**Coordinator(s)**	DR. PRIYADARSHINI
	Teacher(s) (Alphabetically)	DR. PRIYADARSHINI

COURSE OUTCOMES		**COGNITIVE LEVELS**
C330-2.1	Explain the principles, practices and instrumentation	Apply Level (C2)
C330-2.2	Apply understanding of the principles, practices and instrumentation	Apply Level (C3)
C330-2.3	Compare and contrast techniques of different instruments for their strength, limitations and creative use for problem-solving.	Apply Level (C4)
C330-2.4	Assess sample preparation method(s) and problem solving	Apply Level (C4)

Module No.	**Title of the Module**	**Topics in the Module**	**No. of Lectures for the module**
1.	Basic laboratory Instruments	Background of instrumentation, Principle, working and applications of centrifugation, pH meter and other basic instruments	5
2.	Microscopy techniques	Principle, working and applications of simple microscope, electron microscopy (SEM & TEM), confocal, fluorescence and phase contrast microscopy.	7
3.	Spectroscopy techniques	Principle, working and applications of UV, Visible, IR, NMR, Fluorescence, circular dichroism, Atomic Absorption spectroscopy, Surface plasmon resonance, Nuclear magnetic resonance, X-ray diffraction.	7

4.	Mass spectrometry techniques	a) Introduction to Ionisation, Mass analysers, Detectors b) Structural information by tandem mass spectrometry c) Analysing protein complexes d) Computing and database analysis	7

5.	Radioisotopic techniques	a) Principles & application of radioisotope b) The nature of radioactivity c) Detection and measurement of radioactivity d) Other practical aspects of counting of radioactivity and analysis of data e) Safety aspects	6
6.	Flow cytometry	a) Principles of the Flow Cytometer b) Principles of Fluorescence c) Data Analysis d) Controls in Flow Cytometry e) Optimizing your Experiments	5
7.	Live imaging techniques.	a) Issues of maintaining cell viability during imaging b) Types of techniques and microscopy used for live-cell imaging c) Applications of Live Cell Imaging	5
		Total number of Lectures	**42**

Evaluation Criteria

Components Maximum Marks
T1 20
T2 20
End Semester Examination 35
TA 25 (Assignment 1, Assignment2)
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.	I. D. Campbell, Biological spectroscopy (Benjamin/Cummings Pub. Co, Menlo Park, Calif, 1984), Biophysical techniques series
2.	K. Wilson, J. M. Walker, Eds., Principles and techniques of biochemistry and molecular biology (Cambridge University Press, Cambridge, UK: New York, 7th ed., 2009).

3.	D. B. Williams, C. B. Carter, Transmission electron microscopy a textbook for materials science (Springer, New York, 2009; http://dx.doi.org/10.1007/978-0-387-76501-3).
4.	R. M. Silverstein, Spectrometric identification of organic compounds (John Wiley & Sons, Hoboken, NJ, 7th ed., 2005)
5.	Darzynkiewicz, Z., Crissman, H.A. and Robinson, J.P. (eds.) (2001) Cytometry. 3rd edition. Part A and B. Methods in Cell Biology, Volume 63 and 64, Academic Press, San Diego, USA. (ISBN 0-12-203053-2 (Part A); 0-12-203054-0 (Part B)).

Detailed Syllabus

Lecture-wise Breakup

Course Code	16B1NBT634 ELECTIVE	**Semester** EVEN	**Semester VI Semester Session** 2020-21 **Month from** January to June
Course Name	Genetic Disorder and Personalized Medicine		
Credits	4	**Contact Hours**	4

Faculty (Names)	**Coordinator(s)**	Dr. Sujata Mohanty
	Teacher(s) (Alphabetically)	Dr. Sujata Mohanty

COURSE OUTCOMES		**COGNITIVE LEVELS**
C330-1.1	Apply knowledge of genetic principles to understand disease etiology, clinical features and mode of inheritance	Apply Level (C3)
C330-1.2	Explain and interpret different molecular diagnoses and genetic test results	Understand Level (C2)
C330-1.3	Analyze the role of population and quantitative genetics for genetic disorders	Analyze Level (C4)
C330-1.4	Develop the concept of Personalized Medicine and integrate information from HGP databases	Apply Level (C3)
C330-1.5	Assess the genetic counseling process and its impact from a cultural, ethical and psychosocial perspective	Evaluate Level (C5)

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

			module
1.	**Introduction to Genetic Disorder and Principles of their Inheritance**	**Introduction to Medical Genetics, Genetic Disorder and Concern, Clinical Features, Genetic Principles to Understand Disease Etiology, and Mode of Inheritance, Pedigree analysis and carrier screening**	**08**
2.	Genetic Screening and DNA Banking	Preventive Genetics; DNA Banking and Clinical DNA Testing, Cytogenetic, Molecular and Biochemical Common as well as Modern Technology based Genetic Tests and their Results Interpretation	08
3.	Population and Quantitative Genetics	Application of population genetics in genetic risk calculation within Family/Population, heritability factor estimation	06
4.	Case studies	Case studies; Epigenetics, Uniparental disomy, Mosaicism, Inborn errors of metabolism, cancer genetics etc.,	06
5.	Human Genome Projects	Human Genome Projects and Outcomes: Initial Reference Genome, 100,000, Encode, Gencode and the future prospects, Integration of genomic information in Biomedical Sciences, Related Databases	06
6.	Concept of Personalized Medicine	Personalized Medicine, Study of Genetic resources (OMIM, Gene tests, Gene clinics etc.)	04
7.	Genetic counseling	The Genetic Counseling Process and Its Impact from a Cultural, Ethical and Psychosocial Perspective	04
		Total number of Lectures	**42**

Evaluation Criteria

Components Maximum Marks
T1 20
T2 20
End Semester Examination 35
TA 25 (Assignment 1, Class Test, assignment 2)
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.J.F. Griffiths, S.R. Wessler, R.C. Lewontin, S.B. Carroll, *Introduction to Genetic Analysis* ,9th Ed, WH Freeman, 2015
2.	C. Szalai (Eds), *Genetics and Genomics*, 1st Edition, Tipotex, 2014
3.	S. Gersen, M. B. Keagle (Eds), *The Principles of Clinical Cytogenetics*, Humana Press, 2010
4.	M.R. Speicher, A.G. Motulsky, and S.E. Antonarakis (Eds)*Vogel and Motulsky's Human Genetics*. Berlin Heidelberg: Springer, 2010
5.	E.S. Tobias, M. Connor, M.F. Smith, *Essential Medical Genetics*, 7th Ed, John Wiley & Sons
6.	***Genetic disorder and related databases*** e.g. ***Indian Genetic Disease Database (http://www.igdd.iicb.res.in/IGDD/home.aspx), Rare Disorder by Ministry of health and family welfare (https://mohfw.gov.in/diseasealerts/rare diseases), Clinical genomic databases (https://research.nhgri.nih.gov/CGD/)***
7.	Current research articles relevant to this subject will be provided as study materials and discussed in the class.

Detailed Syllabus

Lecture-wise Breakup

Course Code	16B1NPH636	**Semester: Even**	**Semester: VI Session** 2020-21 **Month from:** January to June
Course Name	**Medical & Industrial Applications of Nuclear Radiation**		
Credits	4	**Contact Hours**	4

Faculty (Names)	**Coordinator(s)**	DrPapia Chowdhury
	Teacher(s) (Alphabetically)	DrPapia Chowdhury &DrManojTripathi

COURSE OUTCOMES		**COGNITIVE LEVELS**
C302-11.1	Define nuclear structure, properties and reactions; Nuclear magnetic resonance process.	Remembering (C1)
C302-11.2	Explain models of different nuclear imaging techniques; CNO cycle; principle of radioactive decays.	Understanding (C2)

C302-11.3	Apply knowledge of nuclear reaction mechanisms in atomic devices, dosimetry, radiotracers, medical imaging, SPECT, PET, tomography etc.	Applying (C3)
C302-11.4	Analyze different radiocarbon dating mechanisms and processes.	Analyzing (C4)

Module No.	**Title of the Module**	**Topics in the Module**	**No. of Lectures for the module**
1.	**Nucleus, Radioactivity & Dating**	Structure of matter**;** Nucleus:Nuclear Size, Structure and forces; Binding energy and Nuclear stability, mass defect;Nuclear reaction: Fission, Fusion, chain reaction. Nuclear fusion in stars, Formation of basic elements: proton proton chain, CNO cycle, Hydrostatic equilibrium; Applications: atom bomb, hydrogen bomb, nuclear power plants, Nuclear reactor problems, precautions. **ii)**Radioactive decay, kinetics of radioactive decay, Types of radioactive decay and their measurement, Half life, decay constant, Population of states, Production of radionuclides. Radioactive dating, Radiocarbon dating: Formation, mechanism of dating, carbon cycle, radiocarbon clock and applications, advantages, disadvantages, precautions; Other dating techniques, protein dating, accuracy in dating;	**17**
2.	Radiation and matter interactions	Dosimetry and applications: Interaction of Radiation of matter: Biological effects of radiations; dosimetry, working principles, Tools and radiotherapy, Doses, Radioisotopes, Radiotracers;	09
3.	NMR and MRI	Nuclear Magnetic Resonance: General Introduction to Magnetic Resonance, Reference Frame; RF Pulses, Larmor precision, Basic principles of NMR & ESR Spectroscopy,	09
		Nuclear shielding, Chemical shifts; Couplings, Nuclear Imaging; 1D,2D, 3D Images, Application of NMR in medical industry as MRI, working MRI, Types of differen MRI, Applications of NMR in quantum computation;	
4.	Nuclear Medicine and Nuclear Imaging	Nuclear Medicine and Nuclear imaging techniques, preclinical imaging, detector designing, photon counting, Medical imaging using $\beta+\gamma$ coincidences, SPECT AND PET: Radiation tomography, applications;	05
		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.	Basic Sciences of Nuclear Medicine; Magdy M K halil, Springer
2.	Physics and Radibiology of Nuclear Medicine; Gopal B Saha, Springer
3.	A. Beiser, Concepts of Modern Physics, Mc Graw Hill International.
4.	Radionuclide Techniques in Medicine, JM McAlister (Cambridge University Press, 1979).
5.	Nuclear Physics; S.N.Ghosal

Detailed Syllabus

Lecture-wise Breakup

Course Code	19B13BT311	**Semester** Even **(specify Odd/Even)**	**Semester** VI **Session** 2020-21 **Month from** January to June
Course Name	Nanoscience in Food Technology		
Credits	2	**Contact Hours**	2

Faculty (Names)	**Coordinator(s)**	Prof. Sudha Srivastava
	Teacher(s) (Alphabetically)	Prof.Sudha Srivastava

COURSE OUTCOMES		**COGNITIVE LEVELS**
CO1	Explain properties of nanoparticles and nanoemulsions	**Understand Level (C2)**
CO2	Outline food processing, packaging and preservation	**Understand Level (C2)**

CO3	Apply nanotechnology concepts to improve food quality, texture, and shelf life	**Apply Level (C3)**
CO4	Analyze food quality degradation and pathogens detection, using nanosensors	**Analyze Level (C4)**

Module No.	**Title of the Module**	**Topics in the Module**	**No. of Lectures for the module**
1.	Introduction to Nanomaterials	Introduction to nanomaterials, nanoemulsions, method of synthesis and identification of nanoemulsions	5
2.	Food Packaging and Preservation	Introduction to food processing, packaging and preservation. Modified atmosphere packaging, active packaging and intelligent packaging.	6
3.	Application of nanotechnology in Food and agriculture	Microemulsions for delivery of nutraceuticals, edible films and coating for food, Polymer nanocomposites, effect of nanomaterials on mechanical, thermal and barrier properties of polymers. Application of nanotechnology for pesticide delivery, nutrient uptake etc. Nanomaterials in Food Health and Safety Issues	7
4.	Biosensors for monitoring food quality	Time temperature indicators, pathogen detection using biosensors, Pesticide detection using biosensor.	6
		Total number of Lectures	**24**

Evaluation Criteria

Components Maximum Marks
Mid Term 30
End Term 40
TA 30 (Assignment, Presentations, Project based Evaluation) **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.	VellaichamyChelladurai, Digvir S. Jayas, 2018 Nanoscience and Nanotechnology in Foods and Beverages CRC Press, ISBN 9781498760638
2.	Recent Research papers

Detailed Syllabus

Lecture-wise Breakup

Course Code	**16B19BT692**	**Semester** Even **(specify Odd/Even)**	**Semester VI Session 2020-21** **Month from** January to June
Course Name	**Applied Mushroom Biology**		
Credits	2	**Contact Hours**	**2**

Faculty (Names)	**Coordinator(s)**	Dr. Manisha Singh
	Teacher(s) (Alphabetically)	Dr. Manisha Singh

COURSE OUTCOMES		**COGNITIVE LEVELS**
CO692.1	Define mushroom biology	Remembering Level (C1)
CO692.2	Experiment with mushroom cultivation	Applying Level (C3)
CO692.3	Explain environmental and medicinal aspects of mushroom	Understanding Level (C2)
CO692.4	Analyze economics of mushroom cultivation	Analyzing Level (C4)

Module No.	**Title of the Module**	**Topics in the Module**	**No. of Lectures for the module**
1.	Principles of Mushroom Biology	Introduction, concepts, types, uses of mushrooms, Edible and poisonous mushrooms	2
2.	Global production	Agribusiness involving mushrooms, global status, opportunities and constraints	2
3.	Mushroom cultivation	Cultivation: Culturing, preservation methods, spawn production, quality attributes, storage, transport of commercially important mushrooms Lab: Bed preparation, use of different types of substrates (straw, cotton mill waste, water hyacinth etc.) for cultivation of oyster, white button, shiitake and caterpillar mushrooms	8
4.	Mushroom biotechnology	Constraints in transformation, production of new varieties, genomic and proteomic approaches	4

5.	Environmental & Medicinal aspects	Bioremediation using mushrooms, Production of nutraceuticals & value-added products Lab: Quality checks in cultivation process, processing and preservation	8
6.	Economics	Economics of setting up a commercial mushroom production unit Lab: Report on economics of production	4
		Total number of Lectures	**28**

Evaluation Criteria

Components Maximum Marks
T2 20
End Semester Examination 35
TA 45
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.	SHU-TING CHANG , PHILIP G. MILES: MUSHROOMS: Cultivation, Nutritional Value, Medicinal Effect, and Environmental Impact, SECOND EDITION, CRC Press, 2011
2.	Research papers and manuals

Detailed Syllabus
Lecture-wise Breakup

Course Code	16B1NMA633	**Semester :** Even	**Semester** VI **Session** 2020-21 **Month from** January to June	
Course Name	Statistics			
Credits	4		**Contact Hours**	3-1-0
Faculty (Names)	**Coordinator(s)**	Dr. Himanshu Agarwal		
	Teacher(s) (Alphabetically)	Dr. Anuj Bhardwaj, Dr. Himanshu Agarwal, Dr. Pinkey Chauhan		

COURSE OUTCOMES		**COGNITIVE LEVELS**
After pursuing the above mentioned course, the students will be able to:		
C302-1.1	make use of measures of central tendency, dispersion, skewness and, kurtosis for description and visualization of population data.	Applying Level (C3)
C302-1.2	apply correlation and regression in statistical analysis of data.	Applying Level (C3)

C302-1.3	explain sampling theory and its distributions.		Understanding Level (C2)
C302-1.4	explain the concepts and properties of estimation theory.		Understanding Level (C2)
C302-1.5	apply sampling and estimation theory to find the confidence interval.		Applying Level (C3)
C302-1.6	analyze small and large sample data by using the test of hypothesis.		Analyzing Level (C4)
Module No.	**Title of the Module**	**Topics in the Module**	**No. of Lectures for the module**
1.	Descriptive Statistics	Graphical representation such as histogram, frequency polygon, AM, GM, HM, median, mode, measures of dispersion, skewness and kurtosis such as central and non-central moments, population variance, β, γ coefficient, Box and Whisker plot.	8
2.	Correlation and Regression Analysis	Scatter diagram. Karl Pearson's and Spearman's rank correlation coefficient, regression lines, regression coefficient and their properties.	5
3.	Sampling and Sampling Distributions	Populations and Sample, random sample, statistics, sample moments, law of large numbers, central limit theorem, distribution of sample mean and sample variance, MGF, Chi-square distribution, F-distribution, Student's *t* distribution.	7
4.	Parametric Point Estimation	General concept of point estimation, methods of moments and maximum likelihood for finding estimators, unbiasedness, consistency, efficiency, UMVUE, Cramer Rao inequality, sufficiency, factorization theorem, completeness, Rao-Blackwell theorem.	10
5.	Parametric Interval Estimation	definition of confidence interval, pivotal quantity, confidence interval for mean, variance, difference of means and difference of variances for small and large samples.	5

6.	Hypothesis Testing	The basic idea of significance test. null and alternative hypothesis, type-I and type II errors, testing of small and large samples for mean, variance, difference in means, and difference in variances.	7
Total number of Lectures			**42**

Evaluation Criteria
Components Maximum Marks
T1 20
T2 20
End Semester Examination 35
TA 25 (Quiz, Assignments, Tutprials)
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.	**Biswas and Srivastava**,A Textbook, Mathematical Statistics Ist Edition, Narosa Publishing House, New Delhi.
2.	**W. Feller**, Introduction to Probability Theory and its Applications Vol. I and II. Wiley Eastern-Ltd, 1971
3.	**V. K.Rohatgi**, An Introduction to Probability Theory and Mathematical Statistics Wiley Eastern, 1984
4.	**R. V. Hogg, A. T. Craig,** Introduction to Mathematical Statistics, McMillan, 1971
5	**AM. Mood**, **F. A. Graybill, and D. C. Boes**, Introduction to the Theory of Statistics McGraw Hill, 1974
6.	**Des Raj &Chandak**, Sampling Theory, Narosa Publishing House, 1998.
7.	**Sheldon Ross**, A First Course in Probability, 6th edition, Pearson Education Asia, 2002.
8.	**Meyer, P.L**, Introductory Probability and Statistical Applications Addison-Wesley Publishing Company, 1965.

Detailed Syllabus
Lecture-wise Breakup

Course Code	18B12MA611	**Semester** Even	**Semester** VI **Session** 2020-21 **Month from** January to June	
Course Name	Operations Research			
Credits	4		**Contact Hours**	3-1-0
Faculty	**Coordinator(s)**	Dr. Neha Sighal		

(Names)	Teacher(s) (Alphabetically)	Prof. PatoKumari Dr. AmitaBhagat

COURSE OUTCOMES		COGNITIVE LEVELS
After pursuing the above mentioned course, the students will be able to:		
C302-3.1	construct mathematical models for optimization problems and solve linear programming problems (LPP) using graphical and simplex method.	Applying Level (C3)
C302-3.2	apply two-phase, Big-M and dual simplex method for linear programming problems.	Applying Level (C3)
C302-3.3	make use of sensitivity analysis to linear programming problems.	Applying Level (C3)
C302-3.4	solve transportation, assignment and travelling salesman problems.	Applying Level (C3)
C302-3.5	apply cutting plane and branch & bound techniques to integer programming problems.	Applying Level (C3)
C302-3.6	examine optimality conditions and solve multivariable nonlinear problems.	Analyzing Level (C4)

Module No.	Title of the Module	Topics in the Module	No. of Lectures for the module
1.	Preliminaries	Introduction, Operations Research Models, Phases and Scope of O.R. Studies.	3
2.	Linear Programming Problems (LPP)	Convex Sets, Formulation of LPP, Graphical Solutions, Simplex Method, Big-M Method, Two Phase Method, Special Cases in Simplex Method.	8
3.	Duality and Sensitivity Analysis	Primal-Dual Relationship, Duality, Dual Simplex Method, Sensitivity Analysis.	8
4.	Transportation Problems	Introduction, Matrix Form, Applications, Basic Feasible Solution- North West Corner Rule, Least Cost Method, Vogel's Approximation Method. Degeneracy, Resolution on Degeneracy, Optimal Solution, Maximization TP Model.	5
5.	Assignment Problems	Definition, Hungarian Method, Traveling Salesmen Problems.	4

6.	Integer Linear Programming Problems	Pure and Mixed Integer Linear Programming Problems, Cutting Plane Method, Branch and Bound Method.	6

7.	Non Linear Programming	Introduction to NLP, convex functions and graphical solution, Unconstrained Problem, Constrained Problems - Lagrange Method for equality constraints, Kuhn-Tucker Conditions for inequality constraints, Quadratic Programming -Wolfe's Method	8
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.	Taha, H. A. - Operations Research - An Introduction, Pearson Education, 2005.
2.	Hadley, G. - Linear Programming, Massachusetts: Addison-Wesley, 1962.
3.	Hiller, F.S. and Lieberman, G. J. - Introduction to Operations Research, San Francisco, 1995.
4.	Wagner, H. M. - Principles of Operations Research with Applications to Managerial Decision, PHI, 1975.
5.	Vohra, N. D., Quantitative Techniques in Management, Second Edition, TMH, 2003.
6.	Taha, H. A. - Operations Research - An Introduction, Pearson Education, 2005.

Numerical Aptitude (16B19MA691)

Course Description

Course Code	**16B19MA691**	**Semester Even**	**Semester VI Session 2020-21** **Month from Jan 2021 - Jun 2021**
Course Name	**Numerical Aptitude**		

Credits	2	Contact Hours	2-0-0
Faculty (Names)	Coordinator(s)	Dr. Trapti Neer	
	Teacher(s) (Alphabetically)	Dr. Trapti Neer, Dr. Neha Ahlawat, Dr. Sarfaraz	

After pursuing the above mentioned course, the students will be able to:			COURSE OUTCOMES COGNITIVE LEVELS
C305-5.1	explain basics of mathematical aptitude.		Understanding Level (C2)
C305-5.2	explain set, functions and representation of numbers.		Understanding Level (C2)
C305-5.3	solve problem on probability theory, quadratic equations and complex numbers.		Applying Level (C3)
C305-5.4	explain inequalities, mensuration, data interpretation and errors.		Understanding Level (C2)
Module No.	Title of the Module	Topics in the Module	No. of Lectures for the module
1.	Mathematical Aptitude	Fractions, simplification, HCF and LCM, ratio and proportion, percentage, partnership, age, average, profit and losses, simple interest and compound interest, time and work, time and distance.	10

2.	**Set Theory and Representation of Numbers**	**Basics, identities, Venn diagram, addition principle, Pigeon hole principle, Functions-types of functions, some special functions, hashing function, characteristics function, Ackermann's function, Representation of numbers in binary, octal, hexadecimal, floating point representation of numbers.**	**08**
3.	**Probability**	**Probability, binomial theorem, linear equations, quadratic equations, complex numbers, logarithms.**	**06**

4. Geometry and Data Interpretation **06**

Surds and indices, inequalities, mensuration, geometry, data interpretation, errors- types of errors, error propagation, errors in series approximation.

Total number of Lectures	**30**

Evaluation Criteria

Components Maximum Marks

Mid Term Examination 30

End Semester Examination 40

TA 30 (Assignments)

Total 100

Project based learning: Students are divided in a group of 4-5 to do a survey on the questions that are available in the GMAT or GATE exams. The student can recognize the problems that appear in competitions and do good practice to the said problems as learned in this course.

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.	**Aggarwal, R.S., Quantitative Aptitude, S. Chand & Co., 2008**

2.	**Praveen, R. V., Quantitative Aptitude and Reasoning, 3rd Edition, Prentice Hall India, 2016.**
3.	**Prakasa Rao, B.L.S., A First Course in Probability and Statistics, World Scientific, 2009.**
4.	**Rosen & Kenneth H, Discrete Mathematics and Its Applications, Tata Mc-Graw Hill, New Delhi, 2007.**

Mathematical Modelling in Biotechnology (21B12MA311)

Couse Description

Course Code	21B12MA311	Semester - Even	Semester VI Session 2020-21 Month from Jan 2021- Jun 2021
Course Name	Mathematical Modelling in Biotechnology		
Credits	3	Contact Hours	3-0-0
Faculty (Names)	Coordinator(s)	Dr. Yogesh Gupta	
	Teacher(s) (Alphabetically)	Dr. Yogesh Gupta	

COURSE OUTCOMES	COGNITIVE LEVELS
After pursuing the above mentioned course, the students will be able to:	

C302-12.1	explain basic concepts of mathematical modelling in Biotechnology.	Understanding Level (C2)
C302-12.2	apply difference equations in mathematical modelling.	Applying Level (C3)
C302-12.3	make use of ordinary differential equations in mathematical modelling.	Applying Level (C3)
C302-12.4	construct and solve mathematical models using system of differential equations.	Applying Level (C3)

C302-12.5 apply partial differential equations and numerical methods to solve various models. Applying Level (C3)

Module No.	Title of the Module	Topics in the Module	No. of Lectures for the module
1.	Introduction to Mathematical Modelling	Classification of mathematical models. Procedure, merits and challenges of mathematical modelling. Applications of algebra, geometry, calculus etc. in mathematical modelling.	6
2.	Mathematical Modelling through Difference Equations	Basic theory and methods for difference equations, Homogeneous and non-homogeneous difference equations, Difference equations in discrete models of population dynamics and genetics, Discrete Prey Predator models.	8

3.	Mathematical Modelling through Ordinary Differential Equations	Formation of differential equations, Methods of ordinary differential equations, First order and higher order ODEs, Eigen values and eigen vectors, Stability and bifurcation, Applications in continuous models such as Growth models, Decay models, Newton's Law of Cooling, Population dynamics, Continuous Prey-Predator models and other models.	11
4.	Applications of System of Differential Equations	Methods for system of simultaneous ordinary differential equations, Applications in Mathematical models of infectious diseases, The Kermack McKendrick model, Epidemic models- SI, SIR, SIRS, SIRD etc.	8
5.	Applications of Partial Differential Equations and Numerical Methods in Mathematical Modelling	Basic concepts, methods and applications of partial differential equations, Numerical methods in modelling, Euler method, Runge-Kutta method, some applications in Biotechnological processes.	9

Total number of Lectures 42

Evaluation Criteria

Components Maximum Marks

T1 20

T2 20

End Semester Examination 35

TA 25 (Quiz , Assignments, PBL etc.)

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.	J. N. Kapur, Mathematical Modeling, New Age International 2005.
2.	L. Edsberg, Introduction to Computation and Modeling for Differential Equations, John Wiley and Sons 2008.
3.	D. S. Jones, Differential Equations and Mathematical Biology, Chapman & Hall/CRC Mathematical Biology and Medicine Series 2005.
4.	S. Banerjee, Mathematical Modeling: Models, Analysis and Applications, CRC Press 2014.
5.	Ching-Shan Chou, Avner_Friedman, Introduction to Mathematical Biology, Springer International Publishing Switzerland 2016.

Detailed Syllabus
Lecture-wise break up

Course Code	**15B17BT472**	**Semester EVEN (specify Odd/Even)**	**Semester IV Session 2020 - 2021** **Month from** JAN - JUNE
Course Name	**GENETIC ENGINEERING LAB**		
Credits	**1**	**Contact Hours**	**2**

Faculty (Names)	
Coordinator(s)	Prof. Sujata Mohanty
Teacher(s) (Alphabetically)	Dr. Sonam Chawla Prof. Sujata Mohanty

COURSE OUTCOMES: On successful completion of this module, students should be able to

CO371.1	**Demonstrate good lab practices, equipment handling and biosafety related to Genetic Engineering**

CO371.2	**Explain and perform procedure for nucleic acid isolation and purification** **COGNITIVE LEVELS Understand [C2]**

Understand [C2]

CO371.3 Develop an ability to conduct basic gene cloning experiments Apply [C3]

CO371.4	**Analyze and troubleshoot the experimental outcomes Analyze [C4]**

Module No.	**Title of the Module**	**List of Experiments**	**No. of labs in the module**
1.	Good lab practices & equipment handling	Preparation of culture media and stock buffers	
2.	Nucleic acid isolation	Genomic DNA isolation from Bacterial cells – *E. coli* (DH5α strain)	1
3.		Isolation of plasmid DNA (mini-prep method) by alkaline lysis	2
4.	Separation, purification and analysis of DNA	Agarose gel electrophoresis of isolated genomic DNA	
5		DNA extraction and purification from agarose gels	4
6		Paper chromatography for estimation of nucleotide content of isolated DNA	
7.		Quantitative analysis of isolated plasmid DNA by UV spectrophotometer	
8.	Gene cloning	Preparation of chemically competent *E. coli* (DH5a) cells by $CaCl_2$ method	5
9.		Transformation of competent ce	
10.		Restriction Enzyme digestion of	

11. Ligation of plasmid vector and DNA insert

12.		Screening of recombinants
13.	Application & Analysis	Practice Exercises
		Total number of labs

2

14

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, Papers, Reports, Websites etc. in the IEEE format)

1.

2.

3.

4.

5.

Sambrook J. and Russell D, *Molecular cloning: A laboratory manual*, 4th edition. Cold Spring Harbor Laboratory Press, CoSpring Harbor, New York, 2014.

Sambrook J., Fritsch E.F., and Maniatis T, *Molecular cloning: A laboratory manual*, Cold Spring Harbor Laboratory Press, CoSpring

Harbor, New York.

Springer, 2000.

Dongyou L., *Handbook of Nucleic Acid Purification*, CRC Press, 2017.

David D. Moore et al.. *Short Protocols in Molecular Biology: A Compendium of Methods from Current Protocols in MoleculBiology*, Publisher: John Wiley & Sons, New York, 2002.

Stefan Surzycki. *Basic techniques in molecular biology*, Publisher: Berlin

Detailed Syllabus

Lecture-wise Breakup

Semester VI Session 2020 -2021

Course Code	**21B13HS311**	**Semester Even (specify Odd/Even)**		
Course Name	**Poverty, Inequali**			
Credits	**2**		**Contact Hours**	

Month from Jan 2021-June 2021

1-0-2

Faculty (Names)	**Coordinator(s)** Dr Akarsh Arora Dr Akarsh Arora
	Teacher(s) (Alphabetically)

COURSE OUTCOMES	
C305-13.1	Understand the concepts and dimensions of Poverty, Inequality and Human Development
C305-13.2	Evaluate different approaches to measure Poverty, Inequality and Human Development
C305-13.3	Apply an analytical framework to understand the factual or proximate causes or determinants of Poverty and Inequality
C305-13.4	Analyze the role of public policy and affirmative action to tackle Poverty and Inequality and strengthen Human Development.

Module No.	Title of the Module	Topics in the Module
1.	Concepts and Dimensions	Concepts and Dimensions of Poverty, Inequality and Human Development
2.	Measurement	Measurement of Poverty and Inequality: Steps and Axioms. Steps to calculate Human Development
3.	Data Sources	Census Data, Unit level D Data, Satellite Image Da
4.	Determinants	Determinants/ Factors: D Household, Individual, a variables Introduction to Stata, Reg Binary models
5.	Public Policies and Affirmative Actions	Review of different publi eradicate poverty. Role o policies to strengthen hu

Modu le No.	Title of the Module	List of Exp
1.	Concepts and Dimensions	Practical sessions on di and inequality.
2.	Measurement	Practical sessions on ST measure poverty, inequ development.

COGNITIVE LEVELS Understand
(Level 2)
Evaluate
(Level 5)
Apply
(Level 3)
Analyze
(Level 4)

No. of Lectures for t3

4

2

3

2

14

CO

CO1, CO2

CO1, CO2

3.	Data Sources	Practical sessions on key while collecting data on human development.
4.	Determinants	Practical sessions on ST interpret the determinant regression analysis.
5.	Public Policies and Affirmative Actions	Practical sessions on the Government of India po poverty, inequality and

CO2, CO3 CO2, CO3 CO3, CO4

Evaluation Criteria
Components Maximum Marks
Mid Term 30 (Project)
End Term 40 (Written)
TA 30 (Class Mock Activities, Assignment, Quiz)
Total 100

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

A. V. Banerjee and E. Duflo, *Poor Economics: A Radical Rethinking of the Way to Fight Global Poverty*. New York: P

1.
2.
3.
4.
5.
6.

2011
J. Haughton and S. R. Khandker, *Handbook on Poverty and Inequality*. Washington, DC: The World Bank, 2009.

A. Tarozzi and A. Deaton, "*Using census and survey data to estimate poverty and inequality for small areas*," The revieand statistics, vol. 91, no. 4, pp. 773-792, 2009.
D. Ray, *Development Economics*, 19 ed. New Delhi, India: Oxford University Press, 2012

A. Sen, *On Economic Inequality*. Oxford: Clarenson Press, 1997.

S. Alkire and M. E. Santos, "*Acute Multidimensional Poverty: A New Index for Developing Countries*," OPHI WORKI2017.

Detailed Syllabus
Lecture-wise Breakup

Course Code	**18B13HS612**	**Semester Even (specify Odd/Even)**	**Credits**	**2**
Course Name	**Effective to Management and**		**Session 2020-2021 Month from Jan 1-0-2**	
Faculty (Names)	**Coordinator(s)**	Dr Kanupriya Misra Bakhru Dr Kanupriya Misra Bakhru		
	Teacher(s) (Alphabetically)			

COURSE OUTCOMES		
	C305-2.3	Develop and maximize ones potential for achieving the career option.
	C305-2.4	Analyze the processes involved in securing and manag by employees of different organizations.

COGNITIVE LEVELS

C305-2.1	Assess ones personal priorities, skills, interests, strengths, and values using a variety of contemporary assessment tools and reflection activities.
C305-2.2	Apply knowledge of all the Career Stages and making informed career decisions.

Evaluate Level (C5)
Apply Level (C3) Create Level (C6) Analyze Level (C4)

Module No.	**Title of the Module**	**Topics in the Module**
1.	Introduction to Career Life cycle	Introduction to Career Life Cycle of an individual-Role and importance of human resource in an organization, Evolution of Strategic Human Resource Management.
2.	Self Branding and strategies to do well in Recruitment and Selection	Introduction to comple Selection, Introduction to and testing candidates graphology test etc. Intr Importance and practical Description and Job Spec

3.	Personnel Development and your career	Introduction to various learning and development, Introduction to various techniques used for learning and development, measure of training effectiveness, Training techniques / delivery, Kirkpatrick Model, Introduction to Succession Planning, Transactional Analysis.	3
4.	Human Resource Evaluation and Compensation	Performance Management: Measurement Approach, Developing Job Descriptions, Key Result Areas, Key Performance Indicators, Assessment Centre, 360 Degree feedback, Balanced Scorecard, Effective Performance Metrics. Compensation Strategy and trends- Compensation package, ESOPs, Performance based pay, Recognition, Retrial benefits, Reward management, Team rewards.	3
5.	Human Resource Control and special topics	Human Resources Audit, The Human Resource Information System (HRIS), Human Resources Accounting, Competency Management, Human Resource Management Practices in India, Internationalization of Human Resource Management Commonly Used Jargons.	2
		Total number of Lectures	**14**

No. of Lectures and Tutorial for the module 3

Module No.	**Title of the Module**	**List of Experiments/Activities**	**CO**
1.	Introduction to Career Life cycle	Practical Sessions on Resume and Cover Letter Writing	CO1, CO2
2.	Self Branding and strategies to do well in Recruitment and Selection	Practical Sessions on Job Description, Job Specification and Self-Branding, Psychometric self-reflection tools on Personal Orientation and behavior-Personal Efficacy, Personal effectiveness, Locus of Control, Emotional Intelligence and Assertiveness.	CO3, CO4
3.	Personnel Development and your career	Practical Sessions on Johari Window-Knowing Thyself, Transaction Analysis-Parent, Child, Adult Ego State for effective interpersonal communication.	CO1, CO3
4.	Human Resource Evaluationand Compensation	Practical Sessions on HR Interview and Mock HR Interview	CO2, CO4
5.	Human Resource Control and special topics	Practical Sessions on Group Discussions and Mock Group Discussions	CO2, CO4

Evaluation Criteria

Components	
Mid Term	40 (Written)
End Term	30 (Class Mock Activities, Assignment, Quiz)
TA	
Total	**100**
Project Based Learning: Maximum Marks	
30 (Project)	

Students, in groups of 3-4, are required to select a company that has come for Campus placement at JIIT, Noida. Students have to study the Recruitment and Selection process of the Company selected. The information can be collected with the help of an interview or some kind of questionnaire pertaining to the Recruitment and Selection process from seniors who have been placed in the given company.

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.	Joshi, Campus to Corporate, Your Roadmap to Employability, Sage Publications India Pvt. Ltd., 2015
2.	Mathur, Mastering interviews and group discussions, CBS Publishers& Distributors Pvt. Ltd., New Delhi, 2018
3.	Mitra, Personality Development and soft skills, Oxford University Press, New Delhi, 2011
4.	Pareek and Purohit, Training Instruments in HRD and OD, Sage Publications India Pvt. Ltd., 2018
5.	Pande and Basak, Human Resource Management- Text and Cases, Pearson, 2012
6.	Dessler and Varkkey, Human Resource Management, Pearson, 2011

Detailed Syllabus
Lecture-wise Breakup

Course Code	**16B1NHS634**	**Semester E**ven **(specify Odd/Even)**	**Semester Session** 2020 -2021 **Month from** Jan 2021 to June2021

Course Name	Theatre and performance(Value added)		
Credits	2	Contact Hours	1-0-2

Faculty (Names)	Coordinator(s)	Dr Nilu Choudhary
	Teacher(s) (Alphabetically)	Dr Nilu Choudhary

CO Code	COURSE OUTCOMES	COGNITIVE LEVELS
C304-14.1	Demonstrate problem solving ability and effective life skills through theatre performances.	Understanding level(C2)
C304-14.2	Develop awareness of the role of these arts in human life	Understanding level(C2)
C304-14.3	Apply skills of listening, articulation, awareness and collaboration through the creation of performance.	Applying level(C3)
C304-14.4	Design and present an original performance alone or in collaboration with other artists.	Creating level(C6)

Module No.	Title of the Module	Topics in the Module	No. of Lectures for the module
1.	Introduction of Theatre	History of theatre: role of theatre in human culture with special reference to India	2
2.	Characterization	Tips for developing character, thinking about thoughts, Flash –back, Performance	2
3.	Script Writing	Turning a story into a play , How to write a one Act , setting the scene ,character , stage direction , Dialogues	3
4.	School of Drama	Natya-Shastra, Stanislavsky and Brecht	3
5.	Text and its interpretation	Mother Courage ,Galileo , Aadhe Adhure (any one)	3
6.	Back-stage work	Management, planning, execution	1

Total number of Lectures	**14**

Module No.	Title of the Module	List of Experiments/Activities	CO
1.	Moving in Space.	Students will be moving around the room, filling up the space, changing pace, changing direction, being aware of other people but not touching them. Find new ways of moving, with a different emphasis each time – smooth, jagged, slow, fast, heavy, light, high up, low down and so on. Every now and again Teacher will shout "Freeze! And Students need to freeze every muscle in your body. Absolutely NO LAUGH, LOOKING AROUND, OR MOVING. You will be out.	C304-14.1
2.	Mirror Activity	• A great way to get students aware of body movement and working together.	C304-14.1
3.	Characterization	Developing and analyzing characters to reveal the special qualities and personalities of the characters in a story, making character believable.	**C304-14.2**
4.	Script Writing	The more passionate you feel about your idea, the more attractive your play will be. Divide the idea into a beginning, middle and end.	**C304-14.3**
5.	Role Assignment	No acting or movement at this point – just sit together to speak and hear the script carefully. Discuss and clarify any confusing aspects of the script and any apparent challenges in bringing the script to the stage. Division of script into small "units" and rehearsed separately	**C304-14.3**
6.	Turning story into a play	Read thru each episode or unit separately "on its feet".Actors moving around the stage space. Set blocking for each episode. Use ideas generated from Mini-Episodes, and Staging with Images. Make sure the gestures, movements, and stage pictures tell the story clearly.	**C304-14.3**
7.	Stage blocking	Practice the blocking and the lines so that everyone knows what happens when and what their performance responsibilities are. Memorize lines. Work on making characters, relationships, and dialogue clear. This is a good place in which to use the Creating the Character lessons. Pay attention to vocal projection and articulation. Generate ideas about any technical elements you want to incorporate using the Transformation of Objects.	**C304-14.3**
8.	Script to performance	Finalize and run the entire play from beginning to end without stopping to check any additional rehearsal required to get everything running smoothly or not. Finally Perform!!	**C304-14.4**

Evaluation Criteria **Components Maximum Marks** Mid Term 30

End Term 40 TA 30 (Script writing, End term stage performance) **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.	Eric Bentley, ed., The Theory of the Modern Stage: An Introduction to Modern Theatre and Drama, Penguin Books, 1968
2.	Mark Fontier, Theory/ Theatre: An Introduction, New York: Routledge, 2002
3.	Michael Holt, Stage Design and Property, Oxford: Phaidon, 1986
4.	Michael Holt, Costume and Make-up, Oxford: Phaidon, 1988
5.	Natyashastra, tr. by Adya Rangacharya, New Delhi: Munshiram Manoharlal, 2006,

Detailed Syllabus
Lecture-wise Breakup

Course Code	19B12HS612	Semester: Even	**Semester VI Session** 2020 -2021 **Month from** Jan 2021 to June 2021
Course Name	Social Media and Society		
Credits	3	**Contact Hours**	2-1-0

Faculty (Names)	**Coordinator(s)**	Dr. Shirin Alavi
	Teacher(s) (Alphabetically)	Dr. Shirin Alavi

COURSE OUTCOMES		COGNITIVE LEVELS
C304-1.1	Infer the implications of digital change, and the concept of social media and e-marketing in the context of the changing marketing landscape	Apply Level(C3)
C304-1.2	Elaborate the implications of cyber branding and digitization on online marketing mix decisions	Create Level (C6)
C304-1.3	Develop specific models related to social media and social media analytics	Create Level (C6)
C304-1.4	Evaluate concepts related to Search Engine Marketing, Customer Centric Web Business models and Web Chain Analysis	Evaluate Level(C5)
C304-1.5	Illustrate the new age marketing practices	Understand Level (C2)

Module No.	Title of the Module	Topics in the Module	No. of Lectures for the module
1.	Introduction, Individuals Online and Rules for engagement for social media	What is social media marketing, the importance of social media for influencing target audience, Patterns of internet usage, Internet user demographics, The Behavioural Internet, E-Marketing, The Virtual world, the changing Marketing Landscape, E - Marketing Strengths and Applications, Online Marketing Domains, Digital Marketing Optimization, The Need for Digital Engagement	4
2.	The Online Marketing Mix	The Online Marketing Mix, Consumer Segmentation, Consumer Traits, Consumers and Online Shopping Issues, E-Product, E-Place, E-Price, E-Promotion, Website Characteristics affecting online purchase decision.	3
3.	The Online Consumer and Social Media	The Digital Ecosystem, Online Consumer Behavior, Cultural Implications of key web characteristics, Models of website visits, Web 2.0 and Marketing, The collaborative web, Network evolution, Network science, Marketing with networks, Metcalfe's law, Netnography, Social Media Model by McKinsey, Social Media Tools-Blogs, Wikis, Online Communities, Facebook, Twitter, You Tube, Flickr, Microblogging.	4

4.	Online Branding and Traffic Building	Cyber branding, Online brand presence and enhancement, The Digital Brand Ecosystem, Brand Experience, Brand Customer Centricity, Brands and Emotions, The Diamond Water paradox, Internet Traffic Plan, Search Marketing Methods, Internet Cookies and Traffic Building, Traffic Volume and quality, Traffic Building Goals, Search Engine Marketing, Keyword Advertising, Keyword value, Internet Marketing Metrics, Websites and Internet Marketing.	4
5.	Web Business Models, Social Media Strategy, Social Media Marketing Plan	The value of a Customer Contact, Customer Centric Business Management, Web Chain of Events, Customer Value Analysis and the Internet, Business Models, Revenue Benefits, Value Uncertainty, Purchase Importance, Define a social media plan, explain the social Media marketing planning cycle, list the 8C's of strategy development.	4
6.	Market Influence analytics in a Digital Ecosystem	Engagement Marketing through Content Management, Online Campaign Management, Consumer Segmentation, Targeting, and Positioning using Online Tools, Market Influence Analytics in a Digital Ecosystem, The Digital Ecosystem, Knowledge as a value proposition, CGM and Consumer behavior, The value of the power of influence, Amplifying Social Media Campaigns.	4
7.	The Contemporary Digital Revolution and its impact on society	Online Communities and Co-creation, The fundamentals of online community management strategies, The World of Facebook, The Future of Social media Marketing—Gamification and Apps, Game based marketing The world of Apps, Apps and the Indian Diaspora	3
8.	Integrating Mobile into Social Media Marketing	Types of Mobile Marketing, Progression of the mobile as a Marketing channel, some Indian mobile marketing campaigns, Impact of Social Media on government, the economy, development, and education	2
Total number of Lectures			**28**

Evaluation Criteria

Components Maximum Marks
T1 20
T2 20
End Semester Examination 35
TA 25 (Project, Viva 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.	Digital Marketing, Chaffey, D., & Ellis-Chadwick, F, Seventh Edition, Pearson (U.K) 2019.
2.	Digital Marketing, Seema Gupta, First Edition, Mc Graw Hill Education (India) Private Limited ,2018
3.	Social Media Marketing A Strategic Approach, Melissa Barker, Donald Barker, Second Edition Cengage Learning ,2017.
4.	Internet Marketing: A Practical Approach in the Indian Context, Maity, Moutusy, First Edition Oxford University Press, 2017.
5.	Fundamentals of Digital Marketing, Puneet Singh Bhatia, Second Edition, Pearson,2017.
6.	Digital Marketing, Vandana Ahuja, First Edition, Oxford University Press, 2015
7.	Social Media Marketing, Liana "Li" Evans, First Edition, Pearson, 2011.

Detailed Syllabus
Lecture-wise Breakup

Course Code	18B12HS611	**Semester EVEN** (specify Odd/Even)	**Semester VI Session** 2020-2021 **Month from: Jan - June**
Course Name	Marketing Management		
Credits	**3**	**Contact Hours**	**(2-1-0)**

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

COURSE OUTCOMES		**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)

C304-7.4	To appraise the importance of marketing ethics and social responsibility	Evaluating(C5)
C-304-7.5	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 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	5
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 Behaviour**	Consumer Markets and consumer buyer behaviour. The buying decision process. Business Markets and business buyer behaviour. 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, Viva, Oral 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.	Kotler, Philip and Gary Armstrong, Principles of Marketing, 10th Edition, New Delhi, Pearson Education, 2004.
2.	Darymple, Douglas J., and Leonard J. Parsons, Marketing Management: Text and Cases, 7th Edition, John Wiley & Sons (Asia) Pte. Ltd., 2002.
3.	Kotler, Philip., and Kevin Lane Keller, Marketing Management, 12th Edition, New Delhi, Pearson Education, 2006.
4.	Winer, Russell S., Marketing Management, 2nd Edition, Prentice Hall,2003.

5.	Hollensen, S. (2019). Marketing management: A relationship approach. Pearson Education.

DETAILED SYLLABUS AND EVALUATION SCHEME

Course Code	21B12HS311	**Semester: EVEN (specify Odd/Even)**	**Semester: VI Session:2020-21** Month from: Jan-June
Course Name	Development Issues and Rural Engineering		
Credits	03	Contact Hours	2-1-0

Faculty (Names)	**Coordinator(s)**	Dr. Amandeep Kaur
	Teacher(s) (Alphabetically)	Dr. Amandeep Kaur (amandeep.kaur@mail.jiit.ac.in)

COURSE OUTCOMES		**COGNITIVE LEVELS**
C304-10.1	Understand the concept, philosophy and determinants of rural development	Understanding Level-(C2)
C304-10.2	Assess public policies related to rural development	Analyze Level –(C4)
C304-10.3	Explain the role of local self-governance in planning and development of rural areas.	Understanding Level-(C2)
C304-10.4	Analyze the impact of recent policy changes and schemes on rural development.	Analyze Level –(C4)
C304-10.5	Evaluate the issue and challenges of through possible determinants of rural development.	Evaluation Level- (C5)

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

1.	Rural Development: An Introduction	Rural Development Philosophy, Concepts, Principles, Traditional and Modern Concept of Development, Trends and Pattern of micro as well as macro indicators of Rural Development.	4
2.	Public Policies and Rural Development	Policies related to Employment Generation, Poverty Reduction, Skill Development and, Infrastructure such as MGNGEGA, DDUGKY, Atam Nirbhar Bharat rojgar yojna and schemes related to MSMEs etc.	6
3.	Rural Development Administration and Panchayat Raj Institutions	Rural Development administration: Panchayat Raj System (73rd Amendment Act), functions of Panchayat Raj System, Financial Distribution of Resources in Rural India through Panchayat Raj System, merits and demerits of Panchayat system, Ways to strengthen the existing system by overcoming the flaws.	6
4.	Rural Development Issues and Challenges	Issues and challenges of Rural development: Employment in line with sectoral distribution (GDP and Employment), Poverty and Migration Issue, Rural and Urban Consumption and Production Linkages.	7
5.	Recent Advancements and changes	Recent packages and schemes implemented in Rural India, Budget Allocation for Rural Development -2019-20 and 2020-21: For Employment Generation, poverty reduction, infrastructure and MSMEs.	5
Total number of Lectures			**28**

Evaluation Criteria

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

Project-based Learning: Students are required to collect the data related to different indicators of rural development (related to agriculture, health and education infrastructure, literacy levels, population density, poverty, employment etc.). They also need to check the compatibility of data (data mining and data refining process) and then analyse the contribution of these indicators in rural development of particular state/country as whole. Moreover, they are required to analyse the extent of progress and failure of programmes/schemes implemented in rural areas for poverty reduction, employment generation and MSMEs. Collecting information and analysing the data related to development indicators and policies will upgrade students' knowledge regarding the development issues and strengthen their skills to tackle multiple data handling and measuring issues.

Recommended Reading material:	
1.	**Singh, Katar.** Rural Development: Principles, Policies and Management *(3e)*.2009
2.	**Coke, P., Marsden, T. and Mooney, P.** Handbook of Rural Studies. Sage Publications, 2006
3.	**Todaro, M.P**., **Stephen C. Smith,** Economic Development, Pearson Education, 2017
3.	**Ahuja, H. L.**, Development Economics, S Chand publishing, 2016

4.	**Musgrave, R. A., Musgrave, P. B.,** Public Finance in Theory and Practice, McGraw Hill Education,2017

Detailed Syllabus
Lecture-wise Breakup

Course Code	21B12CS311	**Semester odd (specify Odd/Even)**	**Semester VI Session** 2020 -2021 **Month from** Jan21 to May21
Course Name	Software Development Principles and Practices		
Credits	**3**	**Contact Hours**	**3-0-0**

Faculty (Names)	**Coordinator(s)**	Aparajita Nanda
	Teacher(s) (Alphabetically)	NA

COURSE OUTCOMES	**COGNITIVE LEVELS**

CO1	Explain software engineering principles and software process models for project development.	Understand Level (Level 1)
CO2	Analyze software requirements and document software requirements specification.	Analyze Level (Level 4)
CO3	Design and develop the system models for software development.	Apply Level (Level 3)
CO4	Apply risk management principles and processes to determine risk and its mitigation plans.	Apply Level (Level 3)
CO5	Assess software quality using various metrics	Evaluate Level Level 5

Module No.	**Title of the Module**	**Topics in the Module**	**No. of Lectures for the module**
1.	**Introduction to Software Engineering**	Introduction to software engineering principles, Software process models(build and fix model, waterfall model, Incremental process model, Evolutionary- Prototype and Spiral models. Introduction to Agile Methodologies , Project planning, and Project Scheduling.	7
2.	**Requirement Engineering**	Balancing Development Needs with Organizational Expectations, Writing Requirements and Requirements Specifications, Quality Assurance of Requirements, Types of requirement, Prioritizing Requirements, SRS.	7
3.	**Software Design**	Use case diagram, State diagram, Activity Diagram, Class Diagram, Sequence diagram, Collaboration diagram, Deployment Diagram, Component Diagram and Package diagram. Design Modularity: Coupling Cohesion.	8
4.	**Risk Assessment and management**	Task Analysis, Accident Theory, Accident Investigation and Reporting, Accident Statistics, Safety Inspection Procedures, Disaster Planning, Risk Management Systems, Analysis of risk at various stages of SDLC, Tools and techniques	5
5.	**Software Metrics**	Size-Oriented Metric, Functional Point metric, Function oriented Metric, Halstead's Software Metric, Information Flow Metric, Objectoriented Metric, Class-Oriented Metric, COCOMO Model.	6

6.	**Software Testing and Debugging**	White-Box Testing, Basis Path Testing, Control Structure Testing: Condition Testing, Data Flow Testing, Loop Testing, Black-Box Testing: Equivalence class partitioning, Boundary Value Analysis, Decision table testing, Cause effect graphing, Mutation Testing and regression Testing. Debugging and its types.	9
		Total number of Lectures	**42**

Evaluation Criteria

Components Maximum Marks
T1 20
T2 20
End Semester Examination 35
TA 25 (**Attendance-05, Assignments/Quiz/Mini Project-20**) **Total 100**

Project based learning: Each student in a group of 4-5 will choose an application or problem Software Development Principles to understand the software engineering lifecycle by demonstrating competence in communication, planning, analysis, design, construction, and deployment. To make subject application based, the students demonstrate an understanding of current theories, models, and techniques that provide a basis for the software lifecycle. Expose students to current technologies and issues that provide ability to use the techniques and tools necessary for engineering practice and employability into software industries.

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.	Roger S. Pressman and Bruce R Maxim, "Software Engineering: A practitioner approach", 8th Edition McGraw-Hill - ISBN: 978-0-07-802212-8
2.	Sommerville , "Software Engineering" , Seventh Edition - Addison Wesley
Other Reference books	
3.	GRADYBOOCH**,** JAMES RUMBAUGH**,** IVAR JACOBSON, The Unified Modeling Language User Guide, Addison Wesley, Reading, Massachusetts.
4.	Richard Thayer , "Software Engineering Project Management", Second Edition - Wiley-IEEE Computer Society Press.
5.	B. Bezier, "Software Testing Techniques", Second Edition- International Thomson Computer Press.
6.	Pankaj Jalote, "An Integrated Approach to Software Engineering" Third addition , Springer Press

Detailed Syllabus

Course Code	**20B16CS323**	**Semester** Even **(specify Odd/Even)**	**Semester VI Session** 2020 -2021 Month from January to June

Course Name	Problem Solving using C and C++		
Credits	2	**Contact Hours**	[1- 0 - 2]

Faculty (Names)	**Coordinator(s)**	Mradula Sharma
	Teacher(s) (Alphabetically)	Mradula Sharma, Dr. Alka , Dr. Ashish Mishra

COURSE OUTCOMES [NBA Code: C305-9] At the completion of the course, Students will be able to		**COGNITIVE LEVELS**
C305-9.1	Apply and use library functions, pointer arithmetic, arrays, and regular expressions and secure coding practices in programs.	Apply Level (C3)
C305-9.2	Use critical thinking skills and creativity to choose the appropriate containers, iterators and algorithms for a given problem.	Apply Level (C3)
C305-9.3	Demonstrate the use of concurrency principles, input and output streams and defensive techniques in programs.	Apply Level (C3)

Module No.	**Title of the Module**	**Topics in the Module**	**No. of Lectures for the module**
1.	Review and practice problems on Functions in C/C++	Functions, all function syntax, Function return type deduction, static, const and inline functions, default parameters, overloaded functions- operator and members, friends, overriding functions.	**1**
2.	Practice problems on Arrays and Pointers and Indirections	Smart pointers, pointers and dynamic memory allocation, type inference, array and pointers and their arithmetic and indirections	**2**
3.	Secure Coding practices in C/C++	Common String, Integer and dynamic memory allocation Errors, Integer and dynamic memory allocation and String vulnerabilities their mitigation strategies.	**2**
4.	String Localization and Regular Expression	Localization and working with regular expression, Programming with Regex library	**1**

5.	Practice problems on Exception Handing and Assertions	Errors and Exceptions, Exception Mechanisms, Exceptions and Polymorphism, Stack unwinding and Cleanup, Common error handling issues	**1**
6.	Applications with Disk Files and other I/O	Using streams, Input and Output with Streams, String Streams, File Streams and Bidirectional I/O	**1**

7.	Generic Programming with Templates	Class templates, Function templates, variable templates, Template parameters, Specialization of templates, template recursion, variadic templates, Meta-programming	**2**
8.	Working with Standard Template Library	Understanding and working with containers, container adapters and iterators, Lambda expressions, Function objects, STL algorithms, Customize and extend STL	**2**
9.	Programming using Dynamic Memory Allocation Model	Working with dynamic memory, array-pointer duality, low level memory operations, smart pointers and common memory pitfalls	**1**
10.	Problems on Concurrency in Programming	Introduction, Threads, Atomic operations library, Mutual Exclusion, Conditional variables	**1**
			14

Evaluation Criteria
Components Maximum Marks
Mid Tern Evaluation 30
End Semester Examination 40

TA 30 (Attendance – 10, Quizes/Mini Project – 20)

Total 100

Project based leaning: Each student in a group of 3-4 will develop a simulator with the help of various advanced C and C++ topics. In a team, they will learn how to apply the concepts for problem solving in a meaningful way. The project typically incorporates various advanced C and C++ concepts to enable the synthesis of knowledge from real-life experiences.

Recommended Reading material:

1. C++: The Complete Reference, 4th Edition H. Schildt Tata MacGrawhill

2.	Object-Oriented Programming in C++, Fourth Edition Robert Lafore
3.	C++ How to Program Dietel and Dietel
4.	Advanced C Peter D. Hipson.
5.	Data structures and algorithms in C++, 3rd Edition, Adam Drozdek, Thomson
6.	Data structures using C and C++, Langsam, Augenstein and Tanenbaum, PHI.
7.	Problem solving with C++, The OOP, Fourth edition, W.Savitch, Pearson education
8.	Secure C and C++ Robert C. Seacord

Detailed Syllabus

Course Code	20B12HS311	**Semester** Even **(specify Odd/Even)**	**Semester Session** 2020-21 **Month from** Jan - July
Course Name	Global Politics		
Credits	3(2-1-0)	**Contact Hours**	**3**

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

CO Code	**COURSE OUTCOMES**	**COGNITIVE LEVELS**
C304-9.1	Demonstrate an understanding of the meaning and nature of globalization by addressing its political, economic, cultural and technological dimensions	Understanding (C2)
C304-9.2	Analyzing the significance of contemporary global issues	Analyze (C4)
C304-9.3	Analyze how the global politics shapes domestic politics	Analyze (C4)
C304-9.4	Demonstrate an understanding of the working of the global economy, its anchors and resistances offered by global social movements	Understanding (C2)

Module No.	Title of the Module	Topics in the Module	No. of Lectures for the module
1.	Globalization: Conceptions and Perspectives	Political Dimension of globalization Globalization and Culture Technological Dimensions Debates on territoriality and sovereignty	6
2.	Global Economy	Its Significance and Anchors of Global Political Economy: IMF- history and India's benefit from its membership of IMF WTO- History and India's experience with WTO and reform proposals World Bank- history and role of world Bank in India Rise of TNCs and role of TNCs in globalization Global resistances (Global Social Movement and NGOs)-their nature and characteristics , prominent movements and their impact	8
3.	Contemporary Global Issues-I	Ecological Issues: historical overview of international environmental agreements-UNSCD, Paris agreement, climate change- Copenhagen summit to post Copenhagen summit policies of India, climate change and global initiatives global commons debate	8
		Proliferation of Nuclear Weapons-history of nuclear proliferation, threat of proliferation with increase in globalization	
4.	Contemporary Global Issues-II	International Terrorism: globalization and global terrorism, impact of terrorism on globalization, role of non-state actors and state terrorism; the US and war on terrorism Migration and Human Security- globalization, violent extremism and migration; new global regime	6
		Total number of Lectures	**28**

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.	C. Hay, Ed. *New Directions in Political Science: Responding to the Challenges of an Interdependent World.* New York, USA: Palgrave Macmillan Education, 2010
2.	D.Held & A. McGrew, *Globalization/Anti-globalization: Beyond the Great Divide*. Cambridge, UK: Polity Press, 2007
3.	F. Halliday, "Terrorism in Historical Perspective"., *Open Democracy*. 22 April, 2004 [Online] Available: http://www.opendemocracy.net/conflict/article_1865.jsp
4.	J. Baylis and S. Smith, Ed.*The Globalization of World Politics: An Introduction to International Relations*. Oxford, UK: Oxford University Press, 2017
5.	L.Gordon and S. Halperin, "Effective Resistance to Corporate Globalization" in *Contesting Global Governance*, R.O'Brien, A.M. Goetz, J.C. Scholte & M.Williams. Cambridge, UK: Cambridge University Press,2000

SYLLABUS AND EVALUATION SCHEME

Lecture-wise Breakup

Course Code	19B12HS611	**Semester : EVEN (specify Odd/Even)**	**Semester:** VI **Session** 2020-21 **Month from:** January- June
Course Name	Econometric Analysis		
Credits	3	**Contact Hours**	2-1-0

Faculty (Names)	**Coordinator(s)**	Manas Ranjan Behera
	Teacher(s) (Alphabetically)	Manas Ranjan Behera

COURSE OUTCOMES		COGNITIVE LEVELS
CO1	*Demonstrate* the key concepts from basic statistics to understand the properties of a set of data.	Understanding Level - C2
CO2	*Apply* Ordinary Least Square method to undertake econometric studies.	Apply Level - C3
CO3	*Examine* whether the residuals from an OLS regression are well behaved.	Analyze Level - C4
CO4	*Evaluate* different model selection criteria for forecasting.	Evaluation Level - C5
CO5	*Create* models for prediction from a given set of data.	Creation Level - C6

Module No.	Title of the Module	Topics in the Module	No. of Lectures for the module
1.	Statistical Inference	Point and interval estimation; ;The Z distribution ;The Null and Alternate hypotheses ;The chi-square distribution; The F distribution; The t distribution	3
2.	Regression Analysis	Two variable regression model; The concept of the PRF; Classical assumptions of regression; Derivation of the OLS estimators and their variance; Properties of OLS estimators under classical assumptions; Gauss-Markov Theorem; Tests of	7
		Hypothesis, confidence intervals for OLS estimators; Measures of goodness of fit: R square and its limitations; Adjusted R square and its limitations	

3.	Econometric Model Specification	Identification: Structural and reduced form; Omitted Variables and Bias; Misspecification and Ramsay RESET; Specification test; Endogeneity and Bias	5
4.	Failure of Classical Assumptions	Multi-collinearity and its implications; Auto correlation: Consequences and Durbin Watson test ;Heteroskedasticity: Consequences and the Goldfeld -Quandt test	2
5.	Forecasting	Forecasting with a)moving averages b) linear trend c) exponential trend CAGR; Forecasting with linear regression; Classical time series decomposition; Measures of forecast performance: Mean square error and root mean square error; Limitations of econometric forecasts	5
6.	Time Series Analysis	Univariate Time Series Models: Lag Operator, ARMA , ARIMA models, Autoregressive Distributed Lag Relationship	3
7.	Linear Programming	Linear programming; Dual of a linear programming problem; Simplex method Transportation	3
		Total number of Lectures	**28**

Evaluation Criteria

Components Maximum Marks
T1 20
T2 20
End Semester Examination 35
TA 25 (Quiz+ Project+Viva -Voce) **Total 100**

Project based Learning: Students have to form a group (maximum 5 students in each group) and have to do an econometric analysis on the topic assigned. Students will use the different statistical methods using quantitative data to develop theories or test existing hypothesis. Students will also be encouraged to forecast future economic trends.

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.	Gujarati, D.N. (2002), Basic Econometric (4th ed.), New York: McGraw Hill.
2.	Greene, W.H. (2003), Econometric Analysis, New Jersey: Prentice Hall.
3.	Madala, G.S. (1992), Introduction to Econometrics (2nd ed.), New York: Macmillan.
4.	Wooldridge,J (2010), Econometric Analysis of Cross Section and Panel Data(2nd ed.), Cambridge, The MIT Press.
5.	Stock, J. H., and M. W. Watson. (2015). Introduction to Econometrics, (Third Update), Global Edition. Pearson Education Limited.

Detailed Syllabus
Lecture-wise Breakup

Course Code	**16B1NHS636**	**Semester : Even**	**Semester VI Session** 2020 -2021 **Month: January 2021 to June 2021**
Course Name	**Literature & Adaption**		
Credits	**3**	**Contact Hours**	**2-1-0**

Faculty (Names)	**Coordinator(s)**	Dr. Ekta Srivastava (Sector 128)
	Teacher(s) (Alphabetically)	Dr. Ekta Srivastava

COURSE OUTCOMES		**COGNITIVE LEVELS**
C304-3.1	Understand and outline the elements and theories of adaptation and its various forms, and relate with the texts reflecting the cultural, moral and linguistic changes in the contemporary society.	Understanding Level (C2)

C304-3.2	Utilize visual literacy to analyze the language and style adopted in filmed texts and examine them as reflections of Readers' and Audience' values and perceptions in the context of myriad cultures and multidisciplinary settings individually and in groups.	Applying Level (C3)
C304-3.3	Analyze texts and their adaptations beyond the surface level of narrative or character as reflections of value systems of various cultures and times individually and in a team.	Analysing Level (C4)
C304-3.4	Evaluate, interpret and document source texts and adaptations thematically and stylistically to learn the nuances of language, culture and values of the society.	Evaluating Level (C5)
C304-3.5	Compose and make an effective presentation of a literary/non literary piece in any genre and design an ethical adaptation of any literary/non literary piece in another form individually and in groups.	Creating Level (C6)

Module No.	**Title of the Module**	**Topics in the Module**	**No. of Lectures for the module**
1.	Introduction Literary Devices	Figures of speech, Character, Plotline, Conflict, Point of View	2
2.	Literature & Adaptation	Understanding Cultural Contexts Forms of Adaption Cinematography & Narratology	4
3.	Framework	Adaptation Theories; Reader Response & Audience Response Theories Case study of the Classic Fairy Tale The Sleeping and its contemporary adaptation Maleficent	7
4.	Play & adaptations	The Pygmalion: George Bernard Shaw Hamlet : William Shakespeare	6
5.	Novel & Adaptations	Pride & Prejudice: Jane Austen The Giver: Lois Lowry	9
		The Godfather: Mario Puzo	
		Total number of Lectures	28

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

Recommended Reading material:	
1.	**Linda Hutcheon**, *A Theory of Adaptation*, Routledge, 2006
2.	**Mark William Roche**, *Why Literature matters in the 21st Century*, 1st edition, Yale University Press 2004
3.	**George Bernard Shaw**, *Pygmalion,* Electronic Version, Bartleyby.com, New York, 1999
4.	**Stanley Wills & Gary Taylor**, *The Complete Works. The Oxford Shakespeare* (Compact ed.). Oxford: Clarendon Press. , 1988.
5.	https://www.sparknotes.com/film/sleepingbeauty/
6.	**Jane Austen**, *Pride & Prejudice*, Reprint, Thomas Egerton, 2013
7.	**Mario Puzo,** *The Godfather*, 1st Edition, G. P. Putnam's Sons, USA, 1969
8.	**Lois Lowry,** *The Giver, 1st Edition,* Houghton Mifflin Harcourt Publishing Company, USA, 1993

Detailed Syllabus

Course Code	**20B16CS324**	**Semester** Even	**Semester V**I **Session** 2020 -2021 Month from Jan 2021 to Jun 2021
Course Name	**Non-linear Data Structures & problem solving**		
Credits		**Contact Hours**	1- 0 - 2

Faculty (Names)	**Coordinator(s)**	Dr. Manju
	Teacher(s) (Alphabetically)	Dr. Aparajita Nanda, Dr. Manish Ku. Thakur, Dr. Manju

COURSE OUTCOMES At the completion of the course, Students will be able to		COGNITIVE LEVELS
C305-10.1	Demonstrate operations on different data structures.	Understand Level (C2)
C305-10.2	Use critical thinking skills and creativity to choose the appropriate data structure and solve the given problem.	Apply Level (C3)
C305-10.3	Identify the correctness and efficiency of the solution by constructing different test cases.	Apply Level (C3)
C305-10.4	Develop solutions to real world problems by incorporating the knowledge of data structures	Create Level (C6)

Module No.	Title of the Module	Topics in the Module	No. of Lectures for the module
1.	Review of Problem Solving and Data Structures	Concepts of Problem Solving, Performance metrics for Algorithm Analysis, Why study Data structures and Abstract Data Types. Practice problems on Sparse Matrix	**1**
2.	Practice problems on advanced list structures	Multi-list, skip list, XOR linked list, self organizing list, unrolled linked list	**2**
3.	Practice problems on point and range queries using tree structures	Suffix array and suffix tree, Trie and persistent trie, Segment tree and persistent segment tree, Interval tree, K dimensional tree, Binary indexed tree, Splay tree, Treap (randomized BST), Order statistics tree	**4**
4.	Practice problems on optimization problems using tree structures.	Tournament tree, Decision tree, Cartesian tree	**2**
5.	Practice problems on heaps and sets	Sparse set, Disjoint set, Leftist heap, K-ary heap	**2**
6.	Problem solving using graphs	Social graphs, Transportation system graphs, Resource allocation graphs	**3**
		Total number of Lectures	**14**
Evaluation Criteria			

Components Maximum Marks
Mid Tern Evaluation 30
End Semester Examination 40
TA 30 (Attendance – 10, Quizes/Mini Project – 20)
Total 100

Project based Learning: Each student in a group of 3-4 will develop a simulator with the help of various advanced data structures. Students will be able to understand and apply algorithms and advanced data structures properly; know how to evaluate, choose appropriate algorithms or data structures; know how to design and implement algorithms or data structures to serve the purpose of designing solution. Selecting t**he appropriate** data **structure** is an integral part of the programming and problem-solving process. The project typically incorporates various advanced data structure concepts to enable the synthesis of knowledge from real-life experiences.

Recommended Reading material:	
Text Books	
1.	Data structures and Algorithm Analysis in C++, Mark Allen Weiss, Pearson Education. Ltd., Fourth Edition.
2.	Handbook of Data Structures and Applications, 2nd Edition by Sartaj Sahni, Dinesh P. Mehta, CRC Press
References	
3.	Data structures and Algorithms in C++, Michael T.Goodrich, R.Tamassia and .Mount, Wiley student edition, John Wiley and Sons.
4.	Data structures, Algorithms and Applications in C++, S.Sahni, University Press (India) Pvt.Ltd, 2nd edition, Universities Press Orient Longman Pvt. Ltd.
5.	Data structures and algorithms in C++, 3rd Edition, Adam Drozdek, Thomson
6.	Data structures using C and C++, Langsam, Augenstein and Tanenbaum, PHI.
7.	Problem solving with C++, The OOP, Fourth edition, W.Savitch, Pearson education

Detailed Syllabus
Lecture-wise Breakup

Course Code	**16B1NHS 531**	**Semester : Even (specify Odd/Even)**	**Semester : VI Session: 2020 - 2021** **Month from: Jan- June 2021**
Course Name	**Sociology of Youth**		
Credits	**3**	**Contact Hours**	**(2-1-0)**

Faculty (Names)	**Coordinator(s)**	**Ms Shikha Kumari**
	Teacher(s) (Alphabetically)	**Ms Shikha Kumari**

COURSE OUTCOMES		**COGNITIVE LEVELS**
C304-13.1	Demonstrate an understanding of Youth and youth culture in sociological perspectives	Understanding (C 2)
C304-13.2	Explain the ethical, cultural& social issues concerning Youth	Evaluating(C 5)
C304-13.3	Examine the relative importance of structure and agency in shaping young people's experiences and life opportunities	Analyzing(C 4)
C304-13.4	Evaluate youth experience in a context of social change	Evaluating(C 5)

Module No.	**Title of the Module**	**Topics in the Module**	**No. of Lectures for the module**
1.	Introduction to Youth	Meaning and characteristics of youth, demographic profile of youth in India, Challenges faced by Youth, Youth's roles and responsibilities in society	2
2.	Youth Culture	Concept of Youth Culture, role of Popular culture in shaping youth culture,	2
3.	Perspectives on Youth Culture	Functionalist, Conflict, Interactionist and Feminist Perspective on Youth Culture, Youth and Gender	3

4.	Youth and Identity	Social divisions: sexuality, urban and rural youth, social identities: subcultural, digital, Experiences of youth to negotiate identities in contemporary societies	6
5.	Socialization of Youth	Concept and processs of socialization, Internalization of norms, types of socialization, conditions of learning, internalized objects, theories of socialization, stages of socialization, adult socialization, agents of socialization, role of culture in socialization, socialization and cultural differences, importance of socialization, Failure of the socialization process	7
6.	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	involvement of youth in major decision making institutions, Post-modernity and Youth, Youth Unrest	2
	Youth and Youth Culture in 21st century		
		Total number of Lectures	**28**

Evaluation Criteria

Components Maximum Marks
T1 20 (Project based)
T2 20
End Semester Examination 35
TA 25 (Presentation, Assignment, attendance, Quiz and Participation in Tutorial) **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

Course Code	16B1NHS631	**Semester Even**	**Semester 6th Session** 2020 -2021 **Month from January 2021to June 2021**
Course Name	PROJECT MANAGEMENT		
Credits	3	**Contact Hours**	2-1-0

Faculty (Names)	**Coordinator(s)**	Dr. Swati Sharma, Dr. Deepak Verma
	Teacher(s) (Alphabetically)	Dr. Deepak Verma

COURSE OUTCOMES		**COGNITIVE LEVELS**
C304-5.1	Apply the basic concepts of project management such as features, objectives, life cycle, model and management, in a given context	Apply Level (C3)
C304-5.2	Analyze projects and their associated risks by understanding the various theoretical frameworks, non-numerical and numerical models in order to make correct selection decisions	Analyze Level (C4)
C304-5.3	Evaluate the stages of project management and identify and determine correct techniques for planning and scheduling	Evaluate Level (C5)
C304-5.4	Evaluate management processes for budgeting, controlling and terminating projects in order to achieve overall project success	Evaluate Level (C5)

Module No.	Title of the Module	Topics in the Module	No. of Lectures for the module
1.	Project Management: Introduction	Characteristics of project; Life Cycle of Project; Project Model; Project Management as discipline; Contemporary aspects of Project Management	4
2.	Project Selection	Theoretical Models; Non-numeric models; Numeric Models; Financial Models; Project Portfolio process, Significance and applicability of Monte Carlo simulation	6
3.	Project Organization, Manager and Planning	Pure Project organization; Functional Organizations; Mixed organizations; Matrix organizations; Role, Attitudes and Skills of Project Manager, Project Coordination, Systems Integration, Work Breakdown Structure, Linear Responsibility Charts.	4
4.	Risk Management	Theoretical Aspects of risk, Risk Management process, Numeric Techniques, Hillier model,Sensitivity Analysis, Certainty Equivalent approach and Risk adjusted discount rates, Game theory.	4
5.	Project Scheduling and Resource Allocation	Theoretical aspects-Importance, Focus Area-PERT/CPM, AOA and AON charts, Probability Analysis, Gantt Charts, Crashing of Projects- Time and Cost tradeoff, Basics Resource Leveling and Loading.	6
6.	Budgeting, Control and Project Termination	Estimating Project Budgets, Improving the process of cost estimation, Basics, Importance, Purpose of control, Types of Control, Desirable features of Control, Control Systems, Critical Ratio Method, Control of creative activities, Control	4
		of change and scope creep, Why Termination, Types of termination, typical termination activities.	
Total number of Lectures			**28**

Evaluation Criteria

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

Project Based Learning: Students are supposed to form a group (Maximum 5 students in each group) and identify a real-life project. They are supposed to do the in-depth study of this project and assess it in terms and Time, cost, performance and client satisfaction. They are supposed to do the detailed study of project planning, organizing,

scheduling, leading and controlling. They must highlight the various tools and techniques which are used in their chosen project. The project provides understanding to students that how organizations are managing their projects and what is the relevance and appropriate usage of the concepts, tools and techniques that they are studying in this subject. The fundamentals of Project management are very important in today's corporate world and certainly this subject enhances student's employability in every sector.

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.	Meredith, Mantel, Project Management-A Managerial Approach, 10th Edition, Wiley Publications,2017
2.	Timmothy Kloppenborg, Contemporary Project Management, 5th Edition, Cengage Learning, 2017
3.	Harold Kerzner,Project Management: A Systems Approach to Planning, Scheduling, and Controlling,12th Edition,Wiley Publications,2017
4.	Wysocki,R.K., Effective Project Management: Traditional, Agile, Extreme, Hybrid, 8th Edition,Wiley Publications,2018
5.	Vohra, N. D., Quantitative Techniques in Management, 5thEdition, Tata McGraw Hill Publishing Company, 2017

Detailed syllabus
Lecture-wise Breakup

Subject Code	**16B1NHS632**	**Semester: EVEN**	**Semester 6th Session 2020-21 Month from Jan to June**
Subject Name	**COGNITIVE PSYCHOLOGY**		
Credits	**3**	**Contact Hours**	**2-1-0**
Faculty (Names)	**Coordinator(s)**	**Dr. Badri Bajaj**	
	Teacher(s) (Alphabetically)	**Dr. Badri Bajaj**	

COURSE OUTCOMES		**COGNITIVE LEVELS**
C304-4.1	Understand and apply the concepts of cognitive psychology in everyday life	Applying Level (C3)
C304-4.2	Analyze the different models of various cognitive processes	Analyzing Level (C4)
C304-4.3	Evaluate cognitive psychology issues and recommend possible solutions	Evaluating Level (C5)

C304-4.4	Evaluate interventions/solutions for self-development through cognitive processes	Evaluating Level (C5)

Module No.	**Subtitle of the Module**	**Topics in the module**	**No. of Lectures for the module**
1.	Introduction to Cognitive Psychology	Historical Background: Emergence of modern cognitive Psychology; Approaches: Information Processing and PDP Model; Research Methods	**3**
3.	Perceptual Processes	Perceptual learning and development; perception of shape, space, and movement.	**4**
3.	Attention	Selective Attention and Divided Attention: Meaning, Definition, and Theories.	**4**
4.	Memory	Short Term Memory	**3**
5.	Imagery	Properties of mental images; Representation of images and cognitive maps.	**3**
6.	Language	Structure of language and its acquisition, speech perception, factors affecting comprehension.	**4**
7.	Thinking and Problem Solving	Types of thinking; Classification of problems; Problems solving approaches, Problems space theory by Newell and Simon, Creativity	**4**
8.	Decision Making	Logical reasoning types and errors in reasoning processes. Concept formation and categorization; Judgment and decision making	**3**
Total number of Hours			**28**

Evaluation Criteria

Components Maximum Marks
T1 20
T2 20
End Semester Examination 35
TA 25 (Project, Assignment, Oral Questions)

Total 100

Project based learning: Students in a group will choose a research topic from the syllabi of cognitive psychology. Students will cover the following points to prepare project reports: Understanding of concept, related theories and perspectives; Describe the relevance of the chosen concept for personal growth; Discuss the application of chosen topic for your professional life; Elaborate the relevance of the topic at group level and societal level. Discussions on these practical aspects will enhance students' understanding & application of concepts of cognitive psychology in everyday life.

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.	Ronald T. Kellogg, Fundamentals of Cognitive Psychology, 2nd Ed., Sage Publishing, 2012
2.	Robert Solso, Otto Maclin, M. Kimberly Maclin, Cognitive Psychology, 8th Ed., Pearson Education, 2013
3.	Kathleen M. Galotti, Cognitive Psychology, 5th Ed., Sage Publishing, 2014
4.	Michael W. Eysenck, Mark T. Keane, Cognitive Psychology: A Student's Handbook , 7th Ed, Psychology Press, 2015
5.	Robert Sternberg, Karin Sternberg, Cognitive Psychology, 6th Ed, Wadsworth/Cengage Learning, 2011
6.	Edward E. Smith, Stephen M. Kosslyn, Cognitive Psychology: Mind and Brain, Ist Ed, Pearson Education India; 2015

Project Based Learning: Students are supposed to form a group (Maximum 5 students in each group) and identify a real-life project. They are supposed to do the in-depth study of this project and assess it in terms and Time, cost, performance and client satisfaction. They are supposed to do the detailed study of project planning, organizing, scheduling, leading and controlling. They must highlight the various tools and techniques which are used in their chosen project. The project provides understanding to students that how organizations are managing their projects and what is the relevance and appropriate usage of the concepts, tools and techniques that they are studying in this subject. The fundamentals of Project management are very important in today's corporate world and certainly this subject enhances student's employability in every sector.

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.	Meredith, Mantel, Project Management-A Managerial Approach, 10th Edition, Wiley Publications,2017
2.	Timmothy Kloppenborg, Contemporary Project Management, 5th t Edition, Cengage Learning, 2017
3.	Harold Kerzner,Project Management: A Systems Approach to Planning, Scheduling, and Controlling,12th Edition,Wiley Publications,2017
4.	Wysocki,R.K., Effective Project Management: Traditional, Agile, Extreme, Hybrid, 8th Edition,Wiley Publications,2018
5.	Vohra, N. D., Quantitative Techniques in Management, 5thEdition, Tata McGraw Hill Publishing Company, 2017

Detailed syllabus
Lecture-wise Breakup

Subject Code	**16B1NHS635**	**Semester: Even**	**Semester: VI Session: 2020 -2021**
Subject Name	**Organizational Behavior**		
Credits	**3**	**Contact Hours**	**3(2-1-0)**
Faculty (Names)	**Coordinator(s)**	**Dr Anshu Banwari**	
	Teacher(s) (Alphabetically)	**Dr Anshu Banwari**	

COURSE OUTCOMES			**TIVE LEVELS**
C304-6.1	Identify dynamic human behavior through an insight into relationships between individuals, groups and organizations		Level (C3)
C304-6.2	Analyze individual management style as it relates to influencing and managing behavior in the organization.		g Level (C4)
C304-6.3	Decide and justify set of strategies for meeting the special challenges in the 21st century competitive workplace		g Level (C5)
C304-6.4	Assess the potential effects of important developments in the external environment on behavior in organizations		g Level (C5)

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

1	Introduction to OB: Challenges and Opportunities	Interdisciplinary Field, Concepts, Approaches, Responding to Globalization; Improving Quality & Productivity; Improving Customer Service; Improving People Skill; Empowering People; Stimulating Innovation & Change; Coping with Temporariness; Positive Organizational Behavior, Working in Networked Organizations; Balancing Work-Life Conflict	3
2	Managing Workforce Diversity	Major forms of Workplace Diversity, Valuing Diversity, Role of Disabilities, Discrimination, Diversity Initiatives, Diversity Awareness and Affirmative Action, Diversity Management and strategies to implement it Competitive Advantage of Diversity Management Generational Workforce	4
3.	Job Design and Flexible Job Environment	Job Design & its uses; Flexible Job Environment; Job Enrichment Model	2

4. Leadership: Inspirational Approach to Leadership: Authentic, Ethical & Authentic Servant Leadership through Defining Authentic Leadership Leadership Intrapersonal, Interpersonal and Developmental Aspects; Basic Model of Authentic Leadership; Practical Approach to Authentic Leadership through the research of Terry and Bill George; Authentic Leadership: Trust and Ethics, Dimensions of Trust, Counseling & Mentoring — 6

5.	Power & Politics	Concept of Power; Sources of Power Contingencies of Power; Power Tactics; Measuring Power Bases: Power Authority Obedience Organizational Politics: Types Factors contributing to Political Behavior; Consequences & Ethics of Politics	5
6.	Employee Engagement	Creating a Culture of Engagement, Models of engagement, Benefits of Employee Engagement, Gallup Study, Methods of engaging employees – from entry to exit, Managers Role in Driving Engagement	2

7.	Organizational Culture & Workplace Spirituality	Creating Organizational Culture Approaches to Organizational Culture; How employees learn culture; Measuring Organizational Culture; Spirituality & Organizational Culture	3
8.	Organizational Change & Development	Organizational Change: Meaning & Types; Technology & Change; Resistance to Change v/s Inviting Change; Approaches to Organizational Change; Planning & Implementing Change; Organizational Development; OD Interventions & Change	3
		Total number of Lectures	**28**

Evaluation Criteria

Components Maximum Marks

T1 20
T2 20
End Semester Examination 35
TA 25 (Assignment, 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.	**S. Robbins, T. Judge, S. Sanghi**, *Organizational Behavior*, 13th Ed, Prentice-Hall India, 2001
2.	**P.Subba Rao**, *Organizational Behavior: Text Cases & Games*, 2nd Edition, Himalaya Publishing House , 2015
3.	**John R. Schermerhorn, Richard N. Osborne, Mary Uhl-Bien; James G. Hunt**, *Organizational Behavior*, 12th Edition, Wiley India Pvt. Ltd, 2012
4.	**Debra L.Nelson and James C. Quick**, *Organizational Behavior*, Cengage Learning, India Edition, 2009
5.	**Steven L. McShane and Mary Ann Von Glinow**, *Organizational Behavior Essentials*, Tata McGraw Hill Publishing Company Ltd, 2007
6.	**Jerald Greenberg**, *Behavior in Organizations*, 10th Ed, PHI Learning Pvt Ltd