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"CELEBRATING DREAMS"

School of Engineering & Technology
BOS Minutes

ITM UNIVERSITY
GWALIOR • MP • INDIA
"CELEBRATING DREAMS"

Department of Civil Engineering

ITM University Gwalior Campus, NH-44, Turari, Gwalior, (M.P.) - 475 001 INDIA
mail: info@itmuniversity.ac.in, web: www.itmuniversity.ac.in

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Department of Civil Engineering

Minutes of BOS Meeting

Date: 14-06-2019

A meeting of Board of Studies of B. Tech Civil Engineering was held on 14th of June 2019 at Conference Room of MG Block, ITM University Gwalior.

The following members were present in the meeting:

Sr. No.	Name	Designation
1	Dr. Ranjeet Singh Tomar	Dean
2	Dr. Mukesh Kumar Pandey	HOD
3	Dr. M. K. Trivedi	Expert
4	Mr. O.P.S. Bhadoria	Member
5	Mr. Sohit Agrawal	Member
6	Mr. Aditya Sharma	Member

The Board of Studies discussed and resolved following points which are recommended further for approval by Academic Council of the University:

1) Approval of minutes of the last BOS meeting held on 23rd June, 2018.
2) Following Courses were added (See Annexure 2 for Syllabus)
   - Introduction to Structural Engineering in II Sem
   - Elementary Design of Structures(RCC) was added in III Sem
   - Elementary Design of Structures(Steel) was added in IV Sem
3) Evaluation of Industrial Training was extended in III semester also
4) Elective Subjects in VII and VIII were increased from 6 – 8 (See Annexure 2 for Syllabus).

Dr. Ranjeet Singh Tomar
Dean

Dr. Mukesh Pandey
Chairman

Dr. M.K. Trivedi
Expert

Mr. Aditya Sharma
Member

Mr. O.P.S. Bhadoria
Member

Mr. Sohit Agrawal
Member

ANNEXURE I

Course Code	Course Name	Semester	Number of topics	Change in the number of topics	Change Percentage	Remarks
CEL0201[T]	Introduction to Structural Engineering	I	46	46	100	Newly Added
CEL0302[T]	Strength of Materials	III	35	0	0	
CEL0303[T]	Concrete Technology	III	50	0	0	
CEL0305[T]	Building and Town Planning					
CEL0313[T]	Highway and Traffic Engineering	III	53	0	0	
CEL0331[T]	Elementary design of structures (RCC)	III	30	30	100	Newly Added
CEL0406[T]	Fluid Mechanics	IV	50	0	0	
CEL0407[T]	Fundamentals of Surveying	IV	58	0	0	
CEL0408[T]	Fundamentals of Geotechnical Engineering	IV	55	0	0	
CEL0409[T]	Basic Methods of Structural Analysis	IV	42	0	0	
CEL0432[T]	Elementary Design of Structures (Steel)	V	20	20	100	Newly Added
CEL0510[T]	Hydraulics & fluid machine	V	80	0	0	
CEL0511[T]	Advanced Surveying	V	45	0	0	
CEL0512[T]	Fundamentals of Structural design(RCC)	V	30	0	0	
CEL0514[T]	Advanced Methods of Structural Analysis	V	20	0	0	
CEL0515[T]	Advanced Geotech Engineering	V	69	0	0	
CEL0617[T]	Basic of Structural Design (Steel)	VI	30	0	0	
CEL0618[T]	Water Resource & Irrigation Engineering	VI	44	0	0	
CEL0619[T]	Advanced Structural Design (RCC)	VI	30	0	0	
CEL0620[T]	Railway, Bridges and tunnel engineering	VI	45	0	0	
CEL0621[T]	Quantity Surveying & Costing	VI	31	0	0	
CEL0723[T]	Advanced Structural Design(Steel)	VII	42	0	0	
CEL0724[T]	Environment Engineering -I	VII	51	0	0	
CEL0725[T]	Introduction to Construction Planning and Management	VII	39	0	0	
CEE0701[T]	MATRIX ANALYSIS OF STRUCTURES	VII	42	0	0	
CEE0702[T]	Advanced Foundation Engineering	VII	51	0	0	
CEE0703[T]	Pavement Design	VII	43	0	0	
CEE0704[T]	Seismic analysis of structures	VII	50	0	0	
CEE0705[T]	Fundamentals of Remote Sensing & GIS	VII	45	0	0	
CEE0706[T]	Fluid Dynamics	VII	46	0	0	
CEE0707[T]	Wastewater Treatment and Recycling	VII	44	44	100	Newly Added
CEE0708[T]	Sustainable Construction Methods	VII	48	48	100	Newly Added
CEL0826[T]	Environment Engineering -II	VIII	48	0	0	
CEL0827[T]	Design of Hydraulic Structures	VIII	50	0	0	
CEE0807[T]	Plastic design of steel structure	VIII	48	0	0	
CEE0808[T]	Building Environment & Services	VIII	45	0	0	
CEE0809[T]	Design of Pre stressed Concrete Structure	VIII	45	0	0	
CEE0810[T]	Traffic Engineering	VIII	48	0	0	

CEE0811[T]	Energy Efficient and Green Building	VIII	47	0	0	
CEE0812[T]	Airport Engineering	VIII	46	0	0	
CEE0813[T]	Solid Waste Management	VIII	52	52	100	Newly Added
CEE0814[T]	Urban Transportation Planning	VIII	42	42	100	Newly Added
	Total Percentage Change				**17.10%**	

Syllabus-2019-2020

(SOET)(BTech-CivilEngineering)

Title of the Course	Industrial Training
Course Code	CED0301(P)

Part A

Year		Semester		Credits	L	T	P	C
					0	0	2	2

Course Type	Lab only		
Course Category	Projects and Internship		
Pre-Requisite/s	subject knowledge of first and second semester .	Co-Requisite/s	
Course Outcomes & Bloom's Level	CO1- Understand the 'real' working environment and get acquainted with the organization structure, business operations and administrative functions(BL2-Understand) CO2- To have hands-on experience in the students' related field so that they can relate and reinforce what has been taught at the university(BL2-Understand) CO3- To promote cooperation and to develop synergetic collaboration between industry and the university in promoting a knowledgeable society(BL3-Apply) CO4- Develop the confidence require for group living and sharing of responsibilities of acquire leadership qualities and democratic attitudes. (BL4-Analyze) CO5- Develop the capacity to meet emergencies and natural disasters and practice national integration and social harmony(BL5-Evaluate)		
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✗ Gender ✗ Human Values ✓ Environment ✗	SDG (Goals)	SDG9(Industry Innovation and Infrastructure) SDG11(Sustainable cities and economies)

Part B

Modules	Contents	Pedagogy	Hours
1	Students have to submit a report on training and give a presentation on his/her experience	Presentation	8

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiment/Field work/ Internships	Bloom's Level	Hours
Module-I	Industrial training has its own importance in a career of a student who is pursuing a professional degree. It is considered as a part of college curriculum. The objective of an industrial training is to provide us an insight regarding internal working of companies. We understand that theoretical knowledge is not enough for a successful professional career. With an aim to go beyond academics, industrial visit provides students a practical perspective of the work place. Industrial trainings provide an opportunity to learn practically through interaction, working methods and employment practices.	Field work	BL3-Apply	40 hrs
Module-II	It gives students an exposure to current work practices as opposed to possibly theoretical knowledge being taught at college. Industrial visits provide an excellent opportunity to interact with industries and know more about industrial environment. Industrial trainings are arranged by TAP cell with an objective of providing us an opportunity to explore different sectors like IT, Manufacturing services, finance and marketing. Industrial visit helps to combine theoretical knowledge with practical knowledge. Industrial realities are opened to the students through industrial visits/trainings.	Field work	BL4-Analyze	40 hrs

Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
	50				

Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	40	40	20	60	

Part E

Books	
Articles	
References Books	
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	0	1	0	2	1	3	2	3	2	0	2	1	1	2
CO2	2	1	0	0	2	1	2	3	3	2	1	2	2	1	1
CO3	2	1	0	0	2	1	3	3	2	2	0	2	2	2	1
CO4	2	0	1	0	2	0	3	2	2	2	0	2	1	2	1
CO5	2	1	0	0	2	1	3	3	3	2	0	2	2	1	1
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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Syllabus-2019-2020

(SOET)(BTech-CivilEngineering)

Title of the Course	Wastewater Treatment and Recycling
Course Code	CEE0707

Part A

Year		Semester		Credits	L	T	P	C
					3	1	0	4
Course Type	Theory only							
Course Category	Discipline Electives							
Pre-Requisite/s			Co-Requisite/s					
Course Outcomes & Bloom's Level	CO1- Integrated waste management issues, collection, recovery, reuse, recycling, energy-from-waste, and landfilling(BL3-Apply) CO2- Analyze & compute the challenges of waste management for smart cities(BL4-Analyze) CO3- Understand the C&D Waste and E-Waste Management(BL2-Understand) CO4- Design the generation rates and waste composition material(BL5-Evaluate) CO5- Perform the role of MSW management within the various initiatives of the Govt. of India including Swachh Bharat Mission, Smart Cities as well as Make in India(BL3-Apply)							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✗ Gender ✓ Human Values ✓ Environment ✓	SDG (Goals)	SDG4(Quality education) SDG6(Clean water and sanitation) SDG11(Sustainable cities and economies)					

Part B

Modules	Contents	Pedagogy	Hours
1	Important terminologies in waste water treatments systems Sludge, aerobic treatments, anaerobic treatments, bioengineering, biosolids, clarifiers, sewers, wetland, retention time, disinfection, influent, effluent, scum, anaerobic digestion, trickling filter, root zone treatment technology	Lectures with problem based learning, experimental learning, case study,	8
2	Sewage and waste water treatments systems: A. Primary treatment methods B. Secondary treatment methods and C. Tertiary treatment methods	Lectures with problem based learning, experimental learning, case study,	8
3	Biotechnological application of hazardous waste management and management of Resources: Use of microbial systems, Waste water treatment using root zone treatment by plants. Reclamation of wasteland: biomass production for Biogas	Lectures with problem based learning, experimental learning, case study,	7
4	Sludge disposal: Sources and effects of sludge on the environment, Methods of sludge disposal	Lectures with problem based learning, experimental learning, case study,	8
5	Wastewater Recycling: Scope and demands; Types and stages of recycling; Recycling requirements; Designated reuse criteria, centralized vs decentralized recycling systems	Lectures with problem based learning, experimental learning, case study,	9

Part C

Modules	Title	Indicative CA/PBL/ Experiment/ Field work/ Internships	Bloom's Level	Hours
1	Development of Natural Filters for clean water	PBL	Bl 5-Evaluate	15 hrs
2	Development of Biogas chamber model	PBL	Bl 5-Evaluate	15 hrs

Part D(Marks Distribution)

Theory

Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	40	60	12	40	0

Practical

Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation

Part E

Books	Biotreatment Systems, Volume II ; D.L. Wise Biodegradation and Bioremediation. Academic Press; 2nd edition Martin Alexander
Articles	https://www.researchgate.net/publication/375376650_The_Treatment_of_Wastewater_Recycling_and_Reuse_-_Past_Present_and_in_the_Future
References Books	Gabriel Bitton (Author) Wastewater Microbiology, 2nd Edition Wiley-Liss; 2nd edition (February 16, 1999)
MOOC Courses	https://onlinecourses.nptel.ac.in/noc21_ce49/preview
Videos	https://www.youtube.com/watch?v=fHRxhuMQQnE

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	3	-	-	2	3	-	-	-	2	2	3	3	3
CO2	3	2	2	-	-	-	3	-	-	-	2	3	2	2	2
CO3	2	2	2	-	-	2	3	-	-	-	3	2	2	2	2
CO4	2	2	3	-	-	1	3	-	-	-	2	3	2	2	2
CO5	3	2	2	-	-	2	3	-	-	-	2	3	3	2	2
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2019-2020

(SOET)(BTech-CivilEngineering)

Title of the Course	Sustainable Construction Methods
Course Code	CEE0708

Part A

Year		**Semester**		**Credits**	L	T	P	C
					3	1	0	4
Course Type	Theory only							
Course Category	Discipline Electives							
Pre-Requisite's				**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** Student will be able to Classify the sustainable construction materials **(BL2-Understand)** **CO2-** Student will be able to Apply cutting-edge construction technologies**(BL3-Apply)** **CO3-** Student will be able to Evaluate different sustainable construction methods**(BL5-Evaluate)** **CO4-** Student will be able to Apply different rating systems in construction/buildings as a professional**(BL3-Apply)** **CO5-** Student will be able to Apply life cycle approach to optimize the performance of green construction materials **(BL3-Apply)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✓	**SDG (Goals)**	SDG11(Sustainable cities and economies)					

Part B

Modules	Contents	Pedagogy	Hours
1	Types of foundations and construction methods. Basics of Formwork and Staging. Common building construction methods (conventional walls and slabs; conventional framed structure with brickwork walls). Modular construction methods for repetitive works	Lectures with problem based learning, experimental learning, case study, field trips	8
2	Precast concrete construction methods. Basics of Slip forming for tall structures. Basic construction methods for steel structures. Basics of construction methods for Bridges	Lectures with problem based learning, experimental learning, case study, field trips	8
3	dentification of cutting-edge sustainable construction materials, technologies, and project management strategies for use in the construction industry and evaluation of their potential to reduce the negative environmental impacts of construction activity	Lectures with problem based learning, experimental learning, case study, field trips	8
4	Study and evaluation of current LEED and GRIHA rating for construction system. Detailed case study and analysis of highly successful recent "green construction projects". Guidance to students for the LEED Green Associate professional licensing examination	Lectures with problem based learning, experimental learning, case study, field trips	8
5	Environmental impact of materials; life cycle assessment; material selection to optimize performance; design, evaluation, and production of green construction materials	Lectures with problem based learning, experimental learning, case study, field trips	8

Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	40	60	12	40	0

Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation

Part E

Books	Rebecca L. Henn; Andrew J. Hoffman (2013), Constructing Green the Social Structures of Sustainability (Urban and Industrial Environments), MIT Press
Articles	https://www.researchgate.net/publication/358582436_A_Study_on_Sustainable_Construction_Practices_and_Management
References Books	Kim S. Elliott, Precast Concrete Structures – 12 June 2019, CRC Press Taylor and Francis
MOOC Courses	https://archive.nptel.ac.in/courses/105/102/105102195/
Videos	https://www.youtube.com/watch?v=LdHMjhaBWxw

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	-	1	2	3	-	-	-	1	2	2	2	2
CO2	3	3	2	-	1	1	1	-	-	-	1	2	2	3	2
CO3	2	2	2	-	-	2	2	-	-	-	2	2	2	2	3
CO4	2	2	2	-	1	2	1	-	-	-	1	1	3	3	3
CO5	3	3	2	-	1	1	2	-	-	-	1	2	3	2	2
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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Syllabus-2019-2020

(SOET)(BTech-CivilEngineering)

Title of the Course	Solid Waste Management
Course Code	CEE0813

Part A

Year		**Semester**		**Credits**	L	T	P	C
					3	1	0	4
Course Type	Theory only							
Course Category	Discipline Electives							
Pre-Requisite/s				**Co-Requisite/s**				
Course Outcomes & Bloom's Level	CO1- Students will Understand the concept of solid waste management(BL2-Understand) CO2- Students will be able to explain handling and processing of solid waste(BL2-Understand) CO3- Students will be able to apply the concept of landfill for disposal of solid waste(BL3-Apply) CO4- Students will be able to design composting and other solid waste conversion units(BL4-Analyze) CO5- Students will understand the various hazardous waste, risk assessment and legislation (BL2-Understand)							
Coures Elements	Skill Development ✓ Entrepreneurship ✗ Employability ✓ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✓		**SDG (Goals)**	SDG6(Clean water and sanitation) SDG11(Sustainable cities and economies)				

Part B

Modules	Contents	Pedagogy	Hours
1	Solid waste: Public health and ecological impacts, Sources and types of solid wastes, material flow and waste generation, Functional elements: Waste generation, storage, collection, Transfer and transport, processing and recovery, disposal. Physical and chemical composition of municipal solid waste, integrated solid waste management, hierarchy of waste management options, different methods for generation rates. Storage: movable bins, fixed bins. Collection: home to home collection, community bin system. Theory and design of hauled container system, stationary container system	Lectures with problem based learning, experimental learning, case study, field trips	8
2	Transportation: handcart, tri-cycle, animal cart, tripper truck, dumper placer, bulk refuse carrier, railroad transport, water transport, conveyors, layout of routes. Engineering system for on-site handling and processing of solid waste: separators, size reduction equipments, screening equipments, densification, baling, cubing, pelletizing equipments	Lectures with problem based learning, experimental learning, case study, field trips	8
3	Land filling: Site selection criteria, landfill layout, landfill sections, Occurrence of gases and leachate in landfill composition and characteristics, generation factors, initial adjustment phase, transition phase, acid formation phase, methane formation phase, maturation phase of gases and leachate. Introduction to engineered landfills	Lectures with problem based learning, experimental learning, case study, field trips	8
4	Composting, types of composting, process description, design and operational consideration of aerobic composting, process description, design and operational consideration of anaerobic composting. Thermal conversion technologies: incineration and pyrolysis system, energy recovery, system. Overview of solid waste management practices in India	Lectures with problem based learning, experimental learning, case study, field trips	8
5	Introduction to Hazardous wastes, Definition of Hazardous waste, The magnitude of the problem; Hazardous waste: Risk assessment, Environmental legislations, Characterization and site assessment, Waste minimization and resource recovery, Transportation of hazardous waste, Disposal of hazardous waste. Introduction to Electronic waste and Biomedical waste and their disposal	Lectures with problem based learning, experimental learning, case study, field trips	8

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiment/Field work/ Internships	Bloom's Level	Hours
Module-I	Comparative study of different filters for water purification	PBL	BL3-Apply	15
Module-II	Project on collection and composting of waste	PBL	BL3-Apply	15

Part D(Marks Distribution)

Theory

Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	40	40	12	60	0

Practical

Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation

Part E

Books	Tchobanoglous, G., Theisen, H., & Vigil, S.A; Integrated Solid Waste Management: McGraw Hill,New York
Articles	https://investmeghalaya.gov.in/resources/homePage/17/mpcb/rules/Solid_Waste_Management_Rules.pdf
References Books	Solid Waste Engineering, Principle & Management issues : Ven Te Chow
MOOC Courses	https://archive.nptel.ac.in/courses/105/103/105103205/
Videos	https://www.youtube.com/watch?v=cjlacnRLHE

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	1	2	-	1	2	-	-	-	1	1	2	2	3
CO2	2	1	1	1	-	1	2	-	-	-	1	1	2	3	2
CO3	2	2	2	1	-	2	2	-	-	-	1	2	2	2	2
CO4	3	3	1	1	-	1	1	-	-	-	1	1	2	2	1
CO5	2	2	1	2	-	2	2	-	-	-	1	2	2	2	3
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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Syllabus-2019-2020

(SOET)(BTech-CivilEngineering)

Title of the Course	Urban Transportation Planning
Course Code	CEE0814

Part A

Year		**Semester**		**Credits**	L	T	P	C
					3	1	0	4
Course Type	Theory only							
Course Category	Discipline Electives							
Pre-Requisite/s				**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** Students will be able to Understand the basic concepts of planning at urban and regional levels(BL2-Understand) **CO2-** Students will be able to Distinguish between the Conventional and current approaches for travel demand estimation(**BL4-Analyze**) **CO3-** Students will be able to Implement various types of models and trip generation(**BL3-Apply**) **CO4-** Students will be able to Analyze the urban travel ma...ts(**BL4-Analyze**) **CO5-** Students will be able to Evaluate the transport plan... proposals(**BL5-Evaluate**)							
Coures Elements	Skill Development ✓ Entrepreneurship ✗ Employability ✓ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✗	**SDG (Goals)**	SDG8(Decent work and economic growth) SDG11(...tainable cities and economies)					

Part B

Modules	Contents	Pedagogy	Hours
1	Introduction to transportation planning, planning concept. Goals, objectives, and Importance of transportation planning. Nature of traffic problems in cities. Present Scenario of road transport and rail transport assets. Role of transportation: Social, Political, Environmental. Transport and Socioeconomic Activities. Historical Development of Transport, Transportation in the Cities, Freight Transportation, Future Developments.	Lectures with problem based learning, experimental learning, case stu[illegible] field trips	8
2	Urban form and Transport patterns, land use – transport cycle, concept of accessibility. Types of transport systems, evolution of transport modes, transport problems and mobility issues. Public Transport. Intermediate Public Transport (IPT) Rapid and mass transport system like MRTS & bus rapid transit. Transport Planning Process, Problem Definition, Solution Generation	Lectures with problem based learning, experimental learning, case stu[illegible] field trips	9
3	Travel demand Estimation and fore casting, trip classification, trip generation: factor and methods, multiple regression analysis. Trip distribution method: modal split, trip assignment	Lectures with problem based learning, experimental learning, case stu[illegible] field trips	8
4	Studying travel behavior. Analyzing urban travel market Traffic and transportation surveys and studies Traffic and travel characteristics, urban transport planning process – stages, study area, zoning. Database	Lectures with problem based learning, experimental learning, case stu[illegible] field trips	9
5	Evaluation of transport planning proposals: Land Use Transport Planning, Economic Evaluation method like Net present Value methods, and Benefit cost method. Transport system management Long-term and short-term planning	Lectures with problem based learning, experimental learning, case stu[illegible] field trips	8

Part C

Modules	Title	Indicative-/ABCA/PBL/ Experiment/ Field work/ Internships	Bloom's Level	Hours
1	Traffic Survey of National Highways	PBL	BL4-Analyze	15
2	Parking Planning for given vehicles	PBL	BL4-Analyze	15

Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	40	40	12	60	0

Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation

Part E

Books	Metropolitan Transportation planning-J.W. Dickey
Articles	https://www.tandfonline.com/journals/rupt20
References Books	Hutchinson B.G.(1974).Principles of Urban Transport Systems Planning. Mc Graw Hill Book Company, New York
MOOC Courses	https://archive.nptel.ac.in/courses/105/105/105105208/
Videos	https://www.youtube.com/watch?v=pW-Qymxabsc

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	3	2	2	1	-	-	-	-	2	2	2	2	3
CO2	2	2	2	3	2	1	-	-	-	-	2	1	2	1	2
CO3	3	2	2	2	2	1	-	-	-	-	2	2	2	1	1
CO4	3	2	2	3	1	1	-	-	-	-	1	1	2	2	2
CO5	2	3	2	2	1	1	-	-	-	-	2	2	1	1	2
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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Syllabus-2019-2020

(SOET)(BTech-CivilEngineering)

Title of the Course	Introduction to Structural Engineering
Course Code	CEL0201[T]

Part A

Year		**Semester**		**Credits**	L	T	P	C
					0	1	1	2
Course Type	Embedded theory and lab							
Course Category	Discipline Core							
Pre-Requisite/s	Students must know about various elements and basics of materials		**Co-Requisite/s**					
Course Outcomes & Bloom's Level	CO1- Students will get knowledge of Basic Civil Engineering(BL1-Remember) CO2- To understand the Soil properties, Building elements, integeration of Techniques(BL2-Understand) CO3- Students are able to apply knowledge of surveying in field(BL3-Apply) CO4- To Analyse the different Plannings of building(BL4-Analyze) CO5- To evaluate the behavior and Structural failure & construcional issues(BL4-Analyze) CO6- To Complete Determination of Layouts (BL3-Appl,)							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✗	**SDG (Goals)**	SDG11(Sustainable cities and economies)					

Part B

Modules	Contents	Pedagogy	Hours
1	Introduction of soil, Preliminary definition and relationships, determination of index properties, classification of soils, soil structure and clay mineralogy, bearing capacity, shear strength,	Experimental learning , case study ,field trips	8
2	Introduction of surveying. Principle of surveying. Reconnaissance, types of surveying, different types of map. Methods of linear measurements, Conventional symbols. Area calculation,	Experimental learning , case study ,field trips	9
3	Drawing of Building Elements, Drawing of various elements of buildings like different types of door, windows, Lintels, arches, staircase, floors and roofs, Building Planning, Principles of Layout,	Experimental learning , case study ,field trips	9
4	Introduction, properties, grades, advantages & disadvantages of concrete. Ingredients of concrete, types of cement, aggregates, water, admixtures, Inspection & testing of materials as per Indian Standard Specifications, bricks, types of bond, Admixtures and Chemicals in Concrete	Experimental learning , case study ,field trips	9
5	Structural integrity, Physical and ;performance failure, fatigue failures, failure due to defective materials, failure due to manufacturing errors, failure due to natural disasters,	Experimental learning , case study ,field trips	8

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments Field work/ Internships	Bloom's Level	Hours
1	Sieve Analysis of Fine Aggregates	Experiments	BL3-Apply	2
2	Sieve Analysis of Course Aggregates	Experiments	BL3-Apply	2
3	To range the chain line of 40 to 60m	Experiments	BL3-Apply	2
4	Reconnaissance Survey for Index Sketch	Experiments	BL3-Apply	2
5	Drawing of Bars in Beams	Experiments	BL2-Understand	2
6	Drawing of Bars in Columns	Experiments	BL2-Understand	2
7	Specific Surface of Aggregate	Experiments	BL3-Apply	2
8	Samplings of Soil	Experiments	BL3-Apply	2

Part D(Marks Distribution)

Theory

Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	40	40	20	60	0

Practical

Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	40	60	30	40	0

Part E

Books	Bhavikatti S.S, Basics Civil Engineering, New Age International Publishers
Articles	
References Books	Bansal R K, Basic Civil Engineering and Engineering Mechanics, Laxmi Publication
MOOC Courses	https://nptel.ac.in/courses/105106201
Videos	https://www.youtube.com/watch?v=CsKddkqgwVk&list=PL[illegible]SpQzTE6M_SM0Lmzk2dJFwEIh0Ebhu

Course Articulation Matrix

Os	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	2	2	2	1	-	-	-	2	2	-	3	2	2
CO2	2	2	1	-	-	2	-	-	-	1	-	2	2	2	2
CO3	2	1	3	1	2	-	-	-	-	2	-	-	-	2	-
CO4	1	2	2	3	-	1	-	-	1	1	1	2	3	2	-
CO5	2	1	1	-	2	-	1	-	-	2	-	-	1	2	1
CO6	1	1	-	1	1	-	-	-	-	2	2	-	2	-	1

ITM UNIVERSITY

Syllabus-2019-2020

(SOET)(BTech-CivilEngineering)

Title of the Course	Elementary design of structures (RCC)
Course Code	CEL0331[T]

Part A

Year		**Semester**		**Credits**	L	T	P	C
					3	0	1	4
Course Type	Embedded theory and lab							
Course Category	Discipline Core							
Pre-Requisite/s	Basics of Materials Properties and Knowledge of Mechanics		**Co-Requisite/s**					
Course Outcomes & Bloom's Level	CO1- Students will be able to get knowledge about Structural Members(BL1-Remember) CO2- To introduce the knowledge of Beams and Slab Designs(BL2-Understand) CO3- Students are able to understand yield Line theory of slabs(BL2-Understand) CO4- To analyze the concept of Soft Storey(BL4-Analyze) CO5- To Apply Code Provision in designing methods(BL3-Apply) CO6- To be able to evaluate different basic elements of a building(BL4-Analyze)							
Couros Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✗	**SDG (Goals)**	SDG11(Sustainable cities and economies)					

Part B

Modules	Contents	Pedagogy	Hours
1	Basic Principles of Structural Design : Assumptions, Various properties of concrete and reinforcing steel, Introduction to working stress method and limit state methods of design, partial safety factor for load and material, advantages of RCC construction.	Experimental learning , case study ,field trips,problem based learning	10
2	Introduction & Design of Beams: Singly & Doubly reinforced sections	Experimental learning , case study ,field trips,problem based learning	8
3	Design of Slabs: One way slab, Two way slab	Experimental learning , case study ,field trips,problem based learning	8
4	Concept of Soft Storey: Mechanism of load transfer in soft storey, Stiffness and Stability criteria, Design problems	Experimental learning , case study ,field trips,problem based learning	8
5	Design and drawing details of the various RCC structures, Discussion of Codal provisions of IS 456-2000, SP-16.	Experimental learning , case study ,field trips,problem based learning	10

Part C

Modules	Title	Indicative-ACA/PBL/ Experiments/ Field work/ Internships	Bloom's Level	Hours
1	Patterns of Reinforcements in Beams	Experiments	BL3-Apply	2
2	Patterns of Reinforcements in Columns	Experiments	BL3-Apply	2
3	Patterns of Reinforcements in Slabs	Experiments	BL3-Apply	2
4	Types of Beams	Experiments	BL2-Understand	2
5	Types of Columns	Experiments	BL2-Understand	2
6	Types of Slab	Experiments	BL2-Understand	2
7	Drawings of Beams in AutoCad	Experiments	BL4-Analyze	2
8	Drawings of Columns in AutoCad	Experiments	BL4-Analyze	2

Part D(Marks Distribution)

Theory

Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	40	40	12	60	

Practical

Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	40	40	20	60	

Part E

Books	1. B.C. Punmia Ashok Kumar Jain, RCC Designs, Laxmi Publication 2. A.K. Jain, Reinforced Concrete: Limit State Design, New Chand & Brothers
Articles	https://www.google.co.in/books/edition/Reinforced_Concrete_Structures_Vol_I/6g1fu4pRDCkC?hl=en&gbpv=1&dq=design+of+rcc+structures&printsec=frontcover
References Books	N.Krishnaraju, Design of R.C structures, CBS Publishers and distributors
MOOC Courses	https://nptel.ac.in/courses/105105104
Videos	https://www.youtube.com/watch?v=x2_W127EFrU&list=PLbMYxoCh9TZk49Yx84IbpJeYfe87Kt69I

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	-	-	-	2	2	-	-	3	3	-	-	2	3	2
CO2	1	-	1	1	1	2	-	-	2	3	-	-	3	2	2
CO3	-	-	2	1	-	-	-	-	2	1	-	-	3	2	2
CO4	-	-	2	3	1	-	-	-	-	-	-	-	3	2	2
CO5	-	1	-	2	1	-	-	-	-	-	-	-	3	1	2
CO6	-	1	-	2	2	2	-	-	2	-	-	-	2	2	1

Part C

Modules	Title	Indicative CA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	Analysis of different compressive strength of column for different sizes	PBL	BL4-Analyze	3
2	Tensile structure using steel chord connections	PBL	BL6-Create	-

Part D(Marks Distribution)

Theory

Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	40	40	12	60	

Practical

Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	40	40	12	60	

Part E

Books	S.K Duggal, Steel Structure, T.M.H Publication
Articles	https://pdfcoffee.com/design-of-steel-structure-3rd-edition-s-k-duggal-4-pdf-free.html
References Books	S.S. Bhavikatti, Design of Steel Structure, Vikas Publication
MOOC Courses	https://www.my-mooc.com/en/mooc/introduction-steel-technology-steel101x-1/
Videos	https://www.youtube.com/watch?v=_sG6L8Abfss

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	-	-	2	2	-	-	3	3	-	-	3	-	1
CO2	3	3	1	2	-	2	-	-	2	3	-	-	2	2	1
CO3	2	2	2	-	-	-	-	-	2	1	-	-	1	-	1
CO4	1	1	2	3	1	-	-	-	-	-	-	-	2	-	1
CO5	1	1	1	2	1	-	-	-	-	-	-	-	2	-	2
CO6	-	-	-	-	-	-	-	-	2	2	-	-	1	2	1

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Department of Electronics & Communication Engineering

ITM University Gwalior Campus, NH-44, Turari, Gwalior, (M.P.) - 475 001 INDIA
mail: info@itmuniversity.ac.in, web: www.itmuniversity.ac.in

Department of Electronics & Communication Engineering, School of Engineering & Technology (SOET)
ITM University, Gwalior Session
2019-2020

Board of Studies Meeting Attendance

Date: 18/07/2019
Venue: Conference Room, MG Block, ITM University, Gwalior
Attendance List:

S. No.	Name	Designation	Signature
1.	Dr. Ranjeet Singh Tomar	HOD and Chairman BOS	
2.	Prof. Geetam Singh Tomar	Expert, Director, REC Sonbhadra U.P.	
3.	Dr. Shyam Akashe	Dean Research, Member	
4.	Dr. Sadhana Mishra	Assistant Professor, Member	18/07/19
5.	Mr. Shailendra Ojha	Assistant Professor, Member	
6.	Mr. Ashish Garg	Assistant Professor, Member	
7.	Mr. Mayank Sharma	Assistant Professor, Member	
8.	Mr. Bhupendra Dhakad	Assistant Professor, Member	
9.	Dr. Manish Sharma	Professor and COE, Invitee Member	
10.	Dr. Mukesh Kumar Pandey	Professor and HOD Civil Engineering, Invitee Member	

Head and Chairman BOS
Department of Electronics & Communication Engineering
School of Engineering & Technology
ITM University Gwalior (M.P.)

Head of Department
Electronics & Communication Engg.
ITM University
Gwalior (M.P.)

Department of Electronics & Communication Engineering, School of Engineering & Technology (SOET)
ITM University, Gwalior
Session 2019-2020

Minutes of the Board of Studies Meeting

Date: 18/07/2019
Venue: Conference Room, MG Block, ITM University, Gwalior

Agenda:

1. Approval of the Scheme of Examination for B. Tech. (I Semester to VIII Semester) for the batch 2019.
2. Approval of the Syllabi for B. Tech. (I Semester to VIII Semester) for the batch 2019.
3. Review of Syllabi for B. Tech. Electronics & Communication Engineering for the batches 2018, 2017, 2016.
4. Approval of new courses as Mandatory, Open Elective, & Program Elective courses.
5. Approval of revisions proposed in existing courses.

Attendees:

S. No.	Name	Designation
1.	Dr. Ranjeet Singh Tomar	HOD and Chairman BOS
2.	Prof. Geetam Singh Tomar	Expert, Director, REC Sonbhadra U.P.
3.	Dr. Shyam Akashe	Dean Research, Member
4.	Dr. Sadhana Mishra	Assistant Professor, Member
5.	Mr. Shailendra Ojha	Assistant Professor, Member
6.	Mr. Ashish Garg	Assistant Professor, Member
7.	Mr. Mayank Sharma	Assistant Professor, Member
8.	Mr. Bhupendra Dhakad	Assistant Professor, Member

9.	Dr. Manish Sharma	Professor and COE Invitee Member
10.	Dr. Mukesh Pandey	Invitee Member, Professor and HOD Civil Engineering

Decisions Taken:

1. **Approval of Examination Schemes:**
   - Approved the examination schemes for B. Tech. Electronics & Communication Engineering (I Semester to VIII Semester) for the batch 2019.
2. **Approval of Syllabi:**
   - Approved the syllabi for B. Tech. Electronics & Communication Engineering I to VIII Semester for the batch 2019.
3. The minutes of the previous BOS meeting held on July 06, 2018, were reviewed and approved
4. **Review and Approval of Syllabi:**
   - Reviewed and approved the syllabi of following:
   - B. Tech. / B. Tech. (Honors)
   - B. Tech. + M. Tech. (Integrated) / B. Tech. + MBA (Integrated)
   - M. Tech. (Communication Systems) / M. Tech. (VLSI Design)
5. Approval of New Cutting edge Technology Courses as per requirement of Industry interface:
   - Courses related to IoT, Sensors, Machine Learning, Cloud Computing etc. are introduced from the year 2019 to bridge the gap between academics and industry requirement as per suggestions received from the experts in the meeting.

S. No.	Newly added course Name and Code	Course Code	Semester
1.	Principles of Sensors & IoT	ECL0201[T]	II
2.	Architecture of Smart IoT Devices	ECL0304[T]	III
3.	Evaluation of Industrial Training-I	ECD0301[P]	III
4.	Wireless Sensor Networks & IoT	ECL0460[T]	IV
5.	Evaluation of Industrial Training-II	ECD0502[P]	V
6.	Machine Learning	ECL0662[T]	VI

6. **Approval of Elective Courses as:**

S. No.	Newly added Elective Courses	Course Code	Semester
1.	Micro Electro Mechanical System (MEMS)	ECO0665[T]	VI
2.	Web Technologies	ECO0701B [T]	VII
3.	IoT Data Analytics	ECO0763 [T]	VII
4.	Nano electronics	ECE0736[T]	VII
5.	Intellectual Property Rights	ECO0701C[T]	VII
6.	Cloud Computing	ECE0764[T]	VII
7.	Industrial Electronics	ECO0829[T]	VIII
8.	Soft Computing	ECO0840 [T]	VIII

7. **Approval of Revisions:**
   - No revisions in the other existing courses are carried out for the year 2019.
   - The total curriculum change amounts to approximately 24.14% due to the introduction of new and elective courses. This percentage is derived from the fact that out of 58 courses offered in 2019, 14 were newly proposed, focusing on cutting-edge technology and elective options.
8. **Recommendation:**
   - The Board of Studies recommended the discussed points for further approval by the Academic Council of the University.

Note: Annexure 1 is containing syllabus of new courses introduced for the year 2019

Prof.(DR.) Ranjeet Singh Tomar
Head of Department
Electronics & Communication Engg.
ITM University
Gwalior (M.P.)
Head and Chairman BOS
Department of Electronics & Communication Engineering
School of Engineering & Technology
ITM University Gwalior (MP)

Annexure 1: Syllabus of all the new courses

Syllabus-2019-2020

(SOET)(BTech-Electronics_and_Communication)

Title of the Course	Evaluation of Industrial Training-I
Course Code	ECD0301[P]

Part A

Year		**Semester**		**Credits**	L	T	P	C
					0	0	2	2
Course Type	Lab only							
Course Category	Internships							
Pre-Requisite/s	Basic theoretical knowledge of electronics and communication.			**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** Apply theoretical knowledge from coursework to solve real-world industry problems. (e.g., utilize marketing principles to develop a campaign for a local business) **(BL1-Remember)** **CO2-** Demonstrate proficiency in industry-standard tools and technologies relevant to the internship field. (e.g., use design software to create graphics for a company website) **(BL2-Understand)** **CO3-** Analyze and interpret data collected during the internship experience. (e.g., analyze customer feedback to improve product design).**(BL3-Apply)** **CO4-** Enhance critical thinking skills by analyzing and evaluating the outcomes of assigned projects or tasks.**(BL4-Analyze)** **CO5-** Compile a comprehensive report documenting the learning experiences, challenges, and achievements during the internship period.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕	**SDG (Goals)**						

Part B

Modules	Contents	Pedagogy	Hours

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	Learning of how to do team work, collaboration with others and learning of insight regarding the internal working atmosphere of companies.	Internships	BL2-Understand	15
2	Learning of how to use the theoretical knowledge for solving the industry problem.	Internships	BL3-Apply	15
3	Development of communication skill, managerial skill and exposure to current work practices as opposed to possibly theoretical knowledge being taught at college.	Internships	BL4-Analyze	15
4	Adapting to evolving business cultures, new methods and technologies, services, technical interface.	Internships	BL4-Analyze	15
5	Learning of how to make industrial training reports and presentation of the reports.	Internships	BL5-Evaluate	20

Dr. Sadhana Mishra. Ashish Garg S.S. Ojha Bhupendra Dhakad. Mayank Sharma

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	50	40	20	60	

Part E

Books	
Articles	
References Books	
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	-	-	-	-	-	-	-	-	2	-	-	-	-	3
CO2	1	2	1	2	1	-	-	-	-	2	-	-	-	-	3
CO3	1	2	2	2	2	-	-	-	-	-	-	-	-	-	2
CO4	1	2	2	-	2	-	-	-	-	-	-	-	-	-	-
CO5	1	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Dr. Sadhana Mishra.

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Syllabus-2019-2020

(SOET)(BTech-Electronics_and_Communication)

Title of the Course	Evaluation of Industrial Training-II
Course Code	ECD0502[P]

Part A

Year		**Semester**		**Credits**	L	T	P	C
					0	0	2	2
Course Type	Lab only							
Course Category	Internships							
Pre-Requisite/s	Basic theoretical knowledge of electronics and communication.			**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** Apply theoretical knowledge from coursework to solve real-world industry problems. (e.g., utilize marketing principles to develop a campaign for a local business) **(BL1-Remember)** **CO2-** Demonstrate proficiency in industry-standard tools and technologies relevant to the internship field. (e.g., use design software to create graphics for a company website) **(BL2-Understand)** **CO3-** Analyze and interpret data collected during the internship experience. (e.g., analyze customer feedback to improve product design)**(BL3-Apply)** **CO4-** Enhance critical thinking skills by analyzing and evaluating the outcomes of assigned projects or tasks.**(BL4-Analyze)** **CO5-** Compile a comprehensive report documenting the learning experiences, challenges, and achievements during the internship period.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕	**SDG (Goals)**						

Part B

Modules	Contents	Pedagogy	Hours

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	Learning of how to do team work, collaboration with others and learning of insight regarding the internal working atmosphere of companies.	Internships	BL2-Understand	15
2	Learning of how to use the theoretical knowledge for solving the industry problem.	Internships	BL3-Apply	15
3	Development of communication skill, managerial skill and exposure to current work practices as opposed to possibly theoretical knowledge being taught at college.	Internships	BL4-Analyze	15
4	Adapting to evolving business cultures, new methods and technologies, services, technical interface.	Internships	BL4-Analyze	15
5	Learning of how to make industrial training reports and presentation of the reports and training.	Internships	BL5-Evaluate	20

Dr. Sadhana Mishra.

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	50	40	20	60	

Part E

Books	
Articles	
References Books	
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	-	-	-	-	-	-	-	-	2	-	-	-	-	2
CO2	1	2	1	2	-	-	-	-	-	2	-	-	-	-	3
CO3	1	2	2	2	-	-	-	-	-	-	-	-	-	-	3
CO4	1	2	2	3	-	-	-	-	-	-	-	-	-	-	2
CO5	1	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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Syllabus-2019-2020

(SOET)(BTech-Electronics_and_Communication)

Title of the Course	Micro Electro Mechanical System (MEMS)
Course Code	ECE0665[T]

Part A

Year		**Semester**		**Credits**	L	T	P	C
					3	1	0	4
Course Type	Theory only							
Course Category	Discipline Electives							
Pre-Requisite/s				**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** Remember the operation of micro devices, micro systems and their applications **(BL1-Remember)** **CO2-** Understand the micro electro mechanical system concept **(BL2-Understand)** **CO3-** Apply scaling laws that are used extensively in the conceptual design of micro devices and systems Choose a micromachining technique, such as bulk micromachining and surface micromachining for a specific MEMS fabrication process **(BL3-Apply)** **CO4-** Analysis the concept of sensor, actuator and mems device **(BL4-Analyze)** **CO5-** Simplify and Evaluate the design of micro devices, micro systems using the MEMS fabrication process **(BL5-Evaluate)**							
Coures Elements	Skill Development ✕ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG9(Industry Innovation and Infrastructure)				

Part B

Modules	Contents	Pedagogy	Hours
1	Overview of MEMS and Microsystems: MEMS and Microsystem, Typical MEMS and Microsystems Products, Evolution of Microfabrication, Microsystems and Microelectronics, Multidisciplinary Nature of Microsystems, Miniaturization. Applications and Markets.	Lecture Method/ Case Study/ Video/ Group Discussion	12
2	Working Principles of Microsystems: Introduction, Microsensors, Micro actuation, MEMS with Micro actuators, Micro accelerometers, Microfluidics. Engineering Science for Microsystems Design and Fabrication: Introduction, Molecular Theory of Matter and Inter-molecular Forces, Plasma Physics, Electrochemistry	ecture Method/ Case Study/ Video/ Group Discussion	12
3	Engineering Mechanics for Microsystems Design: Introduction, Static Bending of Thin Plates, Mechanical Vibration, Thermo mechanics, Fracture Mechanics, Thin Film Mechanics, Overview on Finite Element Stress Analysis	ecture Method/ Case Study/ Video/ Group Discussion	12
4	Scaling Laws in Miniaturization: Introduction, Scaling in Geometry, Scaling in Rigid-Body Dynamics, Scaling in Electrostatic Forces, Scaling in Fluid Mechanics, Scaling in Heat Transfer	ecture Method/ Case Study/ Video/ Group Discussion	10
5	Overview of Micromanufacturing: Introduction, Bulk Micromanufacturing, Surface Micromachining, The LIGA Process, Summary on Micromanufacturing	ecture Method/ Case Study/ Video/ Group Discussion	10

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	40	40	12	60	28
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**

Part E

Books	1) Tai-Ran Hsu, MEMS and Micro systems: Design,2nd Ed, Wiley Manufacture and Nanoscale Engineering,
Articles	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8875460/
References Books	1) Hans H. Gatzen,Volker Saile, JurgLeuthold,Micro and Nano Fabrication: Tools and Processes,Springer, 2015. 2)Dilip Kumar Bhattacharya, Brajesh Kumar Kaushik,, Microelectromechanical Systems (MEMS), Cengage Learning.
MOOC Courses	https://www-cloudfront-alias.coursera.org/learn/pressure-force-motion-humidity-sensors?specialization=embedding-sensors-motors
Videos	https://nptel.ac.in/courses/117105082

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	1	1	-	-	-	-	-	-	-	-	1	-	1	-
CO2	1	1	2	-	-	-	-	-	-	-	-	1	-	1	-
CO3	2	2	1	-	-	-	-	-	-	-	-	1	-	2	-
CO4	2	1	1	-	-	-	-	-	-	-	-	1	-	2	-
CO5	1	3	2	-	-	-	-	-	-	-	-	2	-	3	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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Syllabus-2019-2020

(SOET)(BTech-Electronics_and_Communication)

Title of the Course	IoT Data Analytics
Course Code	ECE0763 [T]

Part A

Year		**Semester**		**Credits**	L	T	P	C
					3	1	0	4
Course Type	Theory only							
Course Category	Open Elective							
Pre-Requisite/s				**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** Be able to understand the concepts and applications of IoT, and understand the core problems (e.g., networking, sensing) for building IoT systems **(BL1-Remember)** **CO2-** Be able to understand and manage the knowledge of models and principles and compare the performance of key techniques for IoT data analytics**(BL2-Understand)** **CO3-** Apply statistical methods to develop and evaluate the models. **(BL3-Apply)** **CO4-** Analysis the data collected from different applications. **(BL4-Analyze)** **CO5-** Evaluate statistical methods in EDA. **(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕	**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger)					

Part B

Modules	Contents	Pedagogy	Hours
I	INTRODUCTION : Introduction to Data Science – Evolution of Data Science – Data Science Roles – Stages in a Data Science Project – Applications of Data Science in various fields – Data Security Issues	Lecture Method/Video Clips/Group Discussion	10
II	DATA COLLECTION AND PRE-PROCESSING: Data Collection Strategies – Data Pre-Processing Overview – Data Cleaning – Data Integration and Transformation – Data Reduction – Data Discretization.	Lecture Method/Video	10
III	EXPLORATORY DATA ANALYTICS: Descriptive Statistics – Mean, Standard Deviation, Skewness and Kurtosis – Box Plots – Pivot Table – Heat Map – Correlation Statistics – ANOVA.	Lecture Method/Video	10
IV	MODEL DEVELOPMENT: Simple and Multiple Regression – Model Evaluation using Visualization – Residual Plot – Distribution Plot – Polynomial Regression and Pipelines – Measures for In-sample Evaluation – Prediction and Decision Making.	Lecture Method/Video Clips/Group Discussion	10
V	MODEL EVALUATION: Generalization Error – Out-of-Sample Evaluation Metrics – Cross Validation – Overfitting – Under Fitting and Model Selection – Prediction by using Ridge Regression – Testing Multiple Parameters by using Grid Search.	Lecture Method/Video	10

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
2-4	Real time collected Data preprocessing	PBL	BL4-Analyze	20

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	40	40	12	60	
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**

Part E

Books	Jojo Moolayil Smarter Decisions: The Intersection of IoT and Data Science SAE Publication Iqbal Hussein Electric and Hybrid Vehicles: Design Fundamentals CRC Press, 2003
Articles	Al-Ali, A. R., et al. "Role of IoT technologies in big data management systems: A review and Smart Grid case study." Pervasive and Mobile Computing (2024): 101905.
References Books	Cathy O'Neil and Rachel Schutt Doing Data Science O'Reilly , 2015 David Dietrich, Barry Heller, Beibei Yang Toney Weir Data Science and Big data Analytics EMC 2013
MOOC Courses	https://www.udemy.com/course/iot-data-analytics/?couponCode=24T3MT53024
Videos	https://www.youtube.com/watch?v=JIi_jUvVAHw

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	-	1	-	1	-	-	-	-	-	-	-	1	-	1
CO2	2	-	1	1	-	-	-	-	-	-	-	-	-	1	-
CO3	-	2	-	2	-	-	-	-	-	-	-	-	1	-	1
CO4	1	2	-	-	1	-	-	-	-	-	-	-	-	2	-
CO5	1	-	1	-	2	-	-	-	-	-	-	-	-	-	2
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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CELEBRATING DREAMS

Syllabus-2019-2020

(SOET)(BTech-Electronics_and_Communication)

Title of the Course	Cloud Computing
Course Code	ECE0764[T]

Part A

Year		**Semester**		**Credits**	L	T	P	C
					3	1	0	4
Course Type	Theory only							
Course Category	Discipline Electives							
Pre-Requisite/s				**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** To provide students with the fundamentals and essentials of Cloud Computing.**(BL1-Remember)** **CO2-** To provide sound foundation to compare the advantages and disadvantages of various cloud computing platforms to start using cloud computing services in their real life.**(BL2-Understand)** **CO3-** To apply the fundamental concepts in datacenters to understand the tradeoffs in power, efficiency and cost. Identify resource management fundamentals**(BL3-Apply)** **CO4-** Program data intensive parallel applications in the cloud. i. e. Analyze the performance, scalability, and availability of the underlying cloud technologies and software**(BL4-Analyze)** **CO5-** Deploy applications over commercial cloud computing infrastructures such as Amazon Web Services, Windows Azure, and Google App Engine.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✕ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) SDG4(Quality education)				

Part B

Modules	Contents	Pedagogy	Hours
I	Introduction to Cloud Computing: Overview of Computing, Cloud computing (NIST Model), Properties, Characteristics and disadvantages of Cloud Computing, Role of Open Standards	Lecture Method/Video Clips/Group Discussion	10
II	Cloud Computing Architecture: Cloud Computing Stack, Service Models: Infrastructure aa a Service (IaaS), Platform as a Service (PaaS), Software as a Service (SaaS), Cloud Computing Deployment models: Public, Private, Hybrid	Lecture Method/Video Clips/Group Discussion	10
III	Service Management in Cloud Computing: Service Level Agreement (SLA), Cloud Economics, Resource Management in Cloud Computing	Lecture Method/Video Clips/Group Discussion	10
IV	Data Management in Cloud Computing: Looking at Data, Scalability and Cloud Services, Database and Data Stores in Cloud, Large Scale Data Processing	Lecture Method/Video Clips/Group Discussion	10
V	Cloud Security: Infrastructure Security, Data Security and Storage, Identity and Access Management, Access Control, Trust, Reputation, Risk Research Trends in Cloud Computing, Fog Computing	Lecture Method/Video Clips/Group Discussion	10

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	40	40	12	60	
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**

Part E

Books	Rajkumar Buyya, James Broberg, Andrzej M. Goscinski, Cloud Computing: Principles and Paradigms Wiley,2011
Articles	Dang, L.M.; Piran, M.J.; Han, D.; Min, K.; Moon, H. A Survey on Internet of Things and Cloud Computing for Healthcare. Electronics 2019, 8, 768. https://doi.org/10.3390/electronics8070768
References Books	Barrie Sosinsky, Cloud Computing Bible, John Wiley & Sons, 2010
MOOC Courses	https://onlinecourses.nptel.ac.in/noc21_cs14/preview
Videos	https://www.coursera.org/browse/information-technology/cloud-computing

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	-	-	1	2	-	-	-	-	-	-	-	2	-	-
CO2	-	2	1	2	-	-	-	-	-	-	-	-	-	1	-
CO3	2	1	-	3	-	-	-	-	-	-	-	-	2	-	-
CO4	-	2	1	3	1	-	-	-	-	-	-	-	-	3	-
CO5	1	1	-	-	-	-	-	-	-	-	-	-	-	-	1
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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Syllabus-2019-2020

(SOET)(BTech-Electronics_and_Communication) . .

Title of the Course	Industrial Electronics
Course Code	ECE0829[T]

Part A

Year		**Semester**		**Credits**	L	T	P	C
					3	1	0	4
Course Type	Theory only							
Course Category	Specialization Elective Courses							
Pre-Requisite/s				**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** Learn about the latest electronic devices available in industry**(BL1-Remember)** **CO2-** Be able to understand the functions of power electronics circuit**(BL2-Understand)** **CO3-** Apply critical thinking in solving industrial electronic problems **(BL3-Apply)** **CO4-** Analyze the characteristics of MOSFET, IGBT and UJT**(BL4-Analyze)** **CO5-** To evaluate the performance of various types of circuit**(BL5-Evaluate)**							
Coures Elements	Skill Development ✕ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**					

Part B

Modules	Contents	Pedagogy	Hours
1	Power Supplies Power supply, rectifiers (half wave, full wave), performance parameters of power supplies, filters (capacitor, inductor, inductor-capacitor, pi filter), bleeder resistor, voltage multipliers . Regulated power supplies (series and shunt voltage regulators, fixed and adjustable voltage regulators, current regulator), switched regulator (SMPS), comparison of linear and switched power supply, switch mode converter (flyback, buck, boost, buk-boost, cuk converters)	Lecture Method/ Case Study/ Video/ Group Discussion	12
2	Thyristors Silicon controlled rectifies (SCR), constructional features, principle of operation, SCR terminology, turn-on methods, turn-off methods, triggereing methods of SCR circuits, types of commutation, comparison of thyristors and transistors, thermal characteristics of SCR, causes of damage to SCR, SCR overvoltage protection circuit, seies and parrel operation of sCRs, Line commutated converters (half wave rectifier with inductive and resistive load, single phase and three phase full wave rectifiers)	Lecture Method/ Case Study/ Video/ Group Discussion	12
3	Other members of SCR family Triacs, Diacs, Quadracs, recovery characteristics, fast recovery diodes, power diodes, power transistor, power MOSFET, Insulated gate bipolar transistor (IGBT), loss of power in semiconductor devices, comparison between power MOSFET, power transistor and power IGBT	Lecture Method/ Case Study/ Video/ Group Discussion	12
4	Applications of OP-AMP Basics of OP-AMP, relaxation oscillator, window comparator, Op-comp as rectangular to triangular pulse converter and vice- versa, Wien bridge oscillator, function generator, frequency response of OP-AMP, simplified circuit diagram of OP-AMP, power supplies using OP-AMP, filters (low-pass, high pass) using OP-AMP.	Lecture Method/ Case Study/ Video/ Group Discussion	10
5	Functions, applications, advantages and disadvantages of PLC over conventional relay controllers, comparison of PLC with process control computer system, factors to be considered in selecting PLC, functional block diagram of PLC, microprocessor in PLC, memory, input and output modules (interface cards), sequence of operations in a PLC, status of PLC, event driven device, ladder logic language, simple process control applications of PLC, Programming examples	Lecture Method/ Case Study/ Video/ Group Discussion	10

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	40	40	12	60	
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**

Part E

Books	1) Rehg, James, A., Sartori, Glenn. Industrial Electronics. 5th ed. Upper Saddle River: Prentice Hall. 2006
Articles	https://ieeexplore.ieee.org/xpl/RecentIssue.jsp?punumber=63
References Books	1) Maloney, Timothy. Modern Industrial Electronics, 5th ed.Upper Saddle River: Prentice Hall. 2004
MOOC Courses	https://www.coursera.org/specializations/power-electronics
Videos	https://archive.nptel.ac.in/courses/108/102/108102145/

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3	2	-	-	-	-	-	-	-	-	3	3	-	-
CO2	2	3	2	-	-	-	-	-	-	-	-	3	3	3	-
CO3	2	3	2	-	-	-	-	-	-	-	-	3	3	3	-
CO4	2	3	2	-	-	-	-	-	-	-	-	3	3	3	-
CO5	2	3	2	-	-	-	-	-	-	-	-	3	3	3	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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CELEBRATING DREAMS

Syllabus-2019-2020

(SOET)(BTech-Electronics_and_Communication)

Title of the Course	Digital Image & Video Processing
Course Code	ECE0839[T]

Part A

Year		**Semester**		**Credits**	L	T	P	C
					3	1	0	4
Course Type	Embedded theory and lab							
Course Category	Discipline Electives							
Pre-Requisite/s				**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** To Remember various concept of Image and Video **(BL1-Remember)** **CO2-** Understand the Basic concept of Image processing **(BL3-Apply)** **CO3-** Apply the concept of Digital Image Processing **(BL3-Apply)** **CO4-** Analyze the video technology from analog color TV systems to digital video systems, how video signal is sampled and filtering operations in video processing.**(BL4-Analyze)** **CO5-** Implement and evaluate the image enhancement, edge detection and noise analysis **(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger)				

Part B

Modules	Contents	Pedagogy	Hours
1	Digital Image Fundamentals and Transforms: Elements of visual perception - Image sampling and quantization Basic relationship between pixels -Basic geometric transformations, Introduction to Fourier Transform and DFT Properties of 2D Fourier Transform FFT - Separable Image Transforms -Walsh – Hadamard - Discrete Cosine Transform, Haar , Slant - Karhunen - Loeve transforms	Lecture Method/ Case Study/ Video/ Group Discussion	12
2	Image Enhancement Techniques: Spatial Domain methods: Basic greylevel transformation-Histogram equalization - Image subtraction-image averaging -spatial filtering: Smoothing, sharpening filter, Laplacian filters- Frequency domain filters: Smoothing-Sharpening filters - Homomorphism filtering	Lecture Method/ Case Study/ Video/ Group Discussion	12
3	Image Restoration Model of image degradation / restoration Noise models-inverse filtering, least mean square filtering-constrained, mean square filtering , Blind image restoration-Pseudo inverse Singular value decomposition	Lecture Method/ Case Study/ Video/ Group Discussion	12
4	Image Compression: Lossless compression, Variable length coding- LZW coding Bit plane coding predictive coding-DPCM Lossy Compression, Transform coding Wavelet coding basics of image compression standards: JPEG., MPEG. Basic of Vector quantization Image Segmentation and Representation: Edge detection Thresholding -Region Based Segmentation-Boundary representation chair codes_ Polygonal approximation Boundary segments boundary descriptors Simple descriptors-Fourier descriptors regional descriptors-Simple descriptors- Texture	Lecture Method/ Case Study/ Video/ Group Discussion	10
5	Basic Steps of Video Processing: Analog video, Digital Video, Time varying Image Formation models: 3D motion models, Geometric Image formation, Photometric Image formation, sampling of video signals, filtering operations 2-D Motion Estimation: Optical flow, general methodologies, pixel-based motion estimation, Block matching algorithm, Mesh based motion Estimation, global Motion Estimation, Region based motion estimation, multi resolution motion estimation. Waveform based coding, Block based transform coding, predictive coding, Application of motion estimation in video coding.	Lecture Method/ Case Study/ Video/ Group Discussion	10

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
Unit:2	Image fusion and its separation finger print application on Matlab	PBL	BL4-Analyze	30

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	40	40	12	60	
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**

Part E

Books	1) Digital Signal, Image and Video Processing for Emerging by Byung-Gyu Kim 2)Rafael C. Gonzalez and Richard E. Woods, Digital Image Processing, ", 2nd edition, PHI/Pearson Education, 2002
Articles	Digital-Image-Separation-Algorithm-Based-on-Joint-PDF-of-Mixed-Images.pd https://www.researchgate.net/publication/295179793_Digital_Image_Separation_Algorithm_Based_on_Joint_PDF_of_Mixed_Images/fulltext/56c8e1 Image-Separation-Algorithm-Based-on-Joint-PDF-of-Mixed-Images.pdf
References Books	1) M. Tekalp ,"Digital video Processing", Prentice Hall International 2) A.K.Jain, Fundamentals of Digital Image Processing",1st edition, Prentice Hall India, 1988
MOOC Courses	https://www.coursera.org/courses?query=image%20processing
Videos	https://archive.nptel.ac.in/courses/117/105/117105135/

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	1	2	-	-	-	3	-	-	-	-	1
CO2	-	2	1	-	1	2	-	-	-	3	-	-	-	-	3
CO3	3	2	1	2	-	-	-	-	-	-	-	-	-	-	3
CO4	3	3	1	2	-	-	-	-	-	-	-	-	-	-	3
CO5	2	2	-	1	-	-	-	-	-	-	-	-	-	-	3
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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Syllabus-2019-2020

(SOET)(BTech-Electronics_and_Communication)

Title of the Course	Soft Computing
Course Code	ECE0840 [T]

Part A

Year		**Semester**		**Credits**	L	T	P	C
					3	1	0	4
Course Type	Theory only							
Course Category	Discipline Specific Elective							
Pre-Requisite/s	Basic concepts and applications of soft computing tools such as neural networks, fuzzy logic systems, and several optimization techniques like genetic algorithms, evolutionary computation, simulated annealing etc.			**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** Describe the role of artificial intelligence techniques in real world**(BL1-Remember)** **CO2-** Apply fuzzy logic controller for electrical engineering problem**(BL2-Understand)** **CO3-** Apply different neural network controller for electrical engineering problem**(BL3-Apply)** **CO4-** Apply and compare performance of different optimization techniques for electrical engineering problem**(BL4-Analyze)** **CO5-** Identify and select a suitable Soft Computing technology to solve the problem; construct a Solution and implement a Soft Computing solution**(BL5-Evaluate)**							
Coures Elements	Skill Development ✕ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕	**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger)					

Part B

Modules	Contents	Pedagogy	Hours
1	INTRODUCTION TO SOFT COMPUTING: Concept of computing systems. "Soft" computing versus "Hard" computing, characteristics of Soft computing, Some applications of Soft computing techniques.	Lecture Method / Video/ Group Discussion / Case study	12
2	FUZZY LOGIC: Fuzzy sets, logic operations, and relations; Fuzzy decision-making; fuzzy inference systems; design steps in fuzzy logic controller; application of fuzzy logic controller in Electrical engineering.	Lecture Method / Video/ Group Discussion / Case study	10
3	NEURAL NETWORKS: Basic concepts and major classes of neural networks, supervised and unsupervised learning, Single-layer perceptron, Multi-layer perceptron, Back Propagation Neural network, Recurrent neural networks, support vector machine, Application of neural network modelling / control problems in Electrical engineering	Lecture Method / Video/ Group Discussion / Case study	10
4	OPTIMIZATION TECHNIQUES: Genetic algorithms, Evolutionary Algorithm, Simulated Annealing, Ant colony optimization -Applications to Electrical engineering problems.	Lecture Method / Video/ Group Discussion / Case study	10
5	Genetic Algorithms: Advantages and Limitations of Genetic Algorithm; Applications of Genetic Algorithm; Applications of GA in Machine Learning. Introduction to Hybrid Systems; MATLAB Environment for Soft Computing Techniques.	Lecture Method / Video/ Group Discussion / Case study	10

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	40	40	12	60	
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**

Part E

Books	1. George J.Klir and Bo Yuan, Fuzzy sets and Fuzzy Logic, Second Edition, PHI, 2006 2. J.M.Zurada, Introduction to artificial neural systems, Jaico Publishing House, 2006 3. D.E. Goldberg, Genetic algorithms in search, optimization, and machine learning, Addison-Wesley.
Articles	1. Rao, K. Koteswara, and G. Svp Raju. "An overview on soft computing techniques." International Conference on High Performance Architecture and Grid Computing. Berlin, Heidelberg: Springer Berlin Heidelberg, 2011. 2. Das, Santosh Kumar, et al. "On soft computing techniques in various areas." Comput. Sci. Inf. Technol 3.59 (2013): 166.
References Books	1. S.N.Sivanandam, and S.N.Deepa, Principles of Soft computing, Second Edition, Wiley India Pvt. Ltd, 2013. 2. N.P.Padhy and S.P.Simon, Soft computing with MATLAB programming, Oxford publishers, 2015.
MOOC Courses	https://onlinecourses.nptel.ac.in/noc20_cs17/preview
Videos	https://www.youtube.com/watch?v=6xTmkJM0Yi8&t=2s

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	2	-	-	-	3	-	-	-	-	-
CO2	-	1	1	3	-	2	-	-	-	3	-	-	3	2	2
CO3	-	2	1	2	2	-	-	-	-	-	-	-	3	2	3
CO4	-	2	-	3	-	-	-	-	-	-	-	-	3	-	3
CO5	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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Syllabus-2019-2020

(SOET)(BTech-Electronics_and_Communication)

Title of the Course	Principles of Sensors & IoT
Course Code	ECL0201[T]

Part A

Year		**Semester**		**Credits**	L	T	P	C
					2	1	1	4
Course Type	Embedded theory and lab							
Course Category	Discipline Core							
Pre-Requisite/s				**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** To remember the basic definitions, key terminologies of Sensors, Smart Sensors, & IoT. **(BL1-Remember)** **CO2-** To understand the working principles, concepts, & circuit designs of various sensors.**(BL2-Understand)** **CO3-** To apply that how to make Sensors by using different electronic components, apply an integrated knowledge on the Sensors, work with and interpret the data obtained from various sensor applications**(BL3-Apply)** **CO4-** To analyse various parameters of sensors using simulation or performing experiments on kits.**(BL4-Analyze)** **CO5-** Evaluate performance of sensors & actuators for various applications.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✕ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕	**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) SDG11(Sustainable cities and economies)					

Part B

Modules	Contents	Pedagogy	Hours
1	Introduction to Sensors, Architecture of sensor node, Components of Sensor. Transducers, Sensors classes: analog sensors, digital sensors, scalar sensors, vectored sensors. Different types of sensors: Temperature sensors: Thermocouple- measuring principle and its applications, Resistive temperature detectors (RTD): used materials and construction and its applications. Thermistors: Principle and application. Monolithic Temperature Sensors (IC sensor).	Lecture Method/Audio, Video clip/Group discussion/Field visit	12
2	Semiconductor Sensors: working principle and its applications. Optical Sensors: Photodiodes, Photoresistor, PIN diode, Position Sensitive photo detectors, Pressure sensors. Chemical sensors: Electrochemical sensor, Amperometric and voltammetric sensors, potentiometric sensor, Bio sensors and applications.	Lecture Method/Audio, Video clip/Group discussion/Research/Field visit	12
3	Smart Sensors and Actuators: Architecture of sensor node, Components of Sensor, Participatory Sensing, Wireless sensor motes and its applications: Mica2/MicaZ Motes, TelosB Motes, XM1000 wireless mote, Indriya, IRIS, iSense, Preon32, Wasp Mote, WiSense Mote, panStamp NRG Mote . Actuators: Principle, Types and Examples of Actuators, Sensor Data Communication Protocols.	Lecture Method/Audio, Video clip/Group discussion	12
4	Internet of things (IoT): An Overview: Basics, definition and vision of IOT, IoT Conceptual Framework, IoT Architectural View, Physical Design of IoT, Logical Design of IoT, Applications of IoT. RFID: features, working principle, and applications.	Lecture Method/Audio, Video clip/Group discussion	10
5	Technologies behind IoT: Communication Technologies for IoT: ZigBee, RF links, Bluetooth, Bluetooth 4.0 LE, Wi-Fi, 6LoWPAN, Z-Wave and a comparison. Arduino an Overview: Features of Arduino, Types of Arduino Boards, Arduino IDE, programming setup, Examples. Integration of Sensors and Actuators with Arduino. Basic Architecture of Raspberry pi, Raspberry pi Pin configuration, different functions of Raspberry pi.	Lecture Method//Audio, Video clip/Group discussion/Field visit	10

<4d style="border: 1px solid black;">Experiments

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
4	IOT based Smart specs	PBL	BL6-Create	30
2	smart dustbin based on iot	PBL	BL6-Create	30
1	To familiarize with various sensors such as LM 35 Temperature Sensor, PIR Sensor, Soil Sensor, Thermistor Sensor.	Experiments	BL6-Create	2
1	To study characteristics of Platinum RTD (Resistance Temperature Detector) sensor	Experiments	BL6-Create	2
1	To study Characteristics of NTC Thermistor sensor.	Experiments	BL5-Evaluate	2
1	Study the Characteristics of K Type Thermocouple.	Experiments	BL6-Create	2
1	Study the characteristics of Pressure Transducer/ Sensor.	Experiments	BL6-Create	2
2	To make a touch sensor using 555 Timer IC on Breadboard	BL4-Analyze	2	

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	40	40	12	60	
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	50	40	20	60	

Part E

Books	1) Arshdeep Bahga and Vijay Madisetti Internet of Things – A Hand-on Approach Universities press, 2015 2) Shantanu Bhattacharya, A K Agarwal, Environmental, Chemical and Medical Sensors, Springer Nature Singapore Pvt. Ltd. 2018
Articles	10.1088/978-0-7503-2707-7ch1
References Books	1) Donald Norris, The Internet of Things: Do-It-Yourself at Home Projects for Arduino, Raspberry Pi and Beagle Bone Black, McGraw Hill Publication Raj Kamal, Internet of Things, TMH, New Delhi.
MOOC Courses	https://courses.mooc.fi/org/uh-cs/courses/introduction-to-the-internet-of-things-mooc
Videos	http://www.iot-a.eu/public NPTEL Lectures for Introduction to IoT

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	-	-	-	2	2	-	-	-	3	-	-	3	2	2
CO2	3	1	2	-	1	-	2	1	-	3	-	-	3	3	3
CO3	-	1	3	-	1	-	2	2	-	1	-	3	3	-	2
CO4	1	2	2	-	2	-	-	2	-	-	-	1	-	2	2
CO5	-	-	-	-	1	2	-	-	-	-	-	-	3	-	3
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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CELEBRATING DREAMS

Syllabus-2019-2020

(SOET)(BTech-Electronics_and_Communication)

Title of the Course	Architecturing of Smart IoT Devices
Course Code	ECL0304[T]

Part A

Year		**Semester**		**Credits**	L	T	P	C
					3	1	1	5
Course Type	Embedded theory and lab							
Course Category	Disciplinary Major							
Pre-Requisite/s	To understand the contents and successfully complete this course, a participant must have a basic understanding of Sensors, Actuators, Interfacing of devices, Arduino IDE software and Hardware			**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** To remember the basic definitions, key terminologies of Architecture of IoT, IoT architecture standards, Communication Technologies, Networking Technologies, IoT Protocols. **(BL1-Remember)** **CO2-** To understand the working principles, concepts, & circuit designs of various communication & Networking Technologies for IoT.**(BL2-Understand)** **CO3-** To apply that how to these technologies work with and interpret the data obtained from various IoT applications.**(BL3-Apply)** **CO4-** To analyse various IoT architecture reference models using simulation or performing experiments on IoT builder kit.**(BL4-Analyze)** **CO5-** Evaluate performance of IoT systems for various applications.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✕ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕	**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) SDG4(Quality education) SDG11(Sustainable cities and economies)					

Part B

Modules	Contents	Pedagogy	Hours
I	IoT Architecture Reference Model (ARM): IoT an Overview, Evolution of IoT, Need for ARM, IoT conceptual framework, IoT Architectural view: reference model definition, IoT reference model by CISCO, Oracle's IoT structure, Major components of IoT devices: Physical objects, Hardware, Communication Module, Software, IoT software components for device hardware. Development tools and Open-source Framework for IoT Implementation, Platforms and Integration tools	Lecture Method/Video	12
II	Programming Raspberry Pi: Introduction to Raspberry Pi, Basic Architecture, Pin Configuration, Installation, Interfacing of Sensors, Interfacing of Actuators & Display Devices with Raspberry Pi & Programming concepts.	Lecture Method/Simulation	12
III	IoT Architecture standards: ETSI standard for IoT Architecture: Standards for IoT for Home, Energy, People, motion, City. IoT Communication Architecture: IoT nodes, IoT Edge, 6LOWPAN, IPv4/IPv6, MQTT, SMQTT, CoAP, XMPP, AMQP protocols	Lecture Method	10
IV	M2M Communication M2M Communication, M2M system Architecture: M2M device domain, M2M Network Domain, M2M application Domain, M2M applications, M2M software and development tools, Difference between M2M and IoT.	Lecture Method/Research	10
V	IoT Case studies Cloud computing, cloud computing services, how to send data on cloud platforms like thing speak, Blynk etc. IoT case studies and mini projects based on Industrial automation, Transportation, Agriculture, Healthcare, Home Automation.	Lecture Method/Case Study	10

Part C

Modules	Title	Indicative-ABCA/PBL/. Experiments/Field work/ Internships	Bloom's Level	Hours
1	To study IoT Builder kit & its sub system.	Experiments	BL2-Understand	2
1	To implement a GUI python program to control LED.	Experiments	BL4-Analyze	2
3	To implement a python program to interface DC Motor with IoT Development Kit.	Experiments	BL5-Evaluate	2
2	To interface python program control Stepper motor.	PBL	BL5-Evaluate	2
4	To send & Visualize data on Thing speak cloud Platform using NODE MCU.	PBL	BL5-Evaluate	2
3	Automation projects with data sent to cloud platforms	PBL	BL6-Create	30
5	Smart Healthcare Projects, Smart environment Projects	PBL		

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	40	40	12	60	
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	50	40	20	60	

Part E

Books	Arshdeep Bahga and Vijay Madisetti Internet of Things – A Hand-on Approach Universities press, 2015
Articles	IEEE Standards Association Working Group for an Architectural Framework for the Internet of Things (IoT) (P2413) - http://grouper.ieee.org/groups/2413/
References Books	Donald Norris The Internet of Things: Do-It-Yourself at Home Projects for Arduino, Raspberry Pi and Beagle Bone Black McGraw Hill Publication.
MOOC Courses	https://onlinecourses.nptel.ac.in/noc22_cs53/preview https://www.coursera.org/learn/iot-architecture https://www.coursera.org/learn/raspberry-pi-interface
Videos	http://www.iot-a.eu/public NPTEL Lectures for Introduction to IoT

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	2	-	-	-	3	-	-	-	-	1
CO2	3	2	1	-	-	2	-	-	-	3	-	-	2	-	2
CO3	1	2	1	3	2	-	-	-	-	-	-	-	2	2	2
CO4	1	2	1	3	-	-	-	-	-	-	-	-	3	3	3
CO5	1	2	-	2	-	-	-	-	-	-	-	-	2	3	3
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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Syllabus-2019-2020

(SOET)(BTech-Electronics_and_Communication)

Title of the Course	Wireless Sensor Networks & IoT
Course Code	ECL0460[T]

Part A

Year		**Semester**		**Credits**	L	T	P	C
					3	1	1	5
Course Type	Embedded theory and lab							
Course Category	Disciplinary Major							
Pre-Requisite/s	Knowledge of Architecture of IoT and Communication and Networking Technologies.		**Co-Requisite/s**					
Course Outcomes & Bloom's Level	**CO1-** To remember the basic terminologies of networking, sensor node architecture etc.**(BL1-Remember)** **CO2-** To understand the important functions, concepts, algorithms &types of WSNs, Protocols. **(BL2-Understand)** **CO3-** To apply the knowledge of programming to achieve a specific task/challenge. Gain knowledge about Power Management of WSNs**(BL3-Apply)** **CO4-** To analyse the results by using computer-based tools/kits for engineering applications. Use computer programming tools to process and visualize results**(BL4-Analyze)** **CO5-** To evaluate the applications of WSN in various fields such as research and industries**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕	**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) SDG4(Quality education) SDG11(Sustainable cities and economies)					

Part B

Modules	Contents	Pedagogy	Hours
I	Motivation for a Network of Wireless Sensor Nodes: Definitions and Background - Challenges and Constraints: Energy, Self-Management, Wireless Networking, Decentralized Management, Design Constraints, Security - Applications : Structural Health Monitoring, Traffic Control, Health Care, Pipeline Monitoring, Precision Agriculture, Active Volcano, Underground Mining	Lecture Method/Video/Virtual Lab	12
II	Node Architecture: The Sensing Subsystem, The Processor Subsystem, Communication Interfaces, Prototypes Medium Access Control: Characteristics of MAC Protocols in Sensor Networks, Contention-Free MAC Protocols, Contention-Based MAC Protocols, Hybrid MAC Protocols.	Lecture Method/Video/Virtual Lab	12
III	Network Layer: Routing Metrics, Flooding and Gossiping, Data-Centric Routing, Proactive Routing, On-Demand Routing, Hierarchical Routing, Location-Based Routing, QoS-Based Routing Protocols.	Lecture Method/Video/Virtual LabWhiteboard/PPT	10
IV	IoT with Raspberry pi: Senor motes programming with python on Raspberry pi, Interfacing concepts with python Programming and data cloud concepts with raspberry pi. Remote access of Raspberry pi with Python, Interfacing of sensors & Actuators with Raspberry Pi. Localization: Ranging Techniques, Range-Based Localization, Range-Free Localization, Event-Driven Localization	Lecture Method/Video/Virtual Lab	10
V	Integration of WSN to IoT: Integration approaches – stack-based approaches, topology-based approaches - SCADA network architecture - Security Challenges, Introduction to Simulation Tools of WSN like: NETSIM Simulation, COOJA Simulator, NS2 Simulator. Security: Fundamentals of Network Security, Challenges of Security in Wireless Sensor Networks, Security Attacks in Sensor Networks, Protocols and Mechanisms for Security, Security Protocols for Sensor Networks	Lecture Method/Research/Group Discussion	10

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	To Study Sensor Node Configuration & Different Sensors with pin details.	Experiments	BL2-Understand	2
2	To write a Python Program for test Air Quality Sensor (SS151) with interfacing	Experiments	BL4-Analyze	2
2	Interfacing with Python Program for test Soil Moisture Sensor (SS152).	Experiments	BL5-Evaluate	2
3	Interfacing of Soil / Water Temperature Sensor (SS154). on IoT builder kit	Experiments	BL4-Analyze	2
3	WSN Virtual lab	PBL	BL4-Analyze	2
4	Netsim Tool simulation	PBL	BL5-Evaluate	10
3	IoT based system design and implementation	PBL	BL6-Create	30

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	40	40	12	60	
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	50	40	20	60	

Part E

Books	1. Dr Xuemin (Sherman) Shen Dr Yi Pan Fundamentals of Wireless Sensor Networks, Theory & Practices Wiley Series on Wireless Communications and Mobile Computing 2. Arshdeep Bahga and Vijay Madisetti Internet of Things – A Hand-on Approach Universities press, 2015
Articles	Karan Bajaj, Bhisham Sharma, and Raman Singh Integration of WSN with IoT Applications: A Vision, Architecture, and Future Challenges Springer Nature Switzerland AG 2020 Integration of WSN with IoT Applications: A Vision, Architecture, and Future Challenges Springer Nature Switzerland AG 2020 Akyildiz, I.F.; Su, W.; Sankarasubramaniam, Y.; Cayirci, E. Wireless Sensor Networks: A Survey. Comput. Netw. 2002, 38, 399–422.
References Books	
MOOC Courses	https://www.coursera.org/learn/iot-wireless-cloud-computing https://archive.nptel.ac.in/courses/106/105/106105160/
Videos	http://www.iot-a.eu/public NPTEL Lectures for Introduction to IoT

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PC8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	2	-	-	-	3	-	-	-	-	-
CO2	3	2	1	-	-	2	-	-	-	3	-	1	2	2	2
CO3	1	1	1	3	2	-	-	-	-	-	-	-	2	3	2
CO4	1	2	1	3	-	-	-	-	-	-	-	-	3	3	3
CO5	1	1	-	2	-	-	-	-	-	-	-	-	2	-	3
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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Syllabus-2019-2020

(SOET)(BTech-Electronics_and_Communication)

Title of the Course	Machine Learning
Course Code	ECL0662[T]

Part A

Year		**Semester**		**Credits**	L	T	P	C
					3	1	1	5
Course Type	Embedded theory and lab							
Course Category	Discipline Core							
Pre-Requisite/s	Basic knowledge of Linear Algebra and Statistics			**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** To remember various concept of machine learning.**(BL1-Remember)** **CO2-** To understand the basic concepts of machine learning, various machine learning models, Performance Evaluation techniques and how to improve the performance of the Machine Learning models.**(BL2-Understand)** **CO3-** To implement various Machine Learning Models.**(BL3-Apply)** **CO4-** To train & test machine Learning Models. **(BL4-Analyze)** **CO5-** To evaluate the performance of Machine Learning Models.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship × Employability ✓ Professional Ethics × Gender × Human Values × Environment ×		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) SDG4(Quality education)				

Part B

Modules	Contents	Pedagogy	Hours
I	Introduction: Learning systems, real world applications of machine learning, why machine learning, variable types and terminology, function approximation Types of machine learning: Supervised learning, unsupervised learning, reinforcement learning Important concepts of machine learning: Parametric vs non-parametric models, the trade-off between prediction accuracy and model interpretability, the curse of dimensionality, measuring the quality of fit, bias-variance trade off, overfitting, model selection, no free lunch theorem.	Lecture Method/Video Clips	12
II	Linear Regression: Linear regression, estimating the coefficients, accessing the accuracy of coefficient estimates, accessing the accuracy of the model, multiple linear regression, qualitative predictors Classification: Logistic regression, estimating regression coefficients, making predictions, multiple logistic regressions, linear discriminant analysis, Bayes' theorem of classification, LDA for p=1, LDA for p>1, quadratic discriminant analysis	Lecture Method/Video Clips/Simulation	10
III	Resampling Methods, Model Selection and Regularization: Cross- validation, leave-one-out crossvalidation, k-fold cross-validation, the bootstrap, subset selection, shrinkage methods, ridge and lasso regression, dimension reduction methods, principal components regression, partial least square. Tree Based Methods: Advantages and disadvantages of trees, regression Trees, classification trees, bagging, random forest, boosting.	Lecture Method/Video clip/Simulation	12
IV	Support Vector Machine: Maximum margin classifier, classification using a separating hyperplane, the maximal margin classifier, support vector classifier, support vector machines, classification with non-linear decision boundaries, support vector machine, one-versus-one classification, one-Versus many classification.	Lecture Method/Video Clips/Simulation	10
V	Unsupervised Learning and Reinforcement Learning: Principle component analysis, what are principal components, clustering methods, k- means clustering, hierarchical clustering, Independent component analysis, latent semantic indexing, Markov Models, Hidden Markov Models, Reinforcement Learning.	Lecture Method/Video	12

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	Write a program to handle missing value for .csv file.	Experiments	BL5-Evaluate	2
1	Write a program to Pre-processing of data for.csv file.	Experiments	BL4-Analyze	2
2	Write a program to implement Logistics Algorithm for .csv file.	Experiments	BL5-Evaluate	2
3	Write a program to implement Decision Tree Algorithm for .csv file.	Experiments	BL5-Evaluate	2
5	Heart Disease Prediction	PBL	BL5-Evaluate	20
4	Brain Tumor Detection and Prediction System	PBL	BL5-Evaluate	6
4	Crop/Plant Disease Detection & Prediction System	PBL	BL6-Create	20

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	40	40	12	60	
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	50	40	20	60	

Part E

Books	Aurélien Géron Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow: Concepts, Tools, and Techniques to Build Intelligent Systems
Articles	B. D. Shivahare, S. Suman, S. S. N. Challapalli, P. Kaushik, A. D. Gupta and V. Bibhu, "Survey Paper: Comparative Study of Machine Learning Techniques and its Recent Applications," 2022 2nd International Conference on Innovative Practices in Technology and Management (ICIPTM), Gautam Buddha Nagar, India, 2022, pp. 449-454, doi: 10.1109/ICIPTM54933.2022.9754206.
References Books	D. E. Goldberg Genetic Algorithms in Search, Optimization & Machine Learning Pearson
MOOC Courses	https://onlinecourses.nptel.ac.in/noc23_cs18/preview
Videos	https://www.youtube.com/watch?v=fC7V8QsPBec

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	-	-	-	2	-	-	-	-	-	-	-	-	-	1
CO2	3	2	1	-	3	-	-	-	-	-	-	2	-	1	2
CO3	1	-	1	-	1	-	-	-	-	-	-	-	-	2	2
CO4	2	2	-	-	1	-	-	-	-	-	-	-	-	-	-
CO5	-	-	2	-	-	-	-	-	-	1	-	-	-	1	3
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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Syllabus-2019-2020

(SOET)(BTech-Electronics_and_Communication)

Title of the Course	Web Technologies
Course Code	ECO0701B [T]

Part A

Year		**Semester**		**Credits**	L	T	P	C
					3	0	0	3
Course Type	Theory only							
Course Category	Discipline Electives							
Pre-Requisite/s				**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** To teach students the basics of server side scripting using PHP**(BL1-Remember)** **CO2-** To explain web application development procedures**(BL2-Understand)** **CO3-** To impart servlet technology for writing business logic**(BL3-Apply)** **CO4-** . To facilitate students to connect to databases using JDBC**(BL4-Analyze)** **CO5-** To evalute various concepts of application development using JSP**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕	**SDG (Goals)**						

Part B

Modules	Contents	Pedagogy	Hours
1	Introduction to PHP: Declaring variables, data types, arrays, strings, operations, expressions, control structures, functions, Reading data from web form controls like Text Boxes, radio buttons, lists etc., Handling File Uploads, Connecting to database (My SQL as reference), executing simple queries, handling results, Handling sessions and cookies. File Handling in PHP: File operations like opening, closing, reading, writing, appending, deleting etc. on text and binary files, listing directories.	Lecture Method/ Case Study/ Video/ Group Discussion	12
2	Introduction to JavaScript: JavaScript language – declaring variables, scope of variables functions, event handlers (on click, on submit etc.), Document Object Model, Form validations. Simple AJAX applications.	Lecture Method/ Case Study/ Video/ Group Discussion	12
3	Introduction to XML, Defining XML tags, their attributes and values, Document type definition, XML Schemas, Document Object model, XHTML Parsing XML Data - DOM and SAX parsers in java	Lecture Method/ Case Study/ Video/ Group Discussion	12
4	Common Gateway Interface (CGI), Lifecycle of a Servlets, deploying a Servlets, The Servlets API, Reading Servlets parameters, Reading initialization parameters, Handling Http Request & Responses, Using Cookies and sessions, connecting to a database using JDBC	Lecture Method/ Case Study/ Video/ Group Discussion	10
5	The Anatomy of a JSP Page, JSP Processing, Declarations, Directives, Expressions, Code Snippets, implicit objects, Using Beans in JSP Pages, Using Cookies and session tracking, connecting to database in JSP	Lecture Method/ Case Study/ Video/ Group Discussion	10

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	40	40	12	60	
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**

Part E

Books	1) Web Technologies, Uttam K Roy, Oxford University Press 2) The Complete Reference PHP – Steven Holzner, Tata McGraw-Hill
Articles	https://ieeexplore.ieee.org/document/1232045
References Books	1)Web Programming, building internet applications, Chris Bates 2nd edition, Wiley Dremtech 2)Java Server Pages – Hans Bergsten, SPD O'Reilly
MOOC Courses	https://onlinecourses.swayam2.ac.in/nou24_cs09/preview
Videos	https://onlinecourses.swayam2.ac.in/nou24_cs09/preview

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	2	2	-	-	-	-	-	-	-	3	2	-	-
CO2	2	3	2	2	3	-	-	-	-	-	-	3	3	-	-
CO3	2	3	2	2	3	-	-	-	-	-	-	3	3	-	-
CO4	2	3	2	2	3	-	-	-	-	-	-	3	3	-	-
CO5	2	3	2	3	3	-	-	-	-	-	-	3	2	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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Syllabus-2019-2020

(SOET)(BTech-Electronics_and_Communication)

Title of the Course	Intellectual Property Rights
Course Code	ECO0701C[T]

Part A

Year		**Semester**		**Credits**	L	T	P	C
					3	0	0	3
Course Type	Theory only							
Course Category	Open Elective							
Pre-Requisite/s				**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** To introduce fundamental aspects of intellectual property rights to students who are going to play a major role in development and management of innovative projects in industries**(BL1-Remember)** **CO2-** To disseminate knowledge on patents, patent regime in India and abroad and registration aspects **(BL2-Understand)** **CO3-** To apply the concept of IPR**(BL3-Apply)** **CO4-** To analyze IPR. To disseminate knowledge on Design, Geographical Indication (GI), Plant Variety and Layout Design Protection and their registration aspects **(BL4-Analyze)** **CO5-** Evaluating theory of probability and statistics related to IPR**(BL5-Evaluate)**							
Coures Elements	Skill Development ✕ Entrepreneurship ✕ Employability ✓ Professional Ethics ✓ Gender ✕ Human Values ✓ Environment ✕		**SDG (Goals)**					

Part B

Modules	Contents	Pedagogy	Hours
1	Introduction and the need for intellectual property right (IPR) - Kinds of Intellectual Property Rights: Patent, Copyright, Trade Mark, Design, Geographical Indication, Plant Varieties and Layout Design – Genetic Resources and Traditional Knowledge – Trade Secret - IPR in India : Genesis and development – IPR in abroad - Major International Instruments concerning Intellectual Property Rights: Paris Convention, 1883, the Berne Convention, 1886, the Universal Copyright Convention, 1952, the WIPO Convention, 1967,the Patent Co-operation Treaty, 1970, the TRIPS Agreement, 1994	Lecture Method/ Case Study/ Video/ Group Discussion	12
2	Elements of Patentability: Novelty, Non Obviousness (Inventive Steps), Industrial Application - Non - Patentable Subject Matter - Registration Procedure, Rights and Duties of Patentee, Assignment and licence , Restoration of lapsed Patents, Surrender and Revocation of Patents, Infringement, Remedies & Penalties - Patent office and Appellate Board	Lecture Method/ Case Study/ Video/ Group Discussion	12
3	Nature of Copyright - Subject matter of copyright: original literary, dramatic, musical, artistic works; cinematograph films and sound recordings - Registration Procedure, Term of protection, Ownership of copyright, Assignment and license of copyright - Infringement, Remedies & Penalties – Related Rights - Distinction between related rights and copyrights	Lecture Method/ Case Study/ Video/ Group Discussion	12
4	Different kinds of marks (brand names, logos, signatures, symbols, well known marks, certification marks and service marks) - Non-Registrable Trademarks - Registration of Trademarks - Rights of holder and assignment and licensing of marks - Infringement, Remedies & Penalties - Trademarks registry and appellate board	Lecture Method/ Case Study/ Video/ Group Discussion	10
5	meaning and concept of novel and original - Procedure for registration, effect of registration and term of protection Geographical Indication (GI) Geographical indication: meaning, and difference between GI and trademarks - Procedure for registration, effect of registration and term of protection	Lecture Method/ Case Study/ Video/ Group Discussion	10

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	40	40	12	60	
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**

Part E

Books	1) Nithyananda, K V. (2019). Intellectual Property Rights. India, IN: Cengage Learning India Private Limited.
Articles	http://op.niscair.res.in/index.php/JIPR
References Books	1) Law of Intellectual Property, Asian Law House, Dr.S.R. Myneni.
MOOC Courses	https://www.udemy.com/course/certificate-course-ipr/?--=&gad_source=1&gclid=Cj0KCQjw6PGxBhCVARIsAlumnWYAVsP2ByJ2PaFsYr6Xs5JKQfqgImfwumwXAL_wj2tvGaXZiybXm1YaAsoWEALw_wcB&
Videos	https://archive.nptel.ac.in/courses/110/105/110105139/

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	1	2	-	3	-	3	-	-	-	-	1
CO2	-	2	2	-	1	2	-	3	-	3	-	-	-	-	1
CO3	2	2	1	2	-	-	-	-	-	-	-	-	1	-	3
CO4	2	3	1	2	-	-	-	-	-	-	-	-	2	2	3
CO5	2	2	-	1	-	-	-	-	-	-	-	-	2	-	3
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Dr. Sadhana Mishra.

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Department of Mechanical Engineering

ITM University Gwalior Campus, NH-44, Turari, Gwalior, (M.P.) - 475 001 INDIA
mail: info@itmuniversity.ac.in, web: www.itmuniversity.ac.in

Date: 09/05/2020

Department of Mechanical Engineering
Minutes of BOS Meeting

A meeting of Board of Studies of Mechanical Engineering Department for B. Tech. Mechanical Engineering, M.Tech. Production and Industrial Engineering was held on 9th of May 2020 online via video conference due to COVID-19 pandemic.

The following members were present in the meeting:

Sr. No.	Name	Designation
1	Dr. Ranjeet Singh Tomar	Dean
2	Dr. Mukesh Kumar Pandey	Chairman
3	Dr. M. L Jain	Expert
4	Dr. R.K. Jain	Convener
5	Mr. Rajendra Singh Rajput	Member
6	Mr. Arun Kushwah	Member
7	Mr. Trilok Chauhan	Member
8	Mr. Sateesh Kumar	Member
9	Mr. Jai Kumar	Member
10	Mr. Nadeem Faisal	Member
11	Mr. GauravVerma	Member
12	Dr. Manish Sharma	Invitee Member
13	Dr. Dinesh Singh Tomar	Invitee Member

The Board of Studies discussed and resolved following points which are recommended further for approval by Academic Council of the University:

1. The scheme and syllabus of –

   - B. Tech. Mechanical Engineering for V & VI semester for batch of 2018 and VII & VIII semester for batch of 2017 have been approved.
   - B. Tech. Mechanical Engineering (Specialization in Manufacturing Technology) for III & IV semester for batch of 2019 and I & II semester for batch of 2020 have been approved.
   - M. Tech. Production and Industrial Engineering for III & IV semester for batch of 2019 and I & II semester for batch 2020 have been approved.

Dr. Mukesh Kumar Pandey | Dr. M. L. Jain | Dr. Rajendra Singh Rajput | Mr. Arun Kushwah | Dr. R. K. Jain | Dr. Ranjeet Singh Tomar

Mr. Sateesh Kumar | Mr. Jai Kumar | Mr. Nadeem Faisal | Dr. Manish Sharma | Dr. Dinesh Tomar | Mr. Trilok Chauhan

Mr. Gaurav Verma

1. Industrial Training has been introduced as a new subject in III &V semester.
2. MED0301 Industrial training has been introduced in III sem as new subject.
3. MEL0618 Dynamics of machines is shifted from VI sem to V sem as MEL0516.
4. MEL0513 Manufacturing process-II has been replaced by MEL0522 Advanced manufacturing as new subject.
5. MEL0514 Kinematics of Machines is shifted from V sem to IV sem as MEL0415 and in place of this MEL0523 Industrial Automation and control is introduced as new subject.
6. In place of MEL0624 Modern production process, MEL0627 Additive manufacturing is introduced as new subject in VI sem.
7. MEL0626 Operations research and MEL0727 Total quality management are introduced as new subject.
8. Following new subjects in the B. Tech. Mechanical Engineering (Specialization in Manufacturing Technology) have been incorporated in the scheme and syllabus of 2019-23 batch as recommended by the BOS having average revision of syllabus of 19.56%.

Sr. No.	Subject Code	Subject name	% Change of syllabus
1	MEL0204	Manufacturing Technologies -I	100
2	MEL0341	Manufacturing Technologies -II	100
3	MEL0442	Machining Process	100
4	MEC0301	Evaluation of Industrial Training-1	100
5	MEL0627	Additive Manufacturing	100
6	MEL0522	Advanced Manufacturing	100
7	MEL0523	Industrial Automation and control	100
8	MEL0626	Operation Research	100
9	MEL0727	Total Quality Management	100
	Overall revision in syllabus		19.56%

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Mr. Gaurav Verma

ITM UNIVERSITY

Syllabus-2019-2020

(SOET)(BTech-Mechanical Engineering)

Title of the Course	Manufacturing Technology–II
Course Code	MEL0341[T]

PartA

Year		**Semester**		**Credits**	L	T	P	C
					2	1	1	4
Course Type	Embedded theory and lab							
Course Category	Discipline Core							
Pre-Requisite/s	Basic knowledge of Material science and manufacturing process.			**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** To get the fundamentals of various metal forming operations.**(BL1-Remember)** **CO2-** To understand the mechanism of metal forming.**(BL2-Understand)** **CO3-** To implement the different metal forming operations to deform the parts.**(BL3-Apply)** **CO4-** To analyze the different parameters used in metal forming.**(BL4-Analyze)** **CO5-**Toevaluatedifferentforceswhichactduringtheoperations.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics✕ Gender ✕ HumanValues✕ Environment✕		**SDG(Goals)**	SDG9(Industry Innovation and Infrastructure)				

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PartB

Modules	Contents	Pedagogy	Hours
Unit1	Fundamentals of Metal Forming Importance of manufacturing, Materials and their structures, Mechanical behavior of crystalline materials, elastic and plastic deformation, yield criteria, Concept of flow stress, hot working and cold working, Metallurgical aspects of metal forming, effects of temperature, classification of metal forming processes,	Lectures with whiteboard/PPT , Quiz, Group discussion	8
Unit2	Forging: Forging principle, classification, equipment, tooling-processes, Forging operations, post forging heat treatment forging defects & applications, Forgeability, Comparison of forging with other manufacturing processes. Rolling: Scope and importance of rolling, Principles of rolling processes, classification, types of rolling mills, analysis of rolling load, torque and power, Form rolling, rolling defects, causes and remedies.	Lectures with whiteboard/PPT , Quiz, Group discussion	9
Unit3	Extrusion and Drawing: Classification of extrusion processes, tool, equipment, and principle of these processes, Extrusion dies, Extrusion load analysis, defects and remedies, rod/wire drawing, tool, equipment and principle of processes, defects, Tube drawing and sinking processes.	Lectures with whiteboard/PPT , Quiz, Group discussion	7

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Unit4	Sheet metal forming: Presses and their classification, die and punch assembly and press work methods and process, formability of sheet metals- principle, process parameters, equipment and application ofthe following processes: deep drawing, spinning, stretch forming. cutting/punching mechanism, blanking versus piercing, compound and progressive die, coining, embossing etc.	Lectures with whiteboard/PPT , Quiz, Group discussion	6
Unit5	Powder Metallurgy Powder metallurgy manufacturing process, preparation of powders, types & function of binders, green compaction, sintering process and its effect on the product, advantages and application of powder metallurgy products. Jigs and fixtures: locating and clamping devices, principles of jigs and fixtures, classification and application.	Lectures with whiteboard/PPT , Quiz, Group discussion	6

PartC

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
Experiment 1	To study of forgingprocess.	Experiments	BL2-Understand	2
Experiment 2	To perform the forging operations.	Experiments	BL5-Evaluate	2
Experiment 3	To study of hammer forging.	Experiments	BL2-Understand	2
Experiment 4	To study of rolling process.	Experiments	BL2-Understand	2

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Experiment 5	To study of extrusion and drawing process.	Experiments	BL2-Understand	2
Experiment 6	To study of sheet metal working.	Experiments	BL2-Understand	2
Experiment 7	To perform the sheet metal forming operations.	Experiments	BL5-Evaluate	2
Experiment 8	To make a tray from the given sheet metal.	Experiments	BL5-Evaluate	2

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min .External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	40	40	12	60	
Practical					
Total Marks	**MinimumPassing Marks**	**External Evaluation**	**Min.External Evaluation**	**Internal Evaluation**	**Min.Internal Evaluation**
100	50	40	20	60	

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Mr. Gaurav Verma

PartE

Books	Ghosh and Mallick- Manufacturing Science, East West Press,2010 R.K.Jain Production TechnologyKhannaPublishers,2001
Articles	
References Books	P.C.PandeyProductionEngineeringScienceStandardPublishers,2010 P.N. Rao Manufacturing Technology Mc Graw Hill, 2001 P M Groover Fundamental of modern manufacturing: Materials, Processes, and System John Wiley and Sons, 2010
MOOC Courses	https://www.mooc-list.com/tags/manufacturing
Videos	

CourseArticulationMatrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	2	2	2	2	2	3	3	3	-	-	3	3	3
CO2	3	-	2	2	-	2	2	-	1	3	-	-	3	3	3
CO3	3	2	2	2	1	2	2	-	-	-	-	-	3	2	3
CO4	3	2	3	2	1	-	-	-	-	-	-	-	2	-	3
CO5	3	1	2	2	1	-	-	-	-	-	-	-	2	-	3
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min.External Evaluation**	**Internal Evaluation**	**Min.Internal Evaluation**
100	50	40	20	60	

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ITM UNIVERSITY
CELEBRATING DREAMS

Syllabus-2019-2020

(SOET)(BTech-Mechanical Engineering)

Title of the Course	Evaluation of Industrial Training-1
Course Code	MEC0301[P]

PartA

Year		**Semester**		**Credits**	L	T	P	C
					0	0	2	2
Course Type	Lab only							
Course Category	Projects and Internship							
Pre-Requisite/s	subject knowledge of first and second semester .			**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** Understand themselves in relation to their community and develop among themselves since of social and civic and responsibility. **(BL2-Understand)** **CO2-** Identify the needs and problem of the community and involve them in problem solving. **(BL2-Understand)** **CO3-** Utilize their knowledge in finding practical solution to individual and community problem. **(BL3-Apply)** **CO4-** Develop the confidence require for group living and sharing of responsibilities of acquire leader ship qualities and democratic attitudes. **(BL4-Analyze)** **CO5-** Develop the capacity to meet emergencies and natural disasters and practice national integration and social harmony**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics✗ Gender ✗ HumanValues✗ Environment✗		**SDG(Goals)**	SDG9(Industry Innovation and Infrastructure)				

PartB

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Modules	Contents	Pedagogy	Hours

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom'sLevel	Hours
Module-I	Industrial training has its own importance in a career of a student who is pursuing a professional degree. It is considered as a part of college curriculum. The objective of an industrial training is to provide us an insight regarding internal working of companies. We understand that theoretical knowledge is not enough for a successful professional career. With an aim to go beyond academics, industrial visit provides students a practical perspective of the work place. Industrial trainings provide an opportunity to learn practically through interaction, working methods and employment practices.	Fieldwork	BL3-Apply	40hrs
Module-II	It gives students an exposure to currentwork practices as opposed to possibly theoretical knowledge being taught at college. Industrial visits provide an excellent opportunity to interact with industries and know more about industrial environment. Industrial trainings are arranged by TAP cell with an objective of providing us an opportunity to explore different sectors like IT, Manufacturing services, finance and marketing. Industrial visit helps to combine theoretical knowledge with practical knowledge. Industrial realities are opened to the students through industrialvisits/trainings.	Fieldwork	BL4-Analyze	40hrs

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min .Internal Evaluation**
	50				

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Part E

Books	
Articles	
References Books	
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	2-	-	1	-	-	-	-	-	-	-	2	2	2
CO2	1	-	2-	-	2	-	-	-	-	-	-	-	1	2	1
CO3	1	2	-	2	1	-	-	-	-	-	-	-	2	2	1
CO4	1	1	-	2	-	-	-	-	1	-	-	-	2	2	1
CO5	-	-	-	-	1	-	-	-	-	1	-	-	2	1	1
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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ITM UNIVERSITY

Syllabus-2019-2020

(SOET)(BTech-Mechanical Engineering)

Title of the Course	Additive Manufacturing
Course Code	MEL0627[T]

PartA

Year		**Semester**		**Credits**	L	T	P	C
					2	1	1	4
Course Type	Embedded theory and lab							
Course Category	Discipline Core							
Pre-Requisite/s	Understanding of the concept of design knowledge of CAD. Understanding of the concept of material and manufacturing.		**Co-Requisite/s**					
Course Outcomes & Bloom's Level	**CO1-** To recall the fundamental principles of additive manufacturing. **(BL1-Remember)** **CO2-** To understand the fundamental principles of additive manufacturing.**(BL2-Understand)** **CO3-** To apply appropriate material selection criteria for different additive manufacturing applications.**(BL3-Apply)** **CO4-** To compare and contrast different additive manufacturing processes based on their strengths and weaknesses**(BL4-Analyze)** **CO5-** To evaluate strategies for integrating additive manufacturing into existing manufacturingsystemsforimprovedefficiencyandproductivity.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics✗ Gender ✗ Human Values✗ Environment✗	**SDG(Goals)**	SDG9(Industry Innovation and Infrastructure) SDG12(Responsible consumption and production)					

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PartB

Modules	Contents	Pedagogy	Hours
Unit-1	Introduction and Basic Principles Rapid prototyping and tooling, prototype fundamentals-types of prototypes, History of RP system, development of rapid prototyping, fundamentals of rapid prototyping, Tooling. Three Phases of Development, advantages of rapid prototyping, direct benefits, indirect benefits. Trends in manufacturing, Conventional Machining, Processes- Development of a CAD model, Generation of STL Files, Slicing the STL file Support Structures, Manufacturing, Post processing. Fundamentals, need, advantages, disadvantages, benefits, Complexity, Accuracy, Geometry Additive Manufacturing, AM Parts, uses, The Generic AM Process, Layer-Based Manufacturing, 3D Printing, Benefits ofAM, Distinction Between AM and CNC Machining, Practical Example AM Parts	Lectures with white board/PPT, Quiz, Group discussion	8
Unit-2	Development of Additive Manufacturing Technology Introduction, Computers, Computer-Aided Design Technology, Other Associated Technologies, The Use of Layers, Classification of AM Processes, Metal Systems, Hybrid Systems, Milestones inAM Development,,AM Around the World, Rapid Prototyping ,Direct Digital Manufacturing	Lectures with white board/PPT, Quiz, Group discussion	8
Unit-3	Liquid-Based Systems 3D Systems Stereolithography Apparatus (SLA), Models and Specifications, Advantages and Disadvantages, Process, Principle, Photopolymers, Photopolymerization, Layering Technology, Solid Ground Curing (SGC), Introduction, Highlights Process Machine Details Applications.	Lectures with white board/PPT, Quiz, Group discussion	8

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Unit-4	Solid-Based Rapid Prototyping Systems Fused Deposition Modelling. Modelling System Hardware,Software, Build Materials, The Extrusion Head, Drive Blocks, The Heating Chamber Tips Build Substrate Fused Deposition Modelling Operation Orientation/Positioning Slicing, Build Parameters Uses of Fused Deposition Modelling Parts Advantages and Disadvantages KeyTerms Laminated Object Manufacturing, System Hardware,Laminated Object Manufacturing Operation, Software, Part Orientation Crosshatching System Parameters Laminated Object Manufacturing Build Technique, Finishing a Laminated Object Manufacturing Part, Uses of Laminated Object Manufacturing Advantages and Disadvantages Materials Properties	Lectures with white board/PPT, Quiz, Group discussion	8
Unit-5	Powder-Based Rapid Prototyping Systems Selective Laser Sintering, Selective Laser Sintering Technology, Purpose, Current State, Advantages, High Throughput Capability, Self- Supporting Build Envelope, Purpose, applications, advantages, Disadvantages, Powder Bed Fusion Processes, Materials Various other Techniques	Lectures with white board/PPT, Quiz, Group discussion	8

PartC

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
Experiment -1	Study of Rapid Prototyping and Tooling.	Experiments	BL4-Analyze	2
Experiment -2	Study of Layered Manufacturing (LM).	PBL	BL4-Analyze	2
Experiment -3	Study of Laminated Object Manufacturing (LOM).Laminated Object Manufacturing	Experiments	BL4-Analyze	2
Experiment -4	To study about selective laser sintering	Experiments	BL4-Analyze	2

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Experiment -5	Study of Shape Deposition Manufacturing Process Description	Experiments	BL4-Analyze	2
Experiment -6	Studyanddemonstrationof3D	Experiments	BL4-Analyze	2

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	40	40	12	60	
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	50	40	20	60	

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PartE

Books	Chua C.K., Leong K.F., and Lim C.S Rapid prototyping: Principles and applications, Third edition, World Scientific Publishers, Gebhardt A Rapid prototyping Hanser Gardener Publications,
Articles	
References Books	Kamrani A.K.and Nasr E.A Rapid Prototyping:Theory and practice Springer Liou L.W. and Liou F.W Rapid Prototyping and Engineering applications: A tool box for prototype development CRC Press
MOOC Courses	https://www.coursera.org/courses?query=additive%20manufacturing
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	2	2	-	2	-	-	-	-	-	-	2	3	3	3
CO2	3	3	3	3	3	2	-	-	-	1	3	1	3	3	3
CO3	-	1	-	3	2	2	-	1	-	1	3	3	2	3	3
CO4	3	3	3	3	3	-	-	1	-	2	2	-	3	-	3
CO5	-	3	3	3	3	-	-	-	-	3	3	2	3	3	3
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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ITM UNIVERSITY
CELEBRATING DREAMS

Syllabus-2019-2020

(SOET)(BTech-MechanicalEngineering)

TitleoftheCourse	ManufacturingTechnology-I
CourseCode	MEL0204[T]

PartA

Year		**Semester**		**Credits**	L	T	P	C
					2	1	0	3
CourseType	Embeddedtheoryandlab							
CourseCategory	DisciplineCore							
Pre-Requisite/s	Basic knowledge of properties of Materials, types of manufacturing process, gravity motion and concepts of force, Pascal's law, surface tension capillarity			**Co-Requisite/s**				
CourseOutcomes & Bloom's Level	**CO1-**Torecallbasicprinciplesofsciencesandmaterialscience.**(BL1-Remember)** **CO2-** To describe the basic concept of casting and welding processes**(BL2-Understand)** **CO3-** To implement basic knowledge in analyzing the forces and processes of welding and casting.**(BL3-Apply)** **CO4-**Toanalyzetheweldingandcastingprocesses**(BL4-Analyze)** **CO5-** To evaluate and summarize the analysis in optimizing the casting and welding processes.**(BL5-Evaluate)**							
CouresElements	Skill Development ✓ Entrepreneurship ✕ Employability ✕ ProfessionalEthics✕ Gender ✕ HumanValues✕ Environment✕		**SDG(Goals)**	SDG9(Industry Innovation and Infrastructure)				

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PartB

Modules	Contents	Pedagogy	Hours
Unit-1	Introduction of Engineering Mechanics Basic concepts of system of forces- Coplanar ConcurrentForces-ComponentsinSpace – Resultant Moment of Forces and its Application-CouplesandResultantof Force System - Equilibrium of System of Forces- Free body diagrams- Equations of Equilibrium of Coplanar Systems and Spatial Systems.	Lectures with whiteboard and PPT,Report writing	8
Unit-2	Casting Processes: Sand castings, pressure die casting, permanent mould casting, centrifugal casting,precision investment casting, shell Moulding, CO2 Moulding, electro slag casting, Fettling and finishing, defects in Castings, Casting of non-ferrous materials. Melting and Pouring: Melting furnaces- crucibles oil fired furnaces, electric furnaces, cupola furnace, selection of furnace.	Lectures with whiteboard and PPT,Quiz, Seminar, Poster	8
Unit-3	Basic Joining process- Types of welding-gas welding, -arc welding,-shielded metal arc welding, GTAW, GMAW, SAW, ESW-Resistance welding (spot, seam, projection, percussion, flash types)-atomic hydrogen arc welding-thermit welding.	Lectures with whiteboard and PPT,Quiz, Report writing	8
Unit-4	Welding Process-Special Welding Processes: Soldering, brazing and their applications, welding of special materials– Stainless steel,Aluminium etc. weldability of cast iron, steel, stainless steel, aluminium alloys. Introduction to Electron beam and Laser welding, Flame cutting - Use of Oxyacetylene, modern cutting processes,arc cutting, Pre welding and post welding.	Lectures with whiteboard and PPT,Abstract of research paper	8
Unit-5	Design of Weldments: Welding symbols, Positions of welding, joint and groove design, heat input, effect of welding parameters, preheating and post heating, Selection of electrodes, flux etc. Weldments Testing: Inspection of welds – destructive and non- destructive testing methods, Defects in welding, causes and remedies.	Lectures with whiteboard and PPT,Quiz, Case writing, seminar	8

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Mr. Gaurav Verma

PartC

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom'sLevel	Hours
Module-I	Pattern design and making –for one casting drawing.	PBL		
Module-II	Sand properties testing exercise for strengths and permeability	IndustrialVisit		
Module-III	Mouldingmeltingandcastingprocess	Experiments		
Module-IV	Arcwelding-lap&buttjointpreparation.	Experiments		
Module-V	To prepare spot welding joint.	Experiments		
Module-VI	ToperformTIGwelding.	Experiments		
Module-VII	To perform Plasma welding and brazing process	IndustrialVisit		

PartD(MarksDistribution)

Theory					
Total Marks	**MinimumPassing Marks**	**External Evaluation**	**Min.External Evaluation**	**Internal Evaluation**	**Min.Internal Evaluation**
100	40	40	12	60	
Practical					
Total Marks	**MinimumPassing Marks**	**External Evaluation**	**Min.External Evaluation**	**Internal Evaluation**	**Min.Internal Evaluation**
100	50	40	20	60	

PartE

Books	• PN Rao, ManufacturingTechnology, McGraw Hill. • M. P. Groover, Fundamental of modern manufacturing: Materials, Processes and System, John Wiley and Sons
Articles	
ReferencesBooks	• P C Pandey "Production Engineering Science" Standard publishers • Richard L. Little "Welding& Welding Technology" Tata McGraw Hill

Dr. Mukesh Kumar Pandey

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MOOCCourses	https://www.mooc-list.com/tags/manufacturing
Videos	

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CourseArticulationMatrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	1	-	-	3	3	1	1	1	3	3	1	1	1
CO2	3	3	3	2	2	3	3	-	1	1	3	3	1	1	1
CO3	3	3	3	2	2	3	3	-	-	-	3	3	2	2	2
CO4	3	3	3	2	2	3	3	2	2	2	3	3	3	3	3
CO5	3	3	3	2	3	3	2	2	2	3	3	3	3	3	3
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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ITM UNIVERSITY

Syllabus-2019-2020

(SOET)(BTech-MechanicalEngineering)

TitleoftheCourse	Machiningprocesses
CourseCode	MEL0442[T]

PartA

Year		**Semester**		**Credits**	L	T	P	C
					2	1	1	4
CourseType	Embeddedtheoryandlab							
CourseCategory	DisciplineCore							
Pre-Requisite/s	Knowledge of material science and manufacturing processes		**Co-Requisite/s**					
CourseOutcomes & Bloom's Level	**CO1-** To get the fundamentals of various machining operations.**(BL1-Remember)CO2-** To understand the basic concept of metal cutting mechanism.**(BL2-Understand) CO3-** To implement the mechanism of machining in different machines.**(BL3-Apply)** **CO4-** To analyze the different parameters used in machining operations.**(BL4-Analyze)** **CO5-** To evaluate different forces which act during the machining.**(BL5-Evaluate)**							
CouresElements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ ProfessionalEthics✕ Gender ✕ HumanValues✕ Environment✕		**SDG(Goals)**	SDG9(IndustryInnovationandInfrastructure)				

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Mr. Gaurav Verma

PartB

Modules	Contents	Pedagogy	Hours
Unit1	Metal Cutting: Economics of machines, introduction to machining processes, classification, mechanics of chip formation process, concept of shear angle, chip contraction and cutting forces in metal cutting, Merchant theory, tool wear, tool life, machinability. Fundamentals of measurement of cutting forces and chip tool interface temperature.	Lectures with whiteboard/PPT, Quiz, Group discussion	11
Unit2	Cutting Tools: Types, geometry of single point cutting tool, twist drill and milling cutter, tool signature. Cutting Tool Materials: Classification of cutting tool materials and properties, tool insert, Selection ofmachining parameters. Coolants and lubricants: classification, purpose, function and properties.	Lectures with whiteboard/PPT, Quiz, Group discussion	10
Unit3	Machine Tools Lathe: Classification, description and operations, kinematic scheme of lathe, and lathe attachments. Speed, feed and machine time calculations. Shaping And Planning Machine: Classification, description and operations. Milling Machine: Classification, description and operations, indexing devices, up milling and down milling.	Lectures with whiteboard/PPT, Quiz, Group discussion	8
Unit4	Drilling Machine: Classification, description and operations. Speed, feed and machine time calculations. Boring Machine: Classification, description and operations. Broaching Machine: Classification, description and operations.	Lectures with whiteboard/PPT, Quiz, Group discussion	7

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Unit5	Grinding Machines: Classification, description and operations, grinding wheel composition, nomenclature of grinding wheels.	Lectures with whiteboard/PPT, Quiz, Group discussion	6

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PartC

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom'sLevel	Hours
Experiment 1	Studyofdifferentpartsoflathemachine	Experiments	BL2-Understand	2
Experiment 2	To perform Facing, Turning and Taper turning operations on the given work piece.	Experiments	BL5-Evaluate	2
Experiment 3	To perform thread cutting and knurling operation on the given work piece.	Experiments	BL5-Evaluate	2
Experiment 4	StudyofdifferentpartsofShapermachine	Experiments	BL2-Understand	2
Experiment 5	ToperformtheoperationsonShaper machine.	Experiments	BL5-Evaluate	2
Experiment 6	StudyofdifferentpartsofMillingmachine	Experiments	BL2-Understand	2
Experiment 7	ToperformtheoperationsonMilling machine.	Experiments	BL5-Evaluate	2
Experiment 8	ToperformtheoperationsonDrilling machine.	Experiments	BL5-Evaluate	2

PartD(MarksDistribution)

Theory					
Total Marks	**MinimumPassing Marks**	**External Evaluation**	**Min.External Evaluation**	**Internal Evaluation**	**Min.Internal Evaluation**
100	40	40	12	60	
Practical					
Total Marks	**MinimumPassing Marks**	**External Evaluation**	**Min.External Evaluation**	**Internal Evaluation**	**Min.Internal Evaluation**
100	50	40	20	60	

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Dr. Dinesh Tomar

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Mr. Gaurav Verma

PartE

Books	GhoshandMallickManufacturingScienceEastWestPress,2010 Dr. P. C.Sharma ManufacturingTechnology-II S.Chand &Company Ltd.
Articles	
ReferencesBooks	P.C. Pandey Production Engineering Science Standard Publishers,2010 P.N.RaoManufacturingTechnologyVol.IITataMcGraw–Hill,NewDelhi,2009 P M Groover Fundamental of modern manufacturing, ProcessesAnd System John Wiley and Sons, 2010
MOOCCourses	https://archive.nptel.ac.in/courses/112/104/112104290/
Videos	

CourseArticulationMatrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	2	2	1	2	2	3	3	3	-	-	3	3	3
CO2	3	-	2	2	-	2	2	-	1	3	-	-	3	3	3
CO3	3	2	2	2	1	2	2	-	-	-	-	-	3	2	3
CO4	3	2	3	2	1	-	1	-	-	-	-	-	2	-	3
CO5	3	1	2	2	1	-	1	-	-	-	-	-	2	-	3
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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ITM UNIVERSITY
CELEBRATING DREAMS

Syllabus-2019-2020

(SOET)(BTech-Mechanical Engineering)

TitleoftheCourse	Advanced Manufacturing
CourseCode	MEL0522[T]

PartA

Year		**Semester**		**Credits**	L	T	P	C
					2	1	0	3
CourseType	Theoryonly							
CourseCategory	DisciplineCore							
Pre-Requisite/s	Information about basic manufacturing processs.			**Co-Requisite/s**				
CourseOutcomes & Bloom's Level	**CO1-** To recall the concepts of manufacturing, material science, Production, Engineering Mechanics.**(BL1-Remember)** **CO2-** To understating the concept of advanced machining process i.e. USM,AJM, WJM, AWJM, ECM, EDM, EBM, and LBM.**(BL2-Understand)** **CO3-** To apply the concept ofAdvanced casting process i.e. Metal mould casting.**(BL3-Apply)** **CO4-**ToanalysisofAdvancedweldingprocessi.e.EBW,LBM,USW,Plasmaarcwelding. **(BL4-Analyze)** **CO5-**ToevaluationofAdvancedMetalForming&FinishingProcesses.**(BL5-Evaluate)**							
CouresElements	Skill Development ✓ Entrepreneurship ✓ Employability ✕ ProfessionalEthics✕ Gender ✕ HumanValues✕ Environment✓		**SDG(Goals)**	SDG9(IndustryInnovationandInfrastructure)				

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PartB

Modules	Contents	Pedagogy	Hours
Unit-1	Advanced Machining Processes Limitations of conventional manufacturing processes, Need and classification of unconventional or advanced manufacturing processes,Process Principle, Parametric analysis and applications of processes such as ultrasonic machining (USM), Abrasive jet matching (AJM), Water jet machining(WJM), Abrasive water jet machining (AWJM), Electrochemical machining (ECM), Electro discharge machining (EDM), Electron beam machining (EBM), Laser beam machining (LBM) Processes.	Lectures with whiteboard/PPT, Quiz, Group discussion	8
Unit-2	Advanced Casting Processes Metal mould casting, Continuous Casting, Squeeze casting, Vacuum mould casting, Evaporative pattern casting, Ceramic shell casting , High pressure die casting process and study of injection chamber (HPDC).	Lectures with whiteboard/PPT, Quiz, Group discussion	8
Unit-3	Advanced Welding Processes Details of electron beam welding (EBW), laser beam welding (LBW), ultrasonic welding (USW), Plasma Arc Welding.	Lectures with whiteboard/PPT, Quiz, Group discussion	8
Unit-4	Advanced Metal Forming Processes Details of high energy rate forming (HERF) process, electro- magnetic forming, explosiveforming, Electro-hydraulic forming, Stretch forming, Contour roll forming,	Lectures with whiteboard/PPT, Quiz, Group discussion	8
Unit-5	Advanced Finishing Processes Need, classification, process principle and applications of Abrasive Flow Finishing, MagneticAbrasive Flow Finishing (MAFF) , Magnetic Abrasive Finishing (MAF) .	Lectures with whiteboard/PPT, Quiz, Group discussion	8

PartD(MarksDistribution)

Theory					
Total Marks	MinimumPassing Marks	External Evaluation	Min.External Evaluation	Internal Evaluation	Min.Internal Evaluation

Dr. Mukesh Kumar Pandey
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Dr. Dinesh Tomar
Mr. Trilok Chauhan
Mr. Gaurav Verma

100	0	40	12	60	0
Practical					
Total Marks	**MinimumPassing Marks**	**External Evaluation**	**Min.External Evaluation**	**Internal Evaluation**	**Min.Internal Evaluation**
			0		0

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Dr. Dinesh Tomar

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Mr. Gaurav Verma

PartE

Books	BenedictG.F.Non-TraditionalManufacturingProcessesMarcelDekker
Articles	
ReferencesBooks	JainV.K.AdvanceMachiningProcesses,AlliedPublisher.
MOOCCourses	https://archive.nptel.ac.in/courses/112/107/112107078/
Videos	

CourseArticulationMatrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	-	-	1	-	-	-	-	-	-	-	-	2	-	3
CO2	3	3	-	3	-	-	-	-	-	3	2	-	3	3	3
CO3	2	2	-	3	-	-	-	-	-	3	2	-	3	3	3
CO4	3	3	-	3	-	-	-	-	-	3	2	-	3	3	3
CO5	3	3	-	3	-	-	-	-	-	3	3	-	3	3	3
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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ITM UNIVERSITY
CELEBRATING DREAMS

Syllabus-2019-2020

(SOET)(BTech-Mechanical Engineering)

Title of the Course	Industrial Automation and Control
Course Code	MEL0523[T]

PartA

Year		**Semester**		**Credits**	L	T	P	C
					2	1	0	3
Course Type	Theory only							
Course Category	Discipline Core							
Pre-Requisite/s	Student should have knowledge of kinematics of machine and basic mathematics.			**Co-Requisite/s**				
CourseOutcomes & Bloom's Level	**CO1-** Recall the concepts of Kinematics of machines, Dynamics of machines.**(BL1-Remember)** **CO2-** Understating the concept of joints and links.**(BL2-Understand)** **CO3-** Applying the basic degree of freedom concept.**(BL3-Apply)** **CO4-**Determinetheoptionsoffixedorflexibleautomation.**(BL4-Analyze)** **CO5-**Determinethesafeconditionsofoptimizinghumanandrobotsrole.**(BL5-Evaluate)**							
CouresElements	Skill Development ✓ Entrepreneurship ✗ Employability ✓ ProfessionalEthics✗ Gender ✗ HumanValues✗ Environment✗		**SDG(Goals)**	SDG9(Industry Innovation and Infrastructure)				

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Mr. Gaurav Verma

PartB

Modules	Contents	Pedagogy	Hours
Unit-1	Definition of an industrial automation, the advantages & disadvantages, Types of Automation, Automation in production system, IndustrialAutomation and Robotic Basic Concept Link and Joint Degree of freedom, Orientation Axes, Position Axes, Tool Centre Point (TCP), Work envelope/workspace. Speed, Payload, Repeatability, Accuracy, Settling Lectures with whiteboard/PPT, Quiz, Group discussion Time, Control Resolution, Coordinates, Accuracy and Repeatability, Control resolution, Payload Components, Applications, of Automation system.	Lectures with whiteboard/PPT, Quiz, Group discussion	8
Unit-2	MechanicalSystem:Components,Dynamics and Modeling Elementary Mechanical Concepts Translation or Linear Motion Rotational Motion- Mechanical Work and power, Motion Conversion Rotary to Rotary Motion Conversion, Rotary to Linear Motion Conversion, Linkages, Couplers, The Concept of Power Transfer, Modelling of Mechanical System-Elements, Rules and Nomenclature, Translational Example, Rotational Example, Electrical Analog	Lectures with whiteboard/PPT, Quiz, Group discussion	8
Unit-3	Actuators--Flow Control Valves, Electric actuators, Relays, Power relays, - General purpose relay, -Hydraulic Actuators, - Pneumatic Actuators, Pneumatic Valves Stepper Motors-Principles of stepper motor operation, Half Step Mode Operation, Micro-step Mode, Methods of Damping Rotor Oscillations, Permanent Magnet Stepper Motors Stepper motor drives, Linear stepper, motors	Lectures with whiteboard/PPT, Quiz, Group discussion	8

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Unit-4	Classification of sensors, Sensorgeneralities, Sensor characteristics, Angular and Linear Position Sensors, Velocity and Acceleration Sensors Tacho generator, Signac interferometer, micromechanical angular velocity and acceleration sensor, Contact sensor Piezoresistive andcapacitive tactile sensors, optical tactile sensors, force measurement by deformation of contact sensors, principle andapplications of strain gage sensors, Laser- Range Radar, Laser interferometric distance meter,Laser-DopplerVelocimeter,Pressure, Temperature, Flow measurement	Lectures with whiteboard/PPT, Quiz, Group discussion	8
Unit-5	Automation Design and process specifications, Mechanical Description of the automation, Motion Sequence, Motor and Drive Mechanism Selection, Encoder Selection, Control Structure: Programmable Logic Controller used for Industrial Automation. Lectures with whiteboard/PPT, Quiz, Group discussion	Lectures with whiteboard/PPT, Quiz, Group discussion	8

PartD(MarksDistribution)

Theory					
Total Marks	**MinimumPassing Marks**	**External Evaluation**	**Min.External Evaluation**	**Internal Evaluation**	**Min.Internal Evaluation**
100	40	40	12	60	
Practical					
Total Marks	**MinimumPassing Marks**	**External Evaluation**	**Min.External Evaluation**	**Internal Evaluation**	**Min.Internal Evaluation**
0	0	0	0	0	0

PartE

Books	1. Dr. K. Shivanand and Dr. M. N. Shanmukha Swamy IndustrialAutomation and Engineering Approach CRC Press
Articles	

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ReferencesBooks	1 Stamatios Manesis George Nikolakopoulos Introduction to IndustrialAutomation CRC Press Taylor & Francis Group
MOOCCourses	https://onlinecourses.nptel.ac.in/noc20_me39/preview
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	1	-	-	-	-	-	-	-	-	2	3	2
CO2	3	3	2	1	-	-	-	-	-	-	-	-	2	3	2
CO3	1	3	2	3	-	-	-	-	-	3	-	-	2	3	3
CO4	1	3	2	3	1	-	3	-	-	3	3	-	3	3	3
CO5	-	3	2	3	-	-	-	-	-	3	3	-	3	3	3
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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ITM UNIVERSITY

Syllabus-2019-2020

(SOET)(BTech-MechanicalEngineering)

TitleoftheCourse	OperationsResearch
CourseCode	MEL0626[T]

PartA

Year		**Semester**		**Credits**	L	T	P	C
					2	1	0	3
CourseType	Theoryonly							
CourseCategory	DisciplineCore							
Pre-Requisite/s	Basic knowledge of linear equation, Engineering mathematics and industrial engineering.			**Co-Requisite/s**				
CourseOutcomes & Bloom's Level	**CO1-**Torecalltheindustrialengineering**(BL1-Remember)** **CO2-** To understand the Performance of queue, line balancing**(BL2-Understand)** **CO3-** To apply the queuing theory and game theory**(BL3-Apply)** **CO4-** To measures how effective production system (supply system)**(BL4-Analyze)** **CO5-** To evaluate the production system (supply system). **(BL5-Evaluate)**							
CouresElements	Skill Development ✓ Entrepreneurship ✓ Employability ✕ ProfessionalEthics✕ Gender ✕ HumanValues✕ Environment✕	**SDG(Goals)**	SDG9(Industry Innovation and Infrastructure) SDG12(Responsible consuption and production)					

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PartB

Modules	Contents	Pedagogy	Hours
Unit-1	Linear Programming Meaning of Linear Programming, General Mathematical Formulation of LPP, Graphical Analysis, Simplex Method, Two-phase Method, Big M-Method; Duality and Post OptimalityAnalysis Advantage and Limitations of LPP	Lectures with white board and PPT, Report writing	8
Unit-2	Transportation Model Mathematical Formulation, Initial Basic Feasible Solution, Vogel'sApproximation Method, Optimization (Minimization and Maximization) Using Modified Distribution Method and Stepping Stone Method Assignment Problem Quiz, Seminar, Assignment Model as a Particular Case of Transportation Model, Formulation of Assignment Problems, Solution of Assignment Problems Using Hungarian Method (Minimization and Maximization) RouteAllocation..	Lectures with white board and PPT, Quiz, seminar, Poster and PPT	8
Unit-3	Waiting Line Models Introduction, Scope in Management Decisions, Queuing Models M/M/1 (Infinite and Finite Population), Probability Calculations arid Application of M/M/C (Infinite Population) Replacement Models Introduction Scope in Management, Single Equipment Replacement Model and Group Replacement	Lectures with white board and PPT, Quiz, seminar, Poster and PPT	8
Unit-4	Game Theory Introduction to Games, Maximin and Minimax Principles, Pure and Mixed Strategies, Solution of Games Using-Algebraic and Graphical Methods; Linear programming approach for game theory Simulation & Computer Solutions Introduction to simulation, Monte Carlo Technique and Its Applications	Lectures with white board and PPT, Quiz, seminar, Poster and PPT	8

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Unit-5	Inventory Models: Economic Order Quantity, Economic Production Order, Models with Price Breaks, Lead Times, Stockouts. Fixed time Period Models with SpecifiedProbability of stock-outs & Service levels. Dynamic Programming Nature of Dynamic Programming Problem, Dynamic Programming Solutions for Knap Sack, Traveling Salesman (Stage Coach), Assignment of Salesmen to SalesArea and Capital Budgeting	Lectures with white board and PPT, Quiz, seminar, Poster and PPT	8

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PartD(MarksDistribution)

Theory					
Total Marks	**MinimumPassing Marks**	**External Evaluation**	**Min.External Evaluation**	**Internal Evaluation**	**Min.Internal Evaluation**
100	40	40	12	60	
Practical					
Total Marks	**MinimumPassing Marks**	**External Evaluation**	**Min.External Evaluation**	**Internal Evaluation**	**Min.Internal Evaluation**

PartE

Books	1.Gupta&Hira,OperationsResearchS.Chand&Company
Articles	
ReferencesBooks	[1] Gupta & Hira, Operations Research, S. Chand & Company [2] Taha Operations Research, Pearson Education [3] Kedar Nath and Ram Nath, Operations Research, Publishers [4] Philips Ravindran, Operations Research, Solberg Wiley India Pvt. Limited.
MOOCCourses	https://onlinecourses.nptel.ac.in/noc22_ma48/preview
Videos	

CourseArticulationMatrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	-	-	2	2	-	-	3	3	-	-	3	2	2
CO2	3	1	2	2	2	-	-	-	3	3	1	-	3	3	3
CO3	1	2	2	2	1	-	-	-	-	1	-	3	2	3	2
CO4	1	3	2	3	2	-	3	2	-	-	2	2	2	2	2
CO5	-	1	1	2	2	-	-	-	-	-	2	-	1	2	3
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Dr. Mukesh Kumar Pandey

Dr. M. L. Jain

Dr. Rajendra Singh Rajput

Mr. Arun Kushwah

Dr. R. K. Jain

Dr. Ranjeet Singh Tomar

Mr. Sateesh Kumar

Mr. Jai Kumar

Mr. Nadeem Faisal

Dr. Manish Sharma

Dr. Dinesh Tomar

Mr. Trilok Chauhan

Mr. Gaurav Verma

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Syllabus-2019-2020

(SOET)(BTech-MechanicalEngineering)

TitleoftheCourse	TotalQualityManagement
CourseCode	MEL0727[T]

PartA

Year		**Semester**		**Credits**	L	T	P	C
					2	1	0	3
CourseType	Theoryonly							
CourseCategory	DisciplineCore							
Pre-Requisite/s	Basic knowledge of Probability &Statistics			**Co-Requisite/s**				
CourseOutcomes & Bloom's Level	**CO1-** To recall industrial engineering and operation research**(BL1-Remember)** **CO2-** To understand the history of TQM**(BL2-Understand)** **CO3-**Toapplythetheoriesof TQMinreallifeindustrialproblems**(BL3-Apply)** **CO4-** To analyze the change in productivity through principles of TQM.**(BL4-Analyze)** **CO5-** To evaluate the different ways and theories of TQM**(BL5-Evaluate)**							
CouresElements	Skill Development ✓ Entrepreneurship ✓ Employability ✕ ProfessionalEthics✕ Gender ✕ HumanValues✓ Environment✕		**SDG (Goals)**	SDG8(Decent work and economic growth) SDG12(Responsible consuption and production)				

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Dr. Manish Sharma

Dr. Dinesh Tomar

Mr. Trilok Chauhan

Mr. Gaurav Verma

PartB

Modules	Contents	Pedagogy	Hours
Unit-1	Evolution of Quality Historical Perspective, Basic Concepts of Quality, Vision, Mission and Objectives of an Organization, Corporate Structure in an Organization and Role of Quality	Lectures with whiteboard/PPT, Quiz, Group discussion	
Unit-2	Quality Quality Planning, Quality By Design, Quality Costs and Cost of Failure, Waste Control, How Quality Benefits Business, Quality and Competitiveness in Business, Zero Defects and Continuous Improvement	Lectures with whiteboard/PPT, Quiz, Group discussion	
Unit-3	Total Quality Concepts and Total Preventive Maintenance CWQC, Product Liability Difference in Western And Japanese Approach of TQM, Basic Philosophy and Fundamental Models of TQM, Total Quality and Ethics, Internal Politics andTotal Quality Management, Quality Culture, Educationand Training, Implementing Total Quality Management An Integrated System Approach, Total Preventive Maintenance—SelfAssessment	Lectures with whiteboard/PPT, Quiz, Group discussion	
Unit-4	Leadership Leadership Role of Leadership and Commitment in Quality Deployment, Team Building, Motivation, and Rewards, Total Employee Empowerment, Quality Functions Measurement, Inspection, Testing, Calibration and Assurance	Lectures with whiteboard/PPT, Quiz, Group discussion	
Unit-5	Design Control and Conformity, Tolerance and Variability PDCA Cycle, Juran Trilogy, Crosby's 10 points and Deming's 14 Points Customers Requirements, Customer Supplier and Chain Links, Establishing Customer Focus Customer, Satisfaction, Measurement and Customer Retention	Lectures with whiteboard/PPT, Quiz, Group discussion	

PartD(MarksDistribution)

Theory					
Total Marks	**MinimumPassing Marks**	**External Evaluation**	**Min.External Evaluation**	**Internal Evaluation**	**Min.Internal Evaluation**

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Mr. Jai Kumar

Mr. Nadeem Faisal

Dr. Manish Sharma

Dr. Dinesh Tomar

Mr. Trilok Chauhan

Mr. Gaurav Verma

100	40	40	12	60	
Practical					
Total Marks	**MinimumPassing Marks**	**External Evaluation**	**Min.External Evaluation**	**Internal Evaluation**	**Min.Internal Evaluation**

Dr. Mukesh Kumar Pandey

Dr. M. L. Jain

Dr. Rajendra Singh Rajput

Mr. Arun Kushwah

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Dr. Ranjeet Singh Tomar

Mr. Sateesh Kumar

Mr. Jai Kumar

Mr. Nadeem Faisal

Dr. Manish Sharma

Dr. Dinesh Tomar

Mr. Trilok Chauhan

Mr. Gaurav Verma

PartE

Books	JoelE.RossTotalQualityManagement:Text,Cases,andReadingsRoutledge
Articles	
ReferencesBooks	R. Panneerselvam Total Quality Management: Key Concepts and Case Studies Prentice HallIndia
MOOCCourses	https://onlinecourses.nptel.ac.in/noc20_mg34/preview
Videos	

CourseArticulationMatrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	-	2	3	-	-	2	1	-	2	2	-	3	-	3
CO2	3	2	2	3	-	2	3	1	3	3	3	-	3	3	3
CO3	3	3	2	3	-	2	3	1	3	3	3	-	3	3	3
CO4	3	3	3	3	2	2	3	1	3	3	3	1	3	3	3
CO5	3	3	3	3	2	2	3	1	3	3	3	1	3	3	3
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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Mr. Gaurav Verma

Department of Computer Science

ITM University Gwalior Campus, NH-44, Turari, Gwalior, (M.P.) - 475 001 INDIA
mail: info@itmuniversity.ac.in, web: www.itmuniversity.ac.in

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NOTICE

The board of studies for the Department of Computer Science & Applications will be held on 31/05/2021. All the BOS members are requested to attend the BOS meeting.

Agenda :

1. Review and approval of the following schemes of examination and syllabus –

- B.Tech.(CSE) Batch (2018-2022) VII and VIII semester
- B.Tech.(CSE) Batch (2019-2023) V and VI semester
- B.Tech.(CSE) Batch (2020-2024) III and IV semester
- B.Tech.(CSE) Batch (2021-2025) I and II semester
- B.Tech. + M. Tech (Integrated) (CSE) Batch (2021-2026) I and II semester
- B. Tech(CSE) -Specialization in Data Science and Machine learning- Batch (2018-2022) VII and VIII semester
- B. Tech(CSE) -Specialization in Data Science and Machine learning- Batch (2019-2023) V and VI semester
- B. Tech(CSE) -Specialization in Data Science and Machine learning- Batch (2020-2024) III and IV semester
- B. Tech(CSE) -Specialization in Cyber Security – Batch (2020-2024) III and IV semester
- B. Tech(CSE) -Specialization in Data Science and Machine learning- Batch (2021-2025) I and II semester
- B. Tech(CSE) -Specialization in Cloud Computing- Batch (2021-2025) I and II semester
- B. Tech(CSE) -Specialization in Cyber Security – Batch (2021-2025) I and II semester
- **M. Tech(CSE)** for batch 2021-2023
- **BCA and BCA (Hons)**
- **MCA**

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Dated: 28/01/2019

Minutes of Meeting (BOS)

Meeting of Board of Studies in CS&A School Name :**School ofEngineering & Technology,** ITM University Gwalior was held on **28/01/2019 in Conference Hall , MG** Block Ground Floor**.**

S.No.	Name	Designation	Signature
1.	Dr. Ranjeet Singh Tomar	Dean, SOET	
2.	Dr. Santosh Sharma	Dean , Academic	
3.	Dr. Pallavi Khatri	Chairperson	
4.	Dr. Sanjay Jain	Member	
5.	Mrs. Geetanjali Surange	Member	
6.	Dr. Shashikant Gupta	Member	
7.	Dr. Arun Yadav	Member	
8.	Dr. Deepak Motwani	Member	
9.	Mr. Ashish Tripathi	Member	
10.	Mr. Kapil Sharma	Member	
11.	Mr. H. N Verma	Member	
12.	Dr. Kapil Govil	Member	
13.	Mr. K.K. Joshi	Member	
14.	Dr. Sanjeev Sharma	Member	
15.	Dr. R.S.Jadon, Professor & Head, MITS , Gwalior	Expert	
16.	Dr. Rajesh Doriya,Assistant Professor NIT Raipur	Expert	
17.	Dr. R. S. Rao, Associate Professor, AIACTR New Delhi	Expert	

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Board of Studies , 2019
Department of Computer Science and Applications
Agenda for B.O.S

1. Proposed scheme and Syllabi of specialization in B.Tech (CSE) Course.
    a. Scheme of Specialization in **Cyber forensics**
    b. Scheme Specialization in **Cloud computing**
    c. Scheme Specialization in **Data Science and Machine Learning**
2. Syllabi of **B.Tech, B.Tech(Hons.) , 5th to 8th Semester** for Batch2018-2022,**B.Tech+ M.Tech(Int.) , B.Tech(Hons.) + M.Tech(Int.) 5th to 10th Semester** for batch 2018 – 2023 has been approved.
3. Scheme of examination **B.Tech , B.Tech(Hons.) , B.Tech + M.Tech(Int.), B.Tech (Hons.) +M.Tech Int.), M.tech, MCA, BCA and BCA (Hons.)** for 2019 batch has been approved.
4. Syllabi of examination **B.Tech, B.Tech(Hons.) ,B.Tech+ M.Tech(Int.) , B.Tech(Hons.) + M.Tech(Int.) , M.tech, MCA,BCA and BCA (Hons.)** for 2019 batch has been approved.

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1. In MCA V semester, the following changes were made for the batch 2019-2022
a. Following Electives were added to the scheme
i. MCA-405: Machine Learning

2. In BCA Hons Batch IV semester, the following changes were made for the batch 2019-2022
a. Following Subjects were added to the scheme
i. BCAH-406: Logical and Reasoning Aptitude

3. In B.Tech. VII semester, for the Computer Science and Engineering batch, the following changes weremade for the batch 2019-2023
a. Following Subjects were added to the scheme
i. CSE0732 Blockchain Technology

4.The syllabus of few subjects was revised as per following table for BTECH

Program	Course Code	Course name	Semester	No of Topics	Change in Number of topics	Change %
BTECH	CSP0304[P]	Java Programming	III	34	7	20.58
BTECH	CSL0357[T]	Data Structures & Applications	III	54	5	9.25
BTECH	CSL0306[T]	Operating System	III	55	4	7.27
BTECH	CSP0405[P]	Server Side Programming	IV	45	16	35.55

5. The syllabus of few subjects was revised as per following table for BCA

Program	Course Code	Course name	Semester	No of Topics	Change in Number of topics	Change %
BCA	BCA-101	Computer fundamentals and Applications	I	37	9	24.32

6. Following new courses were reviewed and approved in BCA and –
   a. Wireless and Mobile Communication - BCA 604(B)
   b. software project management – BCA – 601
7. Following new courses were reviewed and approved in BCAH and –
   a. Cloud Computing - BCAH 604-A(T)
   b .Android based Application Development- BCAH 606 -D (T)
8. Following new courses were reviewed and approved in BTech –
   a. Natural Language Processing - CSE0742[T]

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Annexure1- Syllabus of new courses

Note: Further changes in any course introduced by the regularity bodies will be incorporated after the approval of BOS/Academic Council.

Pallavi

(Dr. Pallavi Khatri)

Chairman, BOS
Dept. of CSA
ITM University, Gwalior

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CELEBRATING DREAMS

Syllabus-2019-2020

(SOET)(BCA_Hons)

Title of the Course	Cloud Computing
Course Code	BCAH 604-A(T)

Part A

Year		**Semester**		**Credits**	L	T	P	C
					3	1	0	4
Course Type	Theory only							
Course Category	Generic Elective							
Pre-Requisite/s	To understand the contents and successfully complete this course, a participant must have a basic understanding of Storage Systems, Operating systems, Networking and Database.			**Co-Requisite/s**				
Course Outcomes Bloom's Level	**CO1-** To remember the various technologies for information storage and management. **(BL1-Remember)** **CO2-** To understand the storage techniques, concepts of data center, data center infrastructure management and services. **(BL2-Understand)** **CO3-** To implement the setup of storage techniques such as RAID, LUN Masking at data center. Create the virtual server and virtualize the resources as on demand.**(BL3-Apply)** **CO4-** To analyze the functionality of data center or storage infrastructure as per policies. **(BL4-Analyze)** **CO5-** To evaluate the performance of data center or storage infrastructure on various performance parameters. **(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✗ Employability ✓ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✗		**SDG (Goals)**	SDG1(No poverty) SDG3(Good health and well-being) SDG4(Quality education) SDG8(Decent work and economic growth) SDG10(Reduced inequalities)				

Part B

odules	Contents	Pedagogy	Hours
	(Overview of Cloud Computing): Vision of cloud computing, Defining a cloud, cloud computing reference model, Historical developments, Cloud computing services, types of clouds, Characteristics, benefits and cloud computing challenges.	Lecture with PPT, Audio/Video clips, Pictures, Quiz, Present Report	12
	(Virtualization) Introduction, Characteristics of virtualized environments, Taxonomy of virtualization techniques, Pros and cons of virtualization, Technology- Xen, VMware, Microsoft Hyper-V, Economics of the cloud, Federation, Presence, Identity, and Privacy in the Cloud-Federation in the Cloud, Presence in the Cloud, Privacy and Its relation to Cloud-Based Information Systems, Secure Software Development Life Cycle (SecSDLC).	Lecture with PPT, Audio/Video clips, Pictures, Quiz, implementation on cloud tools	12
	(High throughput Computing) Data-Intensive Computing-Introduction, Characterizing data-intensive computations, Historical perspective, Challenges ahead, Technologies for data-intensive computing, Concept of multi-cloud management, Challenges in managing heterogeneous clouds, benefits and advantages of multi-cloud management systems. Implementing Multi-Cloud Management System (e.g. RightScale Cloud Management System).	Lecture with PPT, Audio/Video clips, Pictures, Quiz, Examples of real-life applications such as YouTube, Facebook, Instagram, WhatsApp, LinkedIn etc.,	12
	(Business Clouds) Cloud Computing in Business, Various Biz Clouds focused on industry domains, Amazon Web Services, Google AppEngine, Microsoft Azure. Scientific Applications-Healthcare: ECG Analysis in the Cloud, Geoscience: Satellite Image Processing, Business and Consumer Applications- CRM and ERP, Productivity, Social Networking, Media Applications, Multiplayer Online Gaming.	Lecture with PPT, Audio/Video clips, Pictures, Quiz, Demonstration of third-party cloud environment	12
	(Future directions in Cloud Computing) Future technology trends in Cloud Computing with a focus on Cloud service	Lecture with PPT, Audio/Video clips, Pictures	12

	models, deployment models, cloud applications, and cloud security. Energy efficiency in clouds, Market-based management of clouds, Third-party cloud services, Current issues in cloud computing leading to future research directions.		

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	40	40	12	60	
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**

Part E

Books	G. Somasundaram, Alok Shrivastava (EMC Education Services) Editors; Information Storage and Management: Storing, Managing, and Protecting Digital Information; Wiley India. Rajkumar Buyya, Christian Vecchiola, S. Thamarai Selvi; Mastering Cloud Computing, Elsevier Ulf Troppens; Storage Network Explained: Basic and Application of SAN, NAS; Wiley India.
Articles	
References Books	Nick Antonopoulos, Lee Gillam; Cloud Computing: Principles, System & Application, Springer. John W. Rittinghouse, James F. Ransome; Cloud Computing: Implementation, Management and Security, CRC Press - Taylor Francis Publication.
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	-	-	-	-	-	-	-	-	-	-	-	1	2	1
CO2	1	1	-	-	1	-	3	-	-	-	-	2	2	2	1
CO3	1	2	2	2	2	-	3	-	-	-	-	2	3	3	2
CO4	1	3	2	2	2	-	2	-	-	-	-	2	3	2	2
CO5	-	3	2	2	2	-	2	-	2	-	-	2	3	3	3
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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Syllabus-2019-2020

(SOET)(BCA_Hons)

itle of the Course	Android based Application Development
Course Code	BCAH 606 -D (T)

Part A

Year		**Semester**		**Credits**	L	T	P	C
					3	1	2	6
Course Type	Embedded theory and lab							
urse Category	Discipline Electives							
Pre-Requisite/s	Having the exposure about the object-oriented programming.			**Co-Requisite/s**				
ourse Outcomes Bloom's Level	**CO1-** To remember various syntax rules of the programming language such as java and XML**(BL1-Remember)** **CO2-** To understand Object Oriented concepts for Android and various mobile application development concepts including interface designing, handling multiple activities**(BL2-Understand)** **CO3-** To implement XML, Java and mysql for database connectivity and file system**(BL3-Apply)** **CO4-** To analyze various widgets and learn to use them as per the problem**(BL4-Analyze)** **CO5-** To develop solutions for real world problems using android application development**(BL5-Evaluate)**							
ourses Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✗		**SDG (Goals)**	SDG1(No poverty) SDG4(Quality education) SDG8(Decent work and economic growth)				

Part B

ules	Contents	Pedagogy	Hours
	(Getting Started with Mobility) Mobility Landscape, Mobile Platforms, Mobile Apps Development, Overview of Android Platform, Setting up the Mobile App Development Environment along with an Emulator, A Case Study on Mobile App development	whiteboard/PPT, Recorded video/interactive videos	08
	(Basics of Java and XML) Event Handling in Java, Events, Foreground Events, Background Events, Events Source, Listeners, Callback Methods, XML: Tags, Namespaces, Name Conflicts, Containers, Overview of Eclipse, Installation of Eclipse.	whiteboard/PPT, Recorded video/interactive videos	10
	(Building Blocks of Mobile Apps) App User Interface Designing - Mobile UI Resources (Layout, UI Elements, Drawable, Menu), Activity - States and Life Cycle, Interaction amongst Activities. App Functionality beyond User Interface - Threads, Asynchronous Task, Services - States and Life Cycle, Notifications, Broadcast Receivers.	whiteboard/PPT, Recorded video/interactive videos	9
	(SQLite (DBMS)) Telephony and SMS APIs Native Data Handling – On-device File I/O, Shared Preferences, Mobile Databases such as SQLite, Enterprise Data Access (via Internet/Intranet).	whiteboard/PPT, Recorded video/interactive videos	08
	(Testing Mobile Apps and Taking Apps to Market) Debugging Mobile Apps, White Box Testing, Black Box Testing, Versioning, Signing and Packaging Mobile Apps, Distributing Apps on Mobile Market Place.	whiteboard/PPT, Recorded video/interactive videos	08

Part C

Project Based Learning on Andriod Based Application Development

1. Develop an application that uses components, Font and Colors.
2. Develop a native calculator application.
3. Develop an application that uses layout managers and events managers.
4. Write an application that draws basic graphical primitives on the screen.
5. Develop an application that creates an alert upon receiving a message
6. Develop an application that makes use of database.
7. Implement an application that implements multi-threading.
8. Develop a native application that uses GPS location information
9. Create a mobile application that creates alarm clock.
10. Create an application that makes use of Explicit and implicit intents.

Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
	40	40	12	60	

Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
	50	40	20	60	

Part E

Books	Lauren Darcey and Shane Conder, Android Wireless Application Development,Pearson Education, 2nd ed. (2011)
Articles	B.M.Harwani Android Programming Unleashed Pearson Education Inc 2013
eferences Books	Charlie Collins, Michael D.Galpin, Matthias Kappler,Android in Practice,DreamTech Press 2016
MOOC Courses	
Videos	

Course Articulation Matrix

ɔs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	1	-	1	1	1	-	-	-	-	-	-	-	1	2	3
2	-	2	-	2	2	-	-	-	-	-	-	-	2	1	-
3	-	2	1	-	1	-	-	-	-	-	-	-	1	2	1
04	1	2	-	1	2	-	-	-	-	-	-	-	2	3	-
05	-	1	2	-	-	-	-	-	-	-	-	-	1	2	1
06	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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Syllabus-2019-2020

(SOET)(BCA)

Title of the Course	Wireless and Mobile Communication
Course Code	BCA 604(B)

Part A

Year		**Semester**		**Credits**	L	T	P	C
					3	1	0	4
Course Type	Theory only							
Course Category	Disciplinary Minor							
Pre-Requisite/s	Basic knowledge of computer fundamentals and basic concepts of network.		**Co-Requisite/s**	Basic knowledge of computer fundamentals and basic concepts of network.				
Course Outcomes & Bloom's Level	**CO1-** Understanding the significance of the layered model, PDUs, SDUs, IDUs, and higher layer protocols, including switching and components.**(BL1-Remember)** **CO2-** The ability to develop applications that are mobile-device specific and demonstrate current practice in mobile computing contexts.**(BL2-Understand)** **CO3-** Understanding of the characteristics and limitations of mobile hardware devices including their user-interface modalities**(BL3-Apply)** **CO4-** Analyze QoS over wire and wireless channels**(BL4-Analyze)** **CO5-** Able to promote the awareness of the life-long learning,business ethics, professional ethics and currentmarketing scenarios.Able to promote the awareness of the life-long learning,business ethics, professional ethics and currentmarketing scenarios.**(BL5-Evaluate)**						
Coures Elements	Skill Development ✕ Entrepreneurship ✕ Employability ✕ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕	**SDG (Goals)**	SDG1(No poverty) SDG4(Quality education) SDG8(Decent work and economic growth) SDG10(Reduced inequalities) SDG12(Responsible consuption and production)					

Part B

Modules	Contents	Pedagogy	Hours
1	**Overview of OSI Model** : Significance of layered Model , PDUs, SDUs and IDUs, Higher layer Protocols. Switching and Components. Introduction, Applications, history, of wired & wireless Communication systems. **Radio Transmission**: frequencies, Signal propagation, Antenna, types of modulation, FHSS frequency hopping, frequency reuse, DSSS. Multiple Access technology for Wireless Communication : FDMA,TDMA,CDMA	Lecturing	8
2	**Cellular System**: Introduction, basic Architecture and components, Cellular Telephony. **Mobile Data Communication**: Fading, Small scale fading, Multi-path Fading, Hand off Management, Switching. **Authentication**: Sharing, without sharing scheme. **Types of Cellular systems:** Personal Communication Systems (PCS) Architecture.	Lecturing	8
3	**Digital Cellular Systems and Standards:** GSM System overview, Architecture, GSM Protocol Model, GSM Mobility Management, General Packet Service (GRPS) Architecture, GRPS Network, Interfaces and Procedures (2.5 G). **Wireless Application Protocol**: (WAP 2.0) model, architecture, Gateway, WAP protocols and WML. Wireless in Local Loop (WLL) architecture, products. **3G Mobile Services**: Overview on UMTS and International Mobile Telecommunications (IMT-2000).	PBL	8
4	WLAN : Components and working of Wireless LAN, Transmission Media for WLAN, Infrastructure & types of WLAN, Infrared technology Introduction to Bluetooth technology.	Case Study	8

	MANET and VANET: Architecture and applications. VSAT: Components of VSAT system, VSAT topologies, access schemes.		
5	**Android:** Mobile Application Programming, Different Platforms, Operating systems, Architecture and working of Android, iOS and Windows phone 8 Comparison of Android, iOS and Windows phone 8, Android Development Environment Advantages and Future of Android, Tools and about Android SDK.	Lecturing	8

Part C

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	40	40	12	60	
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**

Part E

Books	Schiller, J. H. (2003). Mobile Communications. Pearson Education.
Articles	
References Books	Rappaport, T. S. (2010). Wireless Communications: Principles And Practice, 2/E. Pearson Education India.
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	1	-	2	1	-	-	-	-	-	-	-	2	2	2
CO2	2	3	1	2	2	-	-	-	-	-	-	-	3	3	2
CO3	2	3	1	2	2	-	-	-	-	-	-	-	3	3	3
CO4	2	3	2	2	2	-	-	-	-	-	-	-	3	3	3
CO5	1	2	-	2	-	-	-	-	-	-	-	-	2	2	3
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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Syllabus-2019-2020

(SOET)(BCA)

Title of the Course	software project management
Course Code	BCA-601

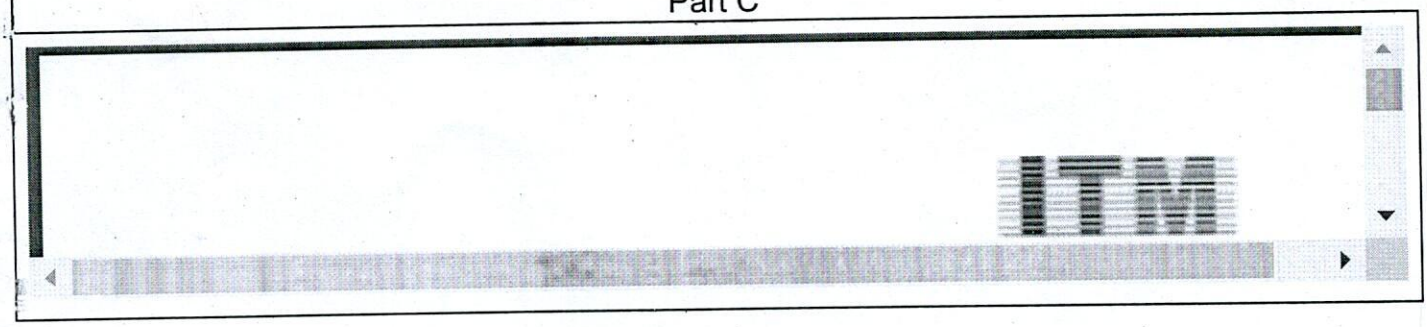
Part A

Year		**Semester**		**Credits**	L	T	P	C
					3	1	1	5
Course Type	Embedded theory and lab							
Course Category	Discipline Core							
Pre-Requisite/s	Prerequisite: basics of software engineering, Software Development models, and Testing strategies etc.		**Co-Requisite/s**					
Course Outcomes & Bloom's Level	**CO1-** CO1: To remember the concepts of Software Engineering, Software Project Management, project planning, needs, vision and scope.**(BL1-Remember)** **CO2-** CO2: To understand the Basic concept of project management, Dimensions of Project Monitoring and Control. **(BL2-Understand)** **CO3-** CO3: To apply various project management concepts, work breakdown structure and its life cycle and Scheduling methods**(BL3-Apply)** **CO4-** CO4: To analyze the various dimensions of Project Monitoring and Control, Error tracking and testing approaches.**(BL4-Analyze)** **CO5-** CO5: To evaluate the performance of various scheduling techniques and testing techniques. CO6: To create various scheduling and monitoring diagrams and their applications to solve real world problems.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕	**SDG (Goals)**						

Part B

Modules	Contents	Pedagogy	Hours
Unit-1	Fundamentals of Software Project Management (SPM), Need Identification, Vision and Scope document, Project Management Cycle, SPM Objectives, Management Spectrum, SPM Framework, Software Project Planning, Planning Objectives, Project Plan, Types of project plan, Structure of a Software Project Management Plan, Software project estimation, Estimation methods, Estimation models, Decision process.	Lectures with whiteboard/PPT, case study	13
Unit-2	Project Elements, Work Breakdown Structure (WBS), Types of WBS, Functions, Activities and Tasks, Project Life Cycle and Product Life Cycle, Ways to Organize Personnel, Project schedule, Scheduling Objectives, Building the project schedule, Scheduling terminology and techniques, Network Diagrams: PERT, CPM, Bar Charts: Milestone Charts, Gantt Charts.	Lectures with whiteboard/PPT, case study	12
Unit-3	Dimensions of Project Monitoring & Control, Earned Value Analysis, Earned Value Indicators: Budgeted Cost for Work Scheduled (BCWS), Cost Variance (CV), Schedule Variance (SV), Cost Performance Index (CPI), Schedule Performance Index (SPI), Interpretation of Earned Value Indicators, Error Tracking, Software Reviews, Types of Review: Inspections, Desk checks, Walkthroughs, Code Reviews, Pair Programming.	Lectures with whiteboard/PPT, case study	13
Unit-4	Testing Objectives, Testing Principles(, Test Plans, Test Cases, Types of Testing, Levels of Testing, Test Strategies, Program Correctness, Program Verification & validation, Testing Automation & Testing Tools, Concept of Software Quality, Software Quality Attributes, Software Quality Metrics and Indicators, The SEI Capability Maturity Model CMM), SQA Activities, Formal SQA Approaches: Proof of correctness, Statistical quality assurance, Cleanroom process	Lectures with whiteboard/PPT, case study	12
Unit-5	Software Configuration Management: Software Configuration Items and tasks, Baselines, Plan for Change, Change Control, Change Requests Management, Version Control, Risk Management: Risks and risk types, Risk Breakdown Structure (RBS), Risk Management Process: Risk identification, Risk analysis, Risk planning, Risk monitoring, Cost Benefit Analysis, Software Project Management Tools: CASE Tools, Planning and Scheduling Tools, MS-Project	Lectures with whiteboard/PPT, case study	10

Part C



Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	40	40	12	60	
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	50	40	20	60	

Part E

Books	Cotterell, M. Software Project Management. Tata McGraw-Hill.
Articles	
References Books	Royce, W. Software Project Management. Pearson Education.
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
CO2	-	-	-	-	-	2	-	-	-	-	-	-	-	-	2
CO3	1	-	-	-	-	-	-	-	-	-	-	-	3	2	3
CO4	2	2	-	2	-	-	-	-	-	-	-	-	3	2	3
CO5	2	2	-	1	-	-	-	-	-	-	-	-	3	2	3
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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Syllabus-2019-2020

(SOET)(BCA)

Title of the Course	Cloud Computing
Course Code	BCA-604 (A)

Part A

Year		**Semester**		**Credits**	L	T	P	C
					3	1	0	4
Course Type	Theory only							
Course Category	Discipline Core							
Pre-Requisite/s	Students must be familiar with the concepts of Information Technology, Database Management Systems and Data Structures.		**Co-Requisite/s**					
Course Outcomes & Bloom's Level	**CO1-** To remember the concepts of Cloud Computing, Virtualization, and data-intensive cloud computing **(BL1-Remember)** **CO2-** To understand the Basic concept of Computer networks, Cloud Computing, big data, and various Cloud Web Services for different applications.**(BL2-Understand)** **CO3-** To apply various virtualization tools in cloud computing.**(BL3-Apply)** **CO4-** To analyze the current issues in cloud computing like its security, energy efficiency, and data handling for different business areas.**(BL4-Analyze)** **CO5-** To evaluate and deploy various applications in a Cloud Computing environment to solve real-world problems.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) SDG4(Quality education) SDG8(Decent work and economic growth) SDG13(Climate action)				

Part B

Modules	Contents	Pedagogy	Hours
I	Overview of Cloud Computing : Vision of cloud computing, Defining a cloud, cloud computing reference model, Historical developments, Cloud computing services, types of clouds, Characteristics, benefits and cloud computing challenges.	Lecturing	8
II	Virtualization : Introduction, Characteristics of virtualized environments, Taxonomy of virtualization techniques, Pros and cons of virtualization, Technology- Xen, VMware, Microsoft Hyper-V, Economics of the cloud, Federation, Presence, Identity, and Privacy in the Cloud-Federation in the Cloud, Presence in the Cloud, Privacy and Its relation to Cloud-Based Information Systems, Secure Software Development Life Cycle (SecSDLC).	Lecturing	9
III	High throughput Computing : Data-Intensive Computing-Introduction, characterizing data-intensive computations, Historical perspective, Challenges ahead, Technologies for data-intensive computing, Concept of multi-cloud management, Challenges in managing heterogeneous clouds, benefits and advantages of multi-cloud management systems. Implementing Multi-Cloud Management System (e.g. RightScale Cloud Management System).	Lecturing	10
IV	Business Clouds : Cloud Computing in Business, Various Biz Clouds focused on industry domains, Amazon Web Services, Google AppEngine, Microsoft Azure. Scientific Applications-Healthcare: ECG Analysis in the Cloud, Geoscience: Satellite Image Processing, Business and Consumer Applications- CRM and ERP, Productivity, Social Networking, Media Applications, Multiplayer Online Gaming.	Application Based Activity, Project Based Activity, Online Certification	10
V	Future directions in Cloud Computing : Future technology trends in Cloud Computing with a focus on Cloud service models, deployment models, cloud applications, and cloud security. Energy efficiency in clouds, Market-based management of clouds, Third-party cloud services, Current issues in cloud computing leading to future research directions.	Project Based Activity, Research Paper Writing	10

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	H
IV	Simple Web Application Deployment: :students needs to build a simple web application (e.g., static website) and deploy it on a cloud platform.	PBL	BL6-Create	10

Part D(Marks Distribution)

Theory

Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	40	40	12	60	

Practical

Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation

Part E

Books	Bunya, R. K., Bromberg, J., & Goscinski, A. (2011). Cloud computing: Principles and paradigms [Fourth Edition]. Wiley. Buyya, R., Vecchiola, C., & Selvi, S. T. (2013). Mastering Cloud Computing. Tata McGraw-Hill. Ritting House, J. W., & Ramsome, J. F. (2011). Cloud Computing. CRC Press.
Articles	-
References Books	Kaittwang, G. C., Fox, G. C., & Dongarra, J. J. (2017). Distributed and Cloud Computing. Elsevier India. Shroff, G. (2017). Enterprise Cloud Computing. Cambridge University Press.
MOOC Courses	https://nptel.ac.in/courses/106105167
Videos	-

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	-	-	-	2	2	-	-	-	1	-	-	3	2	3
CO2	3	1	1	2	2	3	-	-	-	1	-	-	3	-	3
CO3	3	3	1	-	2	2	-	-	-	-	-	-	3	3	3
CO4	3	3	-	2	2	-	-	-	-	-	-	-	3	3	3
CO5	2	3	-	1	2	-	-	-	-	-	-	-	3	3	3
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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Syllabus-2019-2020

(SOET)(MCA)

Title of the Course	Android Based Application Development
Course Code	MCA-306-(C)

Part A

Year		Semester		Credits	L	T	P	C
					0	0	3	3
Course Type	Lab only							
Course Category	Discipline Electives							
Pre-Requisite/s	Having the exposure about the object-oriented programming.			Co-Requisite/s				
Course Outcomes & Bloom's Level	**CO1-** To remember various syntax rules of the programming language such as java and XML**(BL1-Remember)** **CO2-** To understand Object Oriented concepts for Android and various mobile application development concepts including interface designing, handling multiple activities**(BL2-Understand)** **CO3-** To implement XML, Java and mysql for database connectivity and file system**(BL3-Apply)** **CO4-** To analyze various widgets and learn to use them as per the problem**(BL4-Analyze)** **CO5-** To develop solutions for real world problems using android application development**(BL5-Evaluate)**							
Features Elements	Skill Development ✓ Entrepreneurship ✗ Employability ✓ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✗		SDG (Goals)	SDG1(No poverty) SDG4(Quality education) SDG8(Decent work and economic growth)				

Part B

Modules	Contents	Pedagogy	Hours
	Getting Started with Mobility: Mobility Landscape, Mobile Platforms, Mobile Apps Development, Overview of Android Platform, Setting up the Mobile App Development Environment along with an Emulator, A Case Study on Mobile App development	whiteboard/PPT, Recorded video/interactive videos	08
2	**Basics of Java and XML:** Event Handling in Java, Events, Foreground Events, Background Events, Events Source, Listeners, Callback Methods, XML: Tags, Namespaces, Name Conflicts, Containers, Overview of Eclipse, Installation of Eclipse.	whiteboard/PPT, Recorded video/interactive videos	10
3	**Building Blocks of Mobile Apps:** App User Interface Designing - Mobile UI Resources (Layout, UI Elements, Drawable, Menu), Activity - States and Life Cycle, Interaction amongst Activities. App Functionality beyond User Interface - Threads, Asynchronous Task, Services - States and Life Cycle, Notifications, Broadcast Receivers.	whiteboard/PPT, Recorded video/interactive videos	9
	SQLite (DBMS): Telephony and SMS APIs Native Data Handling – On-device File I/O, Shared Preferences, Mobile Databases such as SQLite, Enterprise Data Access (via Internet/Intranet).	whiteboard/PPT, Recorded video/interactive videos	08
	Testing Mobile Apps and Taking Apps to Market: Debugging Mobile Apps, White Box Testing, Black Box Testing, Versioning, Signing and Packaging Mobile Apps, Distributing Apps on Mobile Market Place.	whiteboard/PPT, Recorded video/interactive videos	08

Part C

Project Based Learning on Andriod Based Application Development

1. Develop an application that uses components, Font and Colors.
2. Develop a native calculator application.
3. Develop an application that uses layout managers and events managers.
4. Write an application that draws basic graphical primitives on the screen.
5. Develop an application that creates an alert upon receiving a message
6. Develop an application that makes use of database.
7. Implement an application that implements multi-threading.
8. Develop a native application that uses GPS location information
9. Create a mobile application that creates alarm clock.
10. Create an application that makes use of Explicit and implicit intents.

Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	50	40	20	60	

Part E

Books	Lauren Darcey and Shane Conder, Android Wireless Application Development,Pearson Education, 2nd ed. (2011)
Articles	B.M.Harwani Android Programming Unleashed Pearson Education Inc 2013
References Books	Charlie Collins, Michael D.Galpin, Matthias Kappler,Android in Practice,DreamTech Press 2016
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	-	1	1	1	-	-	-	-	-	-	-	1	2	3
CO2	-	2	-	2	2	-	-	-	-	-	-	-	2	1	-
CO3	-	2	1	-	1	-	-	-	-	-	-	-	1	2	1
CO4	1	2	-	1	2	-	-	-	-	-	-	-	2	3	-
CO5	-	1	2	-	-	-	-	-	-	-	-	-	1	2	1
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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Syllabus-2019-2020

(SOET)(MCA)

Title of the Course	Data Science with Python
Course Code	MCA-405-A(T)

Part A

Year		Semester		Credits	L	T	P	C
					3	1	1	5
Course Type	Embedded theory and lab							
Course Category	Discipline Electives							
Pre-Requisite/s				Co-Requisite/s				
Course Outcomes & Bloom's Level	**CO1-** To remember the basic programming concept.**(BL1-Remember)** **CO2-** To understand the Basic concept of Data science, application areas and tools for data science**(BL2-Understand)** **CO3-** To implement Numpy for handling numerical data, pandas for handling data and basic and advanced visualization techniques to visualize the data. **(BL3-Apply)** **CO4-** To analyze the different domains of data, and perform cleaning and other preprocessing tasks on the data. **(BL4-Analyze)** **CO5-** To evaluate and summarize the data using statistical & visualization tools;**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG12(Responsible consuption and production)				

Part B

Modules	Contents	Pedagogy	Hours
	What is Data Science, The Many Paths to Data Science, What Makes Someone a Data Scientist, Advice for New Data Scientists, Applications of Data Science, Tools and techniques for Data Science.	lecturing	1
	NumPy: Creating arrays, Array Indexing: Field access, Basic Slicing, Advanced indexing, Basic operations and manipulations, Broadcasting, Applications of Broadcasting. Pandas: Series, Dataframe, Reading and Writing Data from csv, text and excel file, Statistics Summarizations, Viewing Data using built in functions, Filter Data Frames based on value condition, Built in Functions for basic operations, Grouping of Data	lecturing,Experiment	1
3	Data Analysis Understanding the Domain, Understanding the Dataset, Python package for data science, Importing and Exporting Data in Python, Basic Insights from Datasets Cleaning and Preparing the Data: Identify and Handle Missing Values, Data Formatting, Data Normalization Sets, Binning, Indicator variables Summarizing the Data Frame: Descriptive Statistics, Basic of Grouping, ANOVA, Correlation, More on Correlation.	lecturing,Experiment	1
	Introduction to Visualization Tools: Introduction to Data Visualization, Introduction to Matplotlib, Basic Plotting with Matplotlib, Line Plots, Area Plots, Histograms, Bar Charts Specialized Visualization Tools: Pie Charts, Box Plots, Scatter Plots, Bubble Plots.	lecturing,Experiment	1
	Advanced Visualization Tools: Waffle Charts,Word Clouds, Seaborn and Regression Plots. Creating Maps and Visualizing Geospatial Data: Introduction to Folium, Maps with Markers, Choropleth Maps.	PBL	1

Part C

PBL(Project Based Learning)
Assignment
Data science with Python

S.No.	Assignment
1.	Do the exploratory data analysis on the data set assigned to you to understand shape of data and other characteristics of the data set
2.	Preprocess the data to remove duplicates, null value , discretize , converting categorical data to numeric which ever is applicable.
3.	Generate different plots of data set to understand te distribution and layout in 2- D plane
4.	Create a learning model by splitting the data set into two parts :training and testing using simple linear regression and test it
5.	Create a learning model by splitting the data set into two parts :training and testing using polynomial linear regression and test it
6.	Compare the results of both the models :simple linear vs polynomial linear

Part D(Marks Distribution)

Theory					
otal Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
00	40	40	12	60	
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
00	50	40	20	60	

Part E

Books	VanderPlas, J. (Year of Publication). Python Data Science Handbook: Essential Tools for Working with Data. O'Reilly Media, Inc.
Articles	
References Books	McKinney, W. Python for Data Analysis: Data Wrangling with Pandas, NumPy, and IPython (2nd ed.). O'Reilly Media, Inc.
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	-	-	-	1	-	1	-	1	-	-	-	-	-	-
CO2	1	-	1	-	1	-	-	-	-	-	-	1	-	1	-
CO3	1	1	1	1	1	-	-	-	1	-	1	-	1	1	1
CO4	-	1	1	1	1	-	-	-	1	-	1	-	1	-	1
CO5	-	1	-	1	-	1	1	1	1	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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Syllabus-2019-2020

(SOET)(MCA)

Title of the Course	Cryptography and Network Security
Course Code	MCA-405-B(T)

Part A

Year		**Semester**		**Credits**	L	T	P	C
					3	1	1	5
Course Type	Embedded theory and lab							
Course Category	Discipline Electives							
Pre-Requisite/s	A strong understanding of mathematical principles, such as linear algebra, number theory, and combinatorics.		**Co-Requisite/s**					
Course Outcomes & Bloom's Level	**CO1-** : Remembering/Revising the basics of computer system, Computer networks and network security **(BL1-Remember)** **CO2-** : Understand the Cryptography and Encryption techniques and the concepts of Hashing **(BL2-Understand)** **CO3-** : Apply the various Symmetric and Asymmetric Key Encryption algorithms**(BL3-Apply)** **CO4-** : Explain the various Encryption and Hashing techniques and analyze the concept of Digital Signatures, IP Security**(BL4-Analyze)** **CO5-** : Evaluating the various methods of Cryptography, Hash functions, Substitution and Transposition techniques**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✗ Employability ✗ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✗		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) SDG4(Quality education)				

Part B

Modules	Contents	Pedagogy	Hours
	Introduction: Computer Security Concepts, Attacks, Services and Mechanisms, Security Attacks, types of attacks- Layer and cryptography-Authorization-Key, Security Services, Integrity check, Cipher Model, Substitution Techniques, Transposition Techniques, Viruses.	Lecturing	8
	Introduction to Cryptography:Fundamentals Principles of Cryptography, Quantum cryptography, Introduction- Secret Key cryptography, Public Key Cryptography, Security Services. Conventional Encryption: Classical Techniques, Conventional Encryption Model, Stegenography, Classical Encryption Techniques. Modern Techniques: Data Encyption Standard (DES), Triple DES, Block Cipher Principles, DES Standard, DES Strength, Block Cipher Modes of Operation	Lecturing, Experiments	8
	Public key Cryptography And Authentication:Public Key Encryption: Public-Key Cryptography: Principles Of Public-Key Cryptosystems, RSA Algorithm, Key Management, Public-Key Infrastructure(PKI), Fermat's & Euler's Theorem, Diffie-Hellman, Authentication: Password based Authentication, Address based Authentication, Cryptographic Authentication Protocols, Passwords as Cryptographic Keys, Trusted Intermediaries, Multiple Trusted Intermediaries and Session Key Establishment.	Lecturing, Experiments	8
	Hash function and Digital Signature Message authentication and Hash function: Hash function, Requirements, Security, Hash algorithm: MD5 message digest algorithm, Digital signature, Digital Signature Standard., X.509 certificates	Lecturing, Experiments	8
	Web and System Security Web- Security, Threats, Secure Sockets Layers (SSL), Electronic mail security: Pretty Good privacy,S/MIME, IP Security Overview, IP Security Architecture: Authentication	Lecturing	8

Header, ESP, Firewalls, System Security, Viruses, Malicious Program, Nature of Viruses, Types Of Viruses, mutual		

Activity I

(Cryptography and Network Security)

Activity type: Review Article

Individual Activity

Mode of submission: online & Hard Copy

Maximum Marks: 15

Guidelines:

1. Each student must prepare a review article and presentation on the assigned topic / Domain.
2. Student Can Search Article at Following Link –
   a. Google Scholar - https://scholar.google.com/
   b. Web of Science - https://mjl.clarivate.com/search-results
   c. SCI Hub - https://sci-hub.se/
3. Each student has to prepare the review article in IEEE paper format in a word file with at least 10 pages and 20 references and a power point presentation having at least 15 slides.
   Source : https://www.ieee.org/conferences/publishing/templates.html
4. The article must have plagiarism less than 15% checked using Turnitin Tool (Consult the faculty coordinator for the same)
5. Each paper should have at least 20 research paper references, all the references must be cited in IEEE format.
   (source : https://researchmethod.net/references-in-research/)
6. All the figures, diagrams, images or tables must also be cited.
7. This is an individual activity so each student has to work on a different topic.

Activity II

(Cryptography and Network Security)

Activity type: Seminar & Presentation

Individual Activity

Mode of submission: online & Hard Copy **Maximum marks: 10**

Guidelines:

1. Each student must select a topic for presentation from the syllabus of MCA-205 cryptography.
2. Student must prepare a report and a presentation in power point on the selected topic coveringthe syllabus.
3. Each student has to prepare a report in word file with at least 10 pages and a power pointpresentation having at least 15 slides.
4. The time allocated for presentation to each of the student is 7 mins. And for Q/A 3 minutes.
5. The student must carry or arrange from the lab, the equipment / software / tools required forpresentation on the day of respective activity.
6. The final hard copy submitted should be a file carrying all Introduction, Report and print out ofppt.
7. This is an individual activity so each student has to work on a different topic.

(Cryptography and Network Security)

Practical List

Set – A

Marks : 20

***Submit their program code with screenshots of output by taking different- different inputs.**

[1] Implement Caesar cipher (K=2) in any preferred language.

[2] Implement monoalphabetic cipher in any preferred language.

[3] W.A.P to implement Euclidean Algorithm

[4] Implement Playfair cipher in any preferred language.

[5] Implement Rail Fence technique (rail=2) in any preferred language.

[6] W.A.P to implement Vigenère Algorithm

[7] W.A.P to implement the DES Logic,

[8] Implement the MD5 Algorithm.

[9] W.A.P to implement the Digital Signature Algorithm

[10] W.A.P to create a tool for encryption and decryption technique with time calculation.

Set – B

Marks : 20

***Submit their program code with screenshots of output by taking different- different inputs.**

[1] Implement Caesar cipher (K=2) in any preferred language.

[2] Implement monoalphabetic cipher in any preferred language.

[3] W.A.P to implement Euclidean Algorithm

[4] Implement Playfair cipher in any preferred language.

[5] Implement Rail Fence technique (rail=2) in any preferred language.

[6] W.A.P to implement Vigenère Algorithm

[7] W.A.P to implement the DES Logic,

[8] Implement the MD5 Algorithm.

[9] W.A.P to implement the Digital Signature Algorithm

[10] W.A.P to create a tool for encryption and decryption technique with time calculation.

Set – C

Marks : 20

***Submit their program code with screenshots of output by taking different- different inputs.**

[1] Implement Caesar cipher (K=5) in any preferred language.

[2] Implement Column Transposition in any preferred language.

[3] W.A.P to implement Diffie Hellman key exchange.

[4] Implement Polyalphabetic cipher in any preferred language.

[5] Implement Rail Fence technique (rail=4) in any preferred language.

[6] W.A.P to implement vernam Algorithm

[7] W.A.P to implement the IDEA algorithm.

[8] Implement the SHA-512 Algorithm.

[9] W.A.P to implement the RSA Algorithm

[10] W.A.P to create a tool for encryption and decryption technique with time calculation.

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
00	40	40	12	60	
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
0	50	40	20	60	

Part E

Books	Stallings, W. (2011). Cryptography and network security principles and practices. Prentice Hall.
Articles	Forouzan, B. A., & Mukhopadhyay, D. (2011). Cryptography and network security. Tata Mcgraw Hill Education Private Ltd.
References Books	Kahate, A. (2011). Cryptography and network security. Tata Mcgraw Hill education Private Ltd.
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	1	-	1	1	-	-	-	-	-	-	-	1	-	1
CO2	-	1	2	-	3	-	-	1	-	-	-	-	1	-	2
CO3	-	1	-	-	1	-	-	1	-	-	-	-	3	-	3
CO4	-	-	-	-	1	-	1	-	-	-	-	-	2	1	2
CO5	-	1	-	-	2	2	1	-	-	-	-	-	2	2	2
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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Syllabus-2019-2020

(SOET)(MCA)

Title of the Course	Cloud Computing
Course Code	MCA-502(T)

Part A

Year		**Semester**		**Credits**	L	T	P	C
					3	1	0	4
Course Type	Theory only							
ɔurse Category	Discipline Core							
Pre-Requisite/s	Students must be familiar with the concepts of Information Technology, Database Management Systems and Data Structures.		**Co-Requisite/s**					
urse Outcomes Bloom's Level	**CO1-** To remember the concepts of Cloud Computing, Virtualization, and data-intensive cloud computing**(BL1-Remember)** **CO2-** To understand the Basic concept of Computer networks, Cloud Computing, big data, and various Cloud Web Services for different applications.**(BL2-Understand)** **CO3-** To apply various virtualization tools in cloud computing.**(BL3-Apply)** **CO4-** To analyze the current issues in cloud computing like its security, energy efficiency, and data handling for different business areas.**(BL4-Analyze)** **CO5-** To evaluate and deploy various applications in a Cloud Computing environment to solve real-world problems.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✕ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) SDG4(Quality education) SDG8(Decent work and economic growth) SDG13(Climate action)				

Part B

Modules	Contents	Pedagogy	Hours
I	Introduction: Historical development, Vision of Cloud Computing, Characteristics of cloud computing as per NIST , Cloud computing reference model ,Cloud computing environments, Cloud services requirements, Cloud and dynamic infrastructure .Overview of cloud applications	Lecturing	8
II	Cloud Computing Architecture: Cloud Reference Model, Types of Clouds, Cloud Interoperability & Standards, Scalability and Fault Tolerance, Cloud Solutions: Cloud Ecosystem, Cloud Business Process Management, Cloud Service Management. Cloud Offerings: Virtual Desktop Infrastructure.	Lecturing	9
III	Cloud Management & Virtualization Technology: Asset Management, Concepts of Map reduce , Cloud Governance, High Availability and Disaster Recovery. Virtualization: Fundamental concepts of compute, storage, networking, desktop and application virtualization .Virtualization benefits, server virtualization, Block and file level storage virtualization Hypervisor management software, Infrastructure Requirements , Virtual LAN(VLAN) and Virtual SAN(VSAN) and their benefits .	Lecturing	10
IV	Cloud Security: Cloud Information security fundamentals, Cloud security services, Design principles, Secure Cloud Software Requirements, Cloud Computing Security Challenges, Virtualization security Management, Cloud Computing Security Architecture.	Application Based Activity, Project Based Activity, Online Certification	10
V	Market Based Management of Clouds, Federated Clouds/Inter Cloud: Characterization & Definition, Third Party Cloud Services.Case study: Google App Engine, Hadoop, Amazon	Project Based Activity, Research Paper Writing	10

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
	Simple Web Application Deployment: :students needs to build a simple web application (e.g., static website) and deploy it on a cloud platform.	PBL	BL6-Create	10

Part D(Marks Distribution)

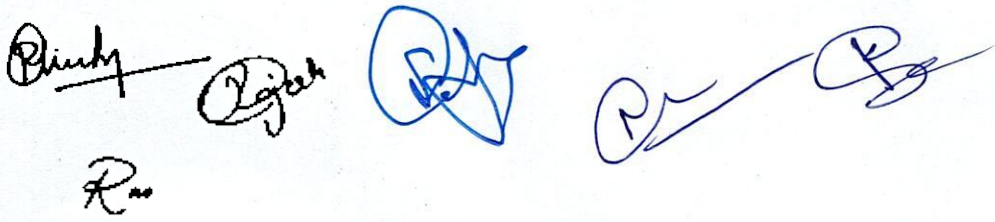
Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
00	40	40	12	60	
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**

Part E

Books	Bunya, R. K., Bromberg, J., & Goscinski, A. (2011). Cloud computing: Principles and paradigms [Fourth Edition]. Wiley. Buyya, R., Vecchiola, C., & Selvi, S. T. (2013). Mastering Cloud Computing. Tata McGraw-Hill. Ritting House, J. W., & Ramsome, J. F. (2011). Cloud Computing. CRC Press.
Articles	-
ferences Books	Kaittwang, G. C., Fox, G. C., & Dongarra, J. J. (2017). Distributed and Cloud Computing. Elsevier India. Shroff, G. (2017). Enterprise Cloud Computing. Cambridge University Press.
MOOC Courses	https://nptel.ac.in/courses/106105167
Videos	-

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	-	-	-	2	2	-	-	-	1	-	-	3	2	3
CO2	3	1	1	2	2	3	-	-	-	1	-	-	3	-	3
CO3	3	3	1	-	2	2	-	-	-	-	-	-	3	3	3
CO4	3	3	-	2	2	-	-	-	-	-	-	-	3	3	3
CO5	2	3	-	1	2	-	-	-	-	-	-	-	3	3	3
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



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CELEBRATING DREAMS

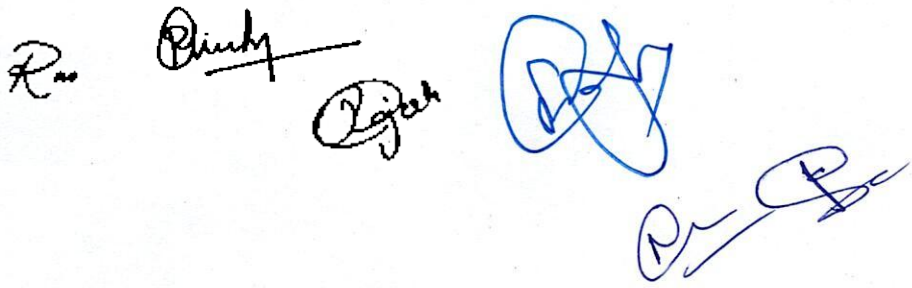
Syllabus-2019-2020

(SOET)(MCA)

Title of the Course	Machine Learning
Course Code	MCA-504-A(T)

Part A

Year		**Semester**		**Credits**	L	T	P	C
					3	1	1	5
Course Type	Embedded theory and lab							
Course Category	Discipline Electives							
Pre-Requisite/s	Basic understanding of Statistical Data Analysis and visualization methods, and Python Programming.			**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** To understand Basic concept of machine learning, various machine learning models**(BL1-Remember)** **CO2-** To understand various Performance evaluation techniques of Machine Learning models. **(BL2-Understand)** **CO3-** To implement various supervised, unsupervised and reinforcement machine Learning Models **(BL3-Apply)** **CO4-** To train & test various machine Learning models using different domains of dataset. **(BL4-Analyze)** **CO5-** To evaluate and summarize the performance of various machine learning models using statistical & visualization tools**(BL5-Evaluate)** **CO6-** To create machine learning models to solve real world problems.**(BL6-Create)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✗ Employability ✓ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✗		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) SDG4(Quality education) SDG8(Decent work and economic growth)				



Part B

Modules	Contents	Pedagogy	Hours
	Introduction of Machine Learning: What is Machine Learning, Need for Machine Learning, Why & When to Make Machines Learn?, Machine Learning Model, Challenges in Machines Learning, Applications of Machines Learning, Overview of various machine Learning Algorithms, Performance evaluation measures for machine learning algorithms, the curse of dimensionality, Data Feature Selection, Training Data vs. Validation Data vs. Test Data for ML Algorithms, bias-variance trade off, over fitting vs under fitting.	Lectures with whiteboard/PPT, Experiments	9
	Supervised Learning-I Regression: Introduction to Regression, Types of Regression Models, Introduction to Linear Regression, Simple Linear Regression, Least square regression, Gradient Descent , Multiple Linear Regression (MLR), Regularization in Linear Regression, Ridge regression, Lasso regression, Polynomial Regression, Support Vector for Regression (SVR).	Lectures with whiteboard/PPT, Experiments	10
	Supervised Learning-II Classification – Introduction to Classification, Types of Learners in Classification, Logistic Regression, K-Nearest Neighbors (K-NN), Support Vector Machine (SVM), Kernel SVM, Naive Bayes, Decision Tree Classification, Random Forest Classification.	Lectures with whiteboard/PPT, Experiments	9
	Unsupervised Learning Clustering-Introduction to Clustering, Types of Clustering, Types of Clustering Algorithms, K-Means Clustering, Hierarchical Clustering, DBSCAN Clustering, Association Rule Learning: Introduction to Association Rule Learning, Types of Association Rule Learning, Apriori Algorithm, Eclat Algorithm, F-P Growth Algorithm, Applications of Association Rule Learning.	Lectures with whiteboard/PPT, Experiments	9
	Reinforcement Learning: Introduction of Reinforcement Learning, Terms used in Reinforcement Learning, Key Features, Elements of Reinforcement Learning, How does Reinforcement Learning Work?, The Bellman Equation, Types of Reinforcement learning, Markov Decision Process, Reinforcement Learning Algorithms, Reinforcement Learning Applications Performance Improvement of ML Models: Performance Improvement with Ensembles, Ensemble Learning Methods, Bagging Ensemble Algorithms, Boosting Ensemble Algorithms, Voting Ensemble Algorithms.	Lectures with whiteboard/PPT, Experiments	8

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
	Implementation of various performance evaluation techniques of machine learning	Experiments	BL3-Apply	02
	Implementation of various regression models of machine learning	Experiments	BL3-Apply	04
	Implementation of various classification models of machine learning	Experiments	BL3-Apply	03
	Implementation of various clustering models of machine learning	Experiments	BL3-Apply	03
	Implementation of RL, bagging and boosting models of machine learning	Experiments	BL3-Apply	03
	Problem Based Learning for real world problems	PBL	BL6-Create	15

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
00	40	40	12	60	
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	50	40	20	60	

Part E

Books	Andreas C. Müller, Sarah Guido.(2016).Introduction to Machine Learning with Python: A Guide for Data Scientists.1st ed.O'Reilly Media.
Articles	
References Books	Tom M. Mitchell.(2017).Machine Learning.1st ed.McGraw Hill Education. Dr S. Sridhar, Dr M. Vijayalakshmi.(2021).Machine Learning.1st ed. Oxford University Press. Manaranjan Pradhan, U Dinesh Kumar.(2019).Machine Learning using Python.1st ed. Wiley India.
MOOC Courses	Prof. S. Sarkar.(2023).Introduction to Machine Learning, IIT Kharagpur.https://nptel.ac.in/courses/106105152 Dr. Balaraman Ravindran.(2024).Introduction to Machine Learning, IIT Madras.https://nptel.ac.in/courses/106106139
Videos	

Course Articulation Matrix

s	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
O1	1	-	-	-	2	2	-	-	-	2	-	-	1	-	1
CO2	1	2	1	2	2	2	-	-	-	2	-	-	1	-	3
O3	2	1	1	-	1	-	-	-	-	-	-	-	3	2	3
CO4	2	2	-	2	1	-	-	-	-	-	-	-	2	3	3
O5	2	2	-	2	1	-	-	-	-	-	-	-	2	2	3
O6	2	1	1	2	2	-	-	-	-	2	-	-	2	2	3

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Syllabus-2019-2020

(SOET)(MCA)

Title of the Course	Cyber Security Fundamentals and Cyber Audit Essentials
Course Code	MCA-504-B

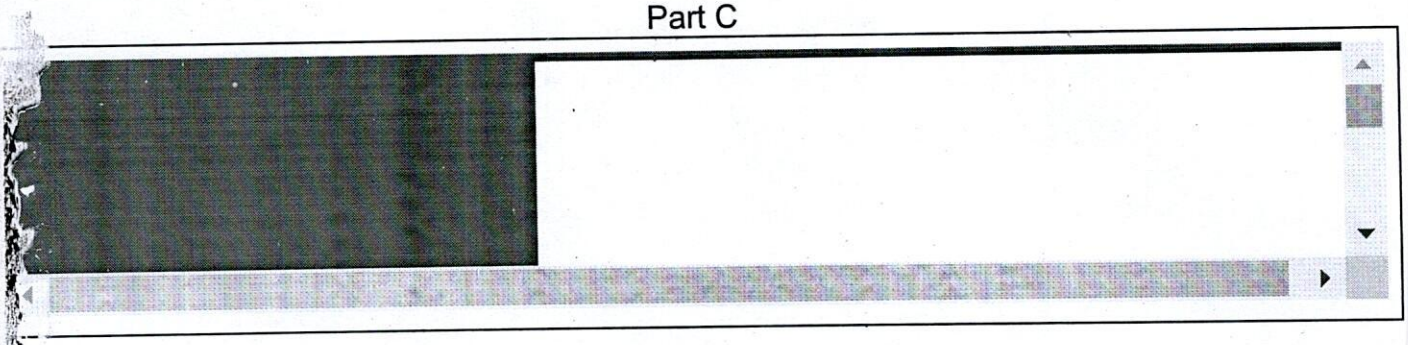
Part A

Year		**Semester**		**Credits**	L	T	P	C
					3	1	1	5
Course Type	Embedded theory and lab							
Course Category	Discipline Electives							
Pre-Requisite/s	Knowledge of Computer Network , Computer Architecture , Digital principals is essential		**Co-Requisite/s**	Knowledge of internet browsers and virtual eenvironment creation is must				
Course Outcomes & Bloom's Level	**CO1-** Understand the cybercrimes, Various attacks performed on network and technique of auditing the digital devices **(BL1-Remember)** **CO2-** Apply the principles of identification of crimes and apply it to prepare the audit report. **(BL2-Understand)** **CO3-** Analyze the data from digital devices for forensic analysis and finalize the audit report **(BL4-Analyze)** **CO4-** Evaluation of various crimes and the techniques applied to perform the crimes in digital world. **(BL5-Evaluate)** **CO5-** Create automated applications for detection of crimes **(BL6-Create)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✕ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG4(Quality education)				

Part B

Modules	Contents	Pedagogy	Hours
Unit I	Introduction to Cyber Crime and Cyber Laws Cyber Crimes, Types of Cybercrime, Hacking, Attack vectors, Cyberspace and Criminal Behavior, Clarification of Terms, Traditional Problems Associated with Computer Crime, Computer Language, Network Language, Realms of the Cyber world, A Brief History of the Internet, Recognizing and Defining Computer Crime, Contemporary Crimes, Computers as Targets, Contaminants and Destruction of Data, Cyber Laws and Ethics.	Lectures with whiteboard/PPT, Recorded video/interactive videos	10
Unit II	Cyber Crime Issues and Investigation Unauthorized Access, Computer Intrusions, White collar Crimes, Viruses and Malicious Code, Internet Hacking and Cracking, Virus Attacks, Pornography, Software Piracy, Intellectual Property, Mail Bombs, Exploitation, Stalking and Obscenity in Internet, Digital laws and legislation, Law Enforcement Roles and Responses, Investigation Tools, E-Mail Investigation, E-Mail Tracking, IP Tracking, E-Mail Recovery, Search and Seizure of Computers, Password Cracking .	Lectures with whiteboard/PPT, Recorded video/interactive videos, programming labs	12
Unit III	Biometric Systems and its Security Biometric fundamentals, Biometric technologies, Biometrics Vs traditional techniques, Biometric System and Security essentials, Privacy Issues in Biometric Security, Standards in Biometric security,	Lectures with whiteboard/PPT, Recorded video/interactive videos, Case sTudy	9
Unit IV	Digital Evidence Cyber crime and digital evidence: what is cyber crime, types of cyber crimes, digital evidence, Digital Vs Physical Evidence, Nature of Digital Evidence, Precautions while dealing with Digital Evidence, Digital Evidence Collection, Evidence Preservation, Recovering Deleted Evidences,	Lectures with whiteboard/PPT, Recorded video/interactive videos, programming labs	11
Unit V	Digital Auditing Cyber Audit Essentials, Compliance Audit, International Standards, ISO27001, Audit of Windows Systems, Audit of Linux systems, Audit of network devices (Switch/Servers), Audit of Websites and Web Applications. Steps for hardening your System. Preparation of an Audit Report.	Lectures with whiteboard/PPT, Recorded video/interactive videos, programming labs	10

Part C



Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	40	40	12	60	
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	50	40	20	60	

Part E

Books	1. Digital Forensics, DSCI - Nasscom, 2012. 2. Cyber Crime Investigation, DSCI - Nasscom, 2013. 3. John R Vacca, "Biometric Technologies and Verification Systems", Elsevier Inc, 2007
Articles	
References Books	
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	-	-	2	2	3	2	1	-	2	-	-	-	2	2
CO2	1	-	-	3	3	2	-	2	-	1	-	-	2	3	2
CO3	1	2	2	3	3	2	3	2	-	3	-	1	3	3	2
CO4	-	2	2	3	2	-	-	-	-	-	-	1	1	-	3
CO5	-	2	2	1	-	-	-	-	-	-	-	-	3	2	3
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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Syllabus-2019-2020

(SOET)(MCA)

Title of the Course	Data Analytics
Course Code	MCA-505-A(T)

Part A

Year		Semester		Credits	L	T	P	C
					3	1	1	5

Course Type	Embedded theory and lab		
Course Category	Discipline Electives		
Pre-Requisite/s		Co-Requisite/s	
Course Outcomes & Bloom's Level	**CO1-** To understand the fundamentals of Big Data.**(BL1-Remember)** **CO2-** To know about the different tools for Big Data and Visualization.**(BL2-Understand)** **CO3-** To explore tools and practices for big data and Visualization.**(BL3-Apply)** **CO4-** To recognize the role of business intelligence and visualization in decision making.**(BL4-Analyze)** **CO5-** To analyze data using Power BI, Tableau etc.**(BL5-Evaluate)** **CO6-** To prepare design dashboard for presenting analytics from data.**(BL6-Create)**		
Coures Elements	Skill Development ✓ Entrepreneurship ✗ Employability ✓ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✗	SDG (Goals)	

Part B

Modules	Contents	Pedagogy	Hours
	Big Data: Fundamentals of Big Data, defining big data, building successful big data management architecture, big data journey Big Data Types: Structured and unstructured data types, real time and non-real time requirements. Distributed Computing: History of distributed computing, basics of distributed computing	lecturing	9
	Visualization: data visualization, appropriate data visualization technique for given data, design visualizations, dashboard Operational Databases: Relational database, nonrelational database, key-value pair databases, document databases, columnar databases, graph databases, spatial databases MapReduce Fundamentals: Origin of MapReduce, map function, reduce function, putting map and reduce together, optimizing map reduce.	lecturing,Experiment	10
	Data Aggregation and Group operations: Group by Mechanics, Data aggregation, General split-apply-combine, Pivot tables and cross tabulation. Time Series Data Analytics: Date and Time Data Types and Tools, Time series Basics, date Ranges, Frequencies and Shifting, Time Zone Handling, Periods and Periods Arithmetic, Resampling and Frequency conversion, Moving Window Functions.	lecturing,Experiment	9
	Hadoop: Discovering Hadoop, Hadoop distributed file system, Hadoop MapReduce, Hadoop file system, dataflow, Hadoop I/O, data integrity, compression, serialization, file- based data structure Chaining.	lecturing,Experiment	9
	Introduction to Hadoop Ecosystem: Avro - Avro data types and schemas, in-memory serialization and deserialization, avro datafiles, schema resolution Pig- Comparison with databases, pig latin, user defined functions, data processing operators Hive-Running hive, comparison with traditional databases, HiveQL, tables, querying data, userdefined functions Spark: Resilient distributed datasets, shared variables, anatomy of a spark job run, executors and cluster managers, HBase: HBasics, concepts, clients, HBase vs RDBMS, Praxis ZooKeeper: ZooKeeper services, building application with ZooKeeper	PBL	8

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
00	40	40	12	60	
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
00	50	40	20	60	

Part E

Books	Big Data Fundamentals: Concepts, Drivers & Techniques (The : Prentice Hall)
Articles	
References Books	Chris Eaton, Dirk Deroos et al. , "Understanding Big data", McGraw-Hill.
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	-	-	-	-	1	1	1	-	-	-	-	-	-	-
CO2	-	-	1	1	1	1	-	-	-	1	1	1	-	-	-
CO3	-	-	1	-	1	-	1	-	1	1	1	-	-	-	-
CO4	1	1	1	1	1	1	-	-	-	-	-	1	-	1	-
CO5	-	-	-	-	1	1	1	1	-	1	-	1	-	1	-
6	1	-	-	-	1	-	1	-	1	-	1	1	-	1	-

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Syllabus-2019-2020

(SOET)(MCA)

Title of the Course	Digital Forensics and Analytics
Course Code	MCA-505-B(T)

Part A

Year		**Semester**		**Credits**	L	T	P	C
					3	1	1	5
Course Type	Embedded theory and lab							
Course Category	Discipline Electives							
Pre-Requisite/s	Basic knowledge of computer fundamentals, hardware, algorithms and basic concepts of network.		**Co-Requisite/s**					
Course Outcomes & Bloom's Level	**CO1-** Remembering Computer Network basics and Network Defense Essentials**(BL1-Remember)** **CO2-** Understand the concepts of Digital Forensics Digital investigation, Digital crime scene Evaluation process**(BL2-Understand)** **CO3-** Apply to the identification of crime and investigate (apply).**(BL3-Apply)** **CO4-** Analyze the data from digital devices for forensic analysis and finalize the audit report(Analyse)**(BL4-Analyze)** **CO5-** Evaluating Evaluation of various crimes and the techniques applied to perform the crimes in digital world.(Investigate)**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✕ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕	**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) SDG3(Good health and well-being) SDG4(Quality education) SDG8(Decent work and economic growth) SDG10(Reduced inequalities)					

Part B

Modules	Contents	Pedagogy	Hours
	Introduction to Digital Forensics: Digital investigation, Digital crime scene evaluation process, Search & Seizure, Digital Forensic Lab Setup, Dead v/s Live Forensics, Types of Digital Evidences, Disk Imaging, Write Blockers, Data Recovery, Chain of Custody, Standard Operating Procedures, Investigation Guidelines, overview of tools, Slack Space, Virtual paging, Volatile Evidence Acquisition, Collection & Analysis	Lecturing, Experiments,	7
	Volume Analysis & File Systems Introduction, PC based partitions- DOS partitions, UNIX partitions, RAW partition, UNIX Console Log, Removable media, Server based partitions- BSD partitions, GPT & MBR partitions, multiple disk volumes- RAID, Disk Spanning, file system, File system category, FAT concepts and analysis, FAT data structure- Boot sector, FAT 32 FS info, Directory entries, Long file name directory entries, NTFS File System concepts, NTFS Analysis, NTFS data structure, Standard file attributes, Index attributes and data structures	Lecturing, Experiments, Case Study	8
	Digital Evidence Analysis Potential Evidences, Evidence collection form different devices, Artifact interpretation, Operating System artifacts analysis, Network Artifacts analysis, File Signatures, Registry Forensics, Last user Activity, MRU, NTUSER.DAT, MFT concepts, MFT Forensics,Multimedia Forensics, Metadata Analysis, Browser Forensics, History Extraction, Cookies based artifacts, Autofill Forms, Cache, Temp file, MAC OS Artifacts analysis, Linux OS Artifact Analysis	Lecturing, Experiments, Case Study	10
	NIX File Systems UNIX, Ext2 and Ext3 data structures, iNodes, Super block, group descriptor tables, Block bitmap, Extended attributes, Directory Entry, Symbolic Link, Hash trees, Journal data structures, UFS1 and UFS2 concepts and analysis, NFS Files Systems, HFS File Systems, CDF File systems, Hadoop File systems	Lecturing, Experiments, Case Study	10
	Forensic Tools Forensic tools collection, Automated v/s manual techniques, Open source forensic tools, Developing scripted tools for basic level investigation, Usage tools for disk imaging and Data recovery, Encase and FTK tools, Autopsy, UFED, XRY, Volatility, Rekall, RedLine, Network Miner, Anti forensics Techniques, Counter anti forensics.	Lecturing, Experiments, Case Study	10

Activity I

(Digital Forensic and Analytics)

Activity type: Survey

Individual Activity

Guidelines:

1. Create a questionnaire for testing general cyber security measures a layman should adopt . Each question in the questionnaire should contain one mark and should have four options for answer. No descriptive questions should be there in the questionnaire.

2. The questionnaire should contain 25 questions related to using safety measures an individual should take to safe guard his / her laptop / mobile/ tab etc.

3. In addition to these questions the questionnaire should also contain following questions which should have descriptive questions: Name, City, state, age as on 1.07.2023, gender, profession (This should be a dropdown list having following options: home maker, Service, Self-employed, student, teacher), phone no./ email id

4. The questionnaire should be shared with at least 50 people and at least 40 entries should be recorded.

5. This assignment should be created as a goggle form and the form as well as the excel sheet of responses should be uploaded as submission.

6. This is an individual activity and not a group activity.

Activity II

Digital Forensic and Analytics

Case Study

Guidelines:

1. This is an individual activity.
2. Please refer to the following list of web application threats and select any three of them:

Web Application Threats

01 Cookie Poisoning	07 Cross-Site Scripting (XSS)	13 Information Leakage
02 SQL Injection	08 Sensitive Data Exposure	14 Improper Error Handling
03 Injection Flaws	09 Parameter/Form Tampering	15 Buffer Overflow
04 Cross-Site Request Forgery	10 Denial of Service (DoS)	16 Insufficient logging and monitoring
05 Directory Traversal	11 Broken Access Control	17 Broken Authentication
06 Unvalidated Input	12 Security Misconfiguration	18 Log Tampering

3. Document the following about the threats selected:
    a. Attack Surface(s)
    b. Attack Vector(s)
    c. Methodology used for attack in form of block diagram
    d. An example or case study of this kind of attack performed
    e. Ways/methods/ tools/ command to detect the attacks in following environment:
        i. Window's
        ii. Linux
4. Comparative analysis of the attacks under consideration on following parameters:
    a. Attack surfaces used
    b. IOC
    c. Possible Damage level
5. The report should be in MS- word format on an A-4 size paper.
6. The report should be submitted in soft copy online as well as hard copy

Practical List

MCA-305 (Digital Forensic and Analytics)

1. Study of Computer Forensics and different tools used for forensic investigation
2. How to Recover Deleted Files using Forensics Tools
3. How to make the forensic image of the hard drive using FTK Forensics.
4. How to used sniffer tool in network forensics.
5. How to View Last Activity of Your PC
6. How to prepared the RAM Dump using FTK Tool
7. How to Collect Email Evidence in Victim PC
8. Find Last Connected USB on your system (USB Forensics)
9. Live Forensics Case Investigation using Autopsy
10. Comparison of two Files for forensics investigation by Compare IT software

Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	40	40	12	60	
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	50	40	20	60	

Part E

Books	Carvey, H. A. (2014). Windows Forensic Analysis Toolkit: Advanced Analysis Techniques for Windows 7. Syngress.
Articles	
References Books	Marshall, A. M. (2008). Digital Forensics: Digital Evidence in Criminal Investigation. Wiley-Blackwell.
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	-	1	2	-	-	-	-	-	-	-	-	2	1	1
CO2	-	1	1	1	2	-	-	-	-	-	-	-	1	2	1
CO3	2	2	1	1	2	-	-	-	-	-	-	-	3	2	3
CO4	-	2	1	2	-	-	-	-	-	-	-	-	2	1	3
CO5	2	2	1	-	1	-	-	-	-	-	-	-	1	2	2
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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Department of Electrical Engineering

ITM University Gwalior Campus, NH-44, Turari, Gwalior, (M.P.) - 475 001 INDIA
mail: info@itmuniversity.ac.in, web: www.itmuniversity.ac.in

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Department of Electrical Engineering

Minutes of BOS Meeting

In order to review the schemes of B. Tech. Electrical Engineering (Specialization in IoT & Sensors) a meeting of BOS was conducted in an online mode on 18th of August 2019 due to COVID- 19 pandemic. This meeting is in continuation of BOS meeting previously held on 16th of August 2018.

The following members were present in the meeting:

Sr. No.	Name	Designation	Digital Signature
1	Dr. Ranjeet Singh Tomar	Dean & Chairman	
3	Dr. G. S. Tomar	Expert	
4	Dr. Manish Sharma	Invitee Member	
5	Dr. Mukesh Pandey	Invitee Member	
5	Mr. Abhishek Saxena	Member	
6	Mr. Abhishek Tripathi	Member	
7	Mr. Upendra Kumar Bhusan	Member	

Subject- Agenda of meeting of Board of Studies in Electrical Engineering to held on 18-Aug-2019

1. Approval of Minutes of last BOS on 16-08-2018
2. Discussion on the scheme for B.Tech Electrical Engineering 2016-2020
3. Discussion on the scheme for B.Tech Electrical Engineering 2018-2022
4. Discussion on the syllabi of VII and VIII semester for B.Tech Electrical Engineering 2016-2020 Batch.
5. Discussion on the syllabi of III and IV semester for B.Tech Electrical Engineering 2018-2022 Batch
6. Network Analysis & Synthesis- ECL0307 as a new subject has been introduced in III semester of B. Tech. courses.
7. Wireless sensor networks & IOT- ECL0460 as a new subject has been introduced in IV semester of B. Tech. courses.
8. Advanced Microprocessors & Interfacing- ECL0515 as a new subject has been introduced in V semester of B. Tech. courses.
9. Principles of Sensors and IoT - ECL0202 as a new subject has been introduced in II semester of B. Tech. courses.

Note: Further changes in any course introduced by the regularity bodies will be incorporated after the approval of BOS / Academic Council.

Syllabus attached in Annexture-1

(Dr. Ranjeet Singh Tomar)
Dean and Chairman BOS
Department of Electrical Engineering
School of Engineering & Technology
ITM University Gwalior (MP)

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CELEBRATING DREAMS

Syllabus-2019-2020

(SOET)(BTech-ElectricalEngineering)

Title of the Course	Principles of Sensors and IoT
Course Code	ECL0202

Part A

Year		**Semester**		**Credits**	L	T	P	C
					2	1	2	5
Course Type	Theory only							
Course Category	Discipline Core							
Pre-Requisite/s				**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** To remember the basic definitions, key terminologies of Sensors, Smart Sensors, & IoT. **(BL1-Remember)** **CO2-** To understand the working principles, concepts, & circuit designs of various sensors. **(BL2-Understand)** **CO3-** To apply that how to make Sensors by using different electronic components, apply an integrated knowledge on the Sensors, work with and interpret the data obtained from various sensor applications**(BL3-Apply)** **CO4-** To analyse various parameters of sensors using simulation or performing experiments on kits.**(BL4-Analyze)** **CO5-** Evaluate performance of sensors & actuators for various applications.**(BL5-Evaluate)** **CO6-** To developed and create the sensors for real world IoT systems.**(BL6-Create)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG9(Industry Innovation and Infrastructure) SDG11(Sustainable cities and economies)				

Part B

Modules	Contents	Pedagogy	Hours
1	Introduction to Sensors: Sensors, Transducers, Difference between Sensor & Transducer, Different criteria to choose a sensor. Classification of Sensors: analog sensors, digital sensors, scalar sensors, vectored sensors. Need of Sensors. Temperature Sensors: Thermocouple-measuring principle and its applications, Resistive temperature detectors (RTD): used materials and construction and its applications. Thermistors: Principle and application. Comparison among Thermistor, Thermocouple, & RTD.	Lectures with whiteboard/PPT, Recorded video/interactive videos	12
2	Different types of Sensors: PIR sensor, Ultrasonic sensor, Gas Sensors, Proximity Sensor, Rain sensor, Touch Sensor, IR Sensor, Humidity Sensor, Semiconductor Sensors: working principle and its applications. Optical Sensors: Photodiodes, Photoresistor, PIN diode, Position Sensitive photo detectors, Pressure sensors. Chemical sensors: Electrochemical sensor, Amperometric and voltammetric sensors, potentiometric sensor, Bio sensors and applications	Lectures with whiteboard/PPT, Recorded video/interactive videos	12
3	Smart Sensors and Actuators: Architecture of sensor node, Components of Sensor, Participatory Sensing, Wireless sensor motes and its applications: Mica2/MicaZ Motes, TelosB Motes, XM1000 wireless mote, Indriya, IRIS, iSense, Preon32, Wasp Mote, WiSense Mote, panStamp NRG Mote . Actuators: Principle, Types and Examples of Actuators, Sensor Data Communication Protocols.	Lectures with whiteboard/PPT, Recorded video/interactive videos	12
4	Internet of things (IoT): An Overview: Basics, definition and vision of IOT, IoT Conceptual Framework, IoT Architectural View, Physical Design of IoT, Logical Design of IoT, Applications of IoT. RFID: features, working principle, and applications.	Audio/Video clips, group discussion, lecture with ppt, quiz	10
5	IoT Practical Applications: Definition & Essentials of IoT & IoT applications for: Home, Cities, Environment, Energy Systems, Retail, Logistics, Industry, Agriculture, Health & Lifestyle.	Audio/Video clips, group discussion, lecture with ppt, quiz	10

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
Unit:4	IOT based Smart specs	PBL	BL5-Evaluate	30
Unit:4	smart dustbin based on iot	PBL	BL5-Evaluate	30

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
0	0	0	0	0	0

Part E

Books	Arshdeep Bahga and Vijay Madisetti Internet of Things – A Hand-on Approach Universities press, 2015
Articles	
References Books	Donald Norris, The Internet of Things: Do-It-Yourself at Home Projects for Arduino, Raspberry Pi and Beagle Bone Black, McGraw Hill Publication
MOOC Courses	
Videos	http://www.iot-a.eu/public NPTEL Lectures for Introduction to IoT

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	-	-	-	2	2	-	-	3	3	-	-	3	2	2
CO2	3	1	2	1	1	2	2	1	2	3	1	-	3	3	3
CO3	-	1	3	2	1	2	2	2	-	1	-	3	3	3	2
CO4	1	2	2	3	2	-	-	2	-	-	2	1	3	2	2
CO5	-	-	-	-	1	2	-	-	-	-	2	-	3	-	3
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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CELEBRATING DREAMS

Syllabus-2019-2020

(SOET)(BTech-ElectricalEngineering)

Title of the Course	Principles of Sensors and IoT
Course Code	ECL0202

Part A

Year		**Semester**		**Credits**	L	T	P	C
					2	1	2	5
Course Type	Theory only							
Course Category	Discipline Core							
Pre-Requisite/s				**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** To remember the basic definitions, key terminologies of Sensors, Smart Sensors, & IoT. **(BL1-Remember)** **CO2-** To understand the working principles, concepts, & circuit designs of various sensors. **(BL2-Understand)** **CO3-** To apply that how to make Sensors by using different electronic components, apply an integrated knowledge on the Sensors, work with and interpret the data obtained from various sensor applications**(BL3-Apply)** **CO4-** To analyse various parameters of sensors using simulation or performing experiments on kits.**(BL4-Analyze)** **CO5-** Evaluate performance of sensors & actuators for various applications.**(BL5-Evaluate)** **CO6-** To developed and create the sensors for real world IoT systems.**(BL6-Create)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG9(Industry Innovation and Infrastructure) SDG11(Sustainable cities and economies)				

Part B

Modules	Contents	Pedagogy	Hours
1	Introduction to Sensors: Sensors, Transducers, Difference between Sensor & Transducer, Different criteria to choose a sensor. Classification of Sensors: analog sensors, digital sensors, scalar sensors, vectored sensors. Need of Sensors. Temperature Sensors: Thermocouple-measuring principle and its applications, Resistive temperature detectors (RTD): used materials and construction and its applications. Thermistors: Principle and application. Comparison among Thermistor, Thermocouple, & RTD.	Lectures with whiteboard/PPT, Recorded video/interactive videos	12
2	Different types of Sensors: PIR sensor, Ultrasonic sensor, Gas Sensors, Proximity Sensor, Rain sensor, Touch Sensor, IR Sensor, Humidity Sensor, Semiconductor Sensors: working principle and its applications. Optical Sensors: Photodiodes, Photoresistor, PIN diode, Position Sensitive photo detectors, Pressure sensors. Chemical sensors: Electrochemical sensor, Amperometric and voltammetric sensors, potentiometric sensor, Bio sensors and applications	Lectures with whiteboard/PPT, Recorded video/interactive videos	12
3	Smart Sensors and Actuators: Architecture of sensor node, Components of Sensor, Participatory Sensing, Wireless sensor motes and its applications: Mica2/MicaZ Motes, TelosB Motes, XM1000 wireless mote, Indriya, IRIS, iSense, Preon32, Wasp Mote, WiSense Mote, panStamp NRG Mote . Actuators: Principle, Types and Examples of Actuators, Sensor Data Communication Protocols.	Lectures with whiteboard/PPT, Recorded video/interactive videos	12
4	Internet of things (IoT): An Overview: Basics, definition and vision of IOT, IoT Conceptual Framework, IoT Architectural View, Physical Design of IoT, Logical Design of IoT, Applications of IoT. RFID: features, working principle, and applications.	Audio/Video clips, group discussion, lecture with ppt, quiz	10
5	IoT Practical Applications: Definition & Essentials of IoT & IoT applications for: Home, Cities, Environment, Energy Systems, Retail, Logistics, Industry, Agriculture, Health & Lifestyle.	Audio/Video clips, group discussion, lecture with ppt, quiz	10

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
Unit:4	IOT based Smart specs	PBL	BL5-Evaluate	30
Unit:4	smart dustbin based on iot	PBL	BL5-Evaluate	30

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
0	0	0	0	0	0

Part E

Books	Arshdeep Bahga and Vijay Madisetti Internet of Things – A Hand-on Approach Universities press, 2015
Articles	
References Books	Donald Norris, The Internet of Things: Do-It-Yourself at Home Projects for Arduino, Raspberry Pi and Beagle Bone Black, McGraw Hill Publication
MOOC Courses	
Videos	http://www.iot-a.eu/public NPTEL Lectures for Introduction to IoT

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	-	-	-	2	2	-	-	3	3	-	-	3	2	2
CO2	3	1	2	1	1	2	2	1	2	3	1	-	3	3	3
CO3	-	1	3	2	1	2	2	2	-	1	-	3	3	3	2
CO4	1	2	2	3	2	-	-	2	-	-	2	1	3	2	2
CO5	-	-	-	-	1	2	-	-	-	-	2	-	3	-	3
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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CELEBRATING DREAMS

Syllabus-2019-2020

(SOET)(BTech-ElectricalEngineering)

Title of the Course	Architecture of Smart IoT devices
Course Code	ECL0304[P]

Part A

Year		**Semester**		**Credits**	L	T	P	C
					3	1	1	5
Course Type	Embedded theory and lab							
Course Category	Discipline Core							
Pre-Requisite/s				**Co-Requisite/s**				
Course Outcomes & Bloom's Level								
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) SDG4(Quality education) SDG9(Industry Innovation and Infrastructure)				

Part B

Modules	Contents	Pedagogy	Hours

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	To study IoT Builder kit & its sub system.	Experiments	BL2-Understand	2
1	To implement a GUI python program to control LED.	Experiments	BL4-Analyze	2
2	To implement a python program to controlling LEDs and push buttons using GPIO pins.	Experiments	BL4-Analyze	2
2	To implement a python program to interface DC Motor with IoT Development Kit.	Experiments	BL4-Analyze	2
3	To interface python program control Stepper motor.	Experiments	BL4-Analyze	2
3	To send & Visualize data on Thing speak cloud Platform using NODE MCU.	Experiments	BL5-Evaluate	2
4	To analyze data on cloud Platform using NODE MCU.	Experiments	BL5-Evaluate	2
4	To implement a python program to interface Bluetooth Module with IoT Development Kit.	Experiments	BL4-Analyze	2

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
	50				
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	0	40	20	60	30

Part E

Books	
Articles	
References Books	
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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Syllabus-2019-2020

(SOET)(BTech-ElectricalEngineering)

Title of the Course	Architecture of Smart IoT devices
Course Code	ECL0304[T]

Part A

Year		**Semester**		**Credits**	L	T	P	C
					3	1	1	5
Course Type	Embedded theory and lab							
Course Category	Discipline Core							
Pre-Requisite/s	To understand the contents and successfully complete this course, a participant must have a basic understanding of Sensors, Actuators, Interfacing of devices, Arduino IDE software.			**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** To remember the basic definitions, key terminologies of Architecture of IoT, IoT architecture standards, Communication Technologies, Networking Technologies, IoT Protocols. **(BL1-Remember)** **CO2-** To understand the working principles, concepts, & circuit designs of various communication & Networking Technologies for IoT.**(BL2-Understand)** **CO3-** To apply that how to these technologies work with and interpret the data obtained from various IoT applications.**(BL3-Apply)** **CO4-** To analyse various IoT architecture reference models using simulation or performing experiments on IoT builder kit.**(BL4-Analyze)** **CO5-** Evaluate performance of IoT systems for various applications.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) SDG4(Quality education) SDG9(Industry Innovation and Infrastructure) SDG11(Sustainable cities and economies)				

Part B

Modules	Contents	Pedagogy	Hours
I	IoT Architecture Reference Model (ARM): IoT an Overview, Evolution of IoT, Need for ARM, IoT conceptual framework, IoT Architectural view: reference model definition, IoT reference model by CISCO, Oracle's IoT structure, Major components of IoT devices: Physical objects, Hardware, Communication Module, Software, IoT software components for device hardware. Development tools and Open-source Framework for IoT Implementation, Platforms and Integration tools	Whiteboard/PPT/Video	12
II	Programming Raspberry Pi: Introduction to Raspberry Pi, Basic Architecture, Pin Configuration, Installation, Interfacing of Sensors, Interfacing of Actuators & Display Devices with Raspberry Pi & Programming concepts.	PPTs/White Board/video	12
III	IoT Architecture standards: ETSI standard for IoT Architecture: Standards for IoT for Home, Energy, People, motion, City. IoT Communication Architecture: IoT nodes, IoT Edge, 6LOWPAN, IPv4/IPv6, MQTT, SMQTT, CoAP, XMPP, AMQP protocols	PPTs/White Board/video	10
IV	M2M Communication M2M Communication, M2M system Architecture: M2M device domain, M2M Network Domain, M2M application Domain, M2M applications, M2M software and development tools, Difference between M2M and IoT.	Whiteboard/PPT	10
V	IoT Case studies Cloud computing, cloud computing services, how to send data on cloud platforms like thing speak, Blynk etc. IoT case studies and mini projects based on Industrial automation, Transportation, Agriculture, Healthcare, Home Automation.	PPT/White board/video	10

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	40	40	None	60	None
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	50	40	None	60	None

Part E

Books	Arshdeep Bahga and Vijay Madisetti Internet of Things – A Hand-on Approach Universities press, 2015
Articles	IEEE Standards Association Working Group for an Architectural Framework for the Internet of Things (IoT) (P2413) - http://grouper.ieee.org/groups/2413/
References Books	Donald Norris The Internet of Things: Do-It-Yourself at Home Projects for Arduino, Raspberry Pi and Beagle Bone Black McGraw Hill Publication.
MOOC Courses	https://onlinecourses.nptel.ac.in/noc22_cs53/preview
Videos	http://www.iot-a.eu/public NPTEL Lectures for Introduction to IoT

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	2	-	-	-	3	-	-	-	-	1
CO2	3	2	1	-	-	2	-	-	-	3	-	-	2	-	2
CO3	1	2	1	3	2	-	-	-	-	-	-	-	2	2	2
CO4	1	2	1	3	-	-	-	-	-	-	-	-	3	3	3
CO5	1	2	-	2	-	-	-	-	-	-	-	-	2	3	3
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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Syllabus-2019-2020

(SOET)(BTech-ElectricalEngineering)

Title of the Course	Network Analysis & Synthesis
Course Code	ECL0307[P]

Part A

Year		**Semester**		**Credits**	L	T	P	C
					2	1	1	4
Course Type	Embedded theory and lab							
Course Category								
Pre-Requisite/s				**Co-Requisite/s**				
Course Outcomes & Bloom's Level								
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕	**SDG (Goals)**						

Part B

Modules	**Contents**	**Pedagogy**	**Hours**

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	To verify Kirchhoff's Current Law (KCL) and Kirchhoff's Voltage Law (KVL).	Experiments		2
4	Determination of the Z- Parameters of a Two-Port Network.	Experiments		2
4	Determination of the Y -Parameters of a Two-Port Network.	Experiments		2
4	Determination of the A, B, C, D Parameters of a Two-Port Network.	Experiments		2
4	Determination of the h- Parameters of a Two-Port Network.	Experiments		2
2	To verify the Superposition Theorem.	Experiments		2
2	To Verify Reciprocity Theorem	Experiments		2
2	To verify Thevenin's Theorem and find the equivalent circuit.	Experiments		2

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	50	40	12	60	28
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	0	40	20	60	30

Part E

Books	
Articles	
References Books	
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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Syllabus-2019-2020

(SOET)(BTech-ElectricalEngineering)

Title of the Course	Network Analysis & Synthesis
Course Code	ECL0307[T]

Part A

Year		**Semester**		**Credits**	L	T	P	C
					2	1	1	4
Course Type	Embedded theory and lab							
Course Category	Discipline Core							
Pre-Requisite/s	Basic concepts of DC circuits, AC circuits and laplace transform			**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** To remember the concepts of basic electric circuits.**(BL1-Remember)** **CO2-** To understand & gain the knowledge on basic network elements.**(BL2-Understand)** **CO3-** To implement the concept of TPN, RLC, RL, LC, RC circuits in other electronics devices.**(BL3-Apply)** **CO4-** To analyze the various electrical and electronics hardware circuit and Gain the knowledge about network Synthesis.**(BL4-Analyze)** **CO5-** To Evaluation of various electrical parameters (current, voltage, power etc.) of RLC circuits.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) SDG4(Quality education) SDG9(Industry Innovation and Infrastructure)				

Part B

Modules	Contents	Pedagogy	Hours
1	Introduction: Development of circuit concept- R,L&C elements, Conventions for describing network- current direction & dot, Network Equations	Whiteboard/PPT, Video	12
2	Transient analysis of RLC networks- RL ,LC, CR, RLC & Initial condition (Series & Parallel combinations)'	Whiteboard/PPT, Video	10
3	The Laplace Transform & its Application on Network Circuits – RL, LC, CR, RLC & Initial condition (series & parallel combinations) Transform of other Signal Variables : The sifted unit step functions, The ramp & impulse function ,Waveform synthesis, The initial and Final value of f(t) from F(s), The convolution integral , convolution as a summation	Whiteboard/PPT, Video	10
4	Network function: Poles and zeros, terminal pairs of ports, network function for one port and two port, the calculation of network function: ladder network general network, poles and zeros of network function. Two Port Parameters: Relation of two port variables, short circuit admittance parameters, the open circuit impedance parameters, Transmission parameters, the hybrid parameters, relation between parameters sets, parallel connection of two port network	Whiteboard/PPT, Video	10
5	Introduction to Network Synthesis: PRF & its properties, Basic synthesis procedure, Methods of synthesis, Driving point synthesis of one networks with two type of elements, Synthesis of RLC driving point functions.	Whiteboard/PPT, Video	10

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	50	40	20	60	30
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
0	0	0	0	0	0

Part E

Books	Van Valkenburg M.E, Network Analysis, Prentice Hall India
Articles	
References Books	D. Roy Chaudhary, Network Theory, Newage Asian
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	2	-	-	-	3	-	-	-	-	-
CO2	3	2	-	-	-	2	-	-	-	3	-	-	2	-	2
CO3	1	1	1	3	2	-	-	-	-	-	-	-	2	2	2
CO4	1	2	1	3	-	-	-	-	-	-	-	-	3	3	3
CO5	1	2	1	2	-	-	-	-	-	-	-	-	2	3	3
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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Syllabus-2019-2020

(SOET)(BTech-ElectricalEngineering)

Title of the Course	Wireless sensor networks & IOT
Course Code	ECL0460[P]

Part A

Year		**Semester**		**Credits**	L	T	P	C
					3	1	1	5
Course Type	Embedded theory and lab							
Course Category	Discipline Core							
Pre-Requisite/s				**Co-Requisite/s**				
Course Outcomes & Bloom's Level								
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**					

Part B

Modules	**Contents**	**Pedagogy**	**Hours**

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	To Study Sensor Node Configuration & Different Sensors with pin details.	Experiments	BL2-Understand	2
2	To understand the use of GSM Gateway (3G modem) & ZigBee Coordinator on IOT Development Platform.	Experiments	BL3-Apply	2
4	To write a Python Program for test Air Quality Sensor (SS151) with interfacing	Experiments	BL4-Analyze	2
5	A Python Program for test Soil Moisture Sensor (SS152).	Experiments	BL4-Analyze	2
4	Interfacing of Soil / Water Temperature Sensor (SS154). on IoT builder kit	Experiments	BL4-Analyze	2
3	To create a database in MYSQL using IOT Builder Kit.	Experiments	BL4-Analyze	2
4	To upload data on cloud using python. programming and interfacing	Experiments	BL4-Analyze	2
3	A Python Program for test Light Intensity Sensor (SS153).	Experiments	BL4-Analyze	2

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
	50				
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	0	40	20	60	30

Part E

Books	
Articles	
References Books	
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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CELEBRATING DREAMS

Syllabus-2019-2020

(SOET)(BTech-ElectricalEngineering)

Title of the Course	Wireless sensor networks & IOT
Course Code	ECL0460[T]

Part A

Year		**Semester**		**Credits**	L	T	P	C
					3	1	1	5
Course Type	Embedded theory and lab							
Course Category	Discipline Core							
Pre-Requisite/s				**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** To remember the basic terminologies of networking, sensor node architecture etc. **(BL1-Remember)** **CO2-** To understand the important functions, concepts, algorithms &types of WSNs, Protocols. **(BL2-Understand)** **CO3-** To apply the knowledge of programming to achieve a specific task/challenge. Gain knowledge about Power Management of WSNs**(BL3-Apply)** **CO4-** To analyse the results by using computer-based tools/kits for engineering applications. Use computer programming tools to process and visualize results**(BL4-Analyze)** **CO5-** To evaluate the applications of WSN in various fields such as research and industries**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕	**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) SDG4(Quality education) SDG9(Industry Innovation and Infrastructure) SDG11(Sustainable cities and economies)					

Part B

Modules	Contents	Pedagogy	Hours
I	Motivation for a Network of Wireless Sensor Nodes: Definitions and Background - Challenges and Constraints: Energy, Self-Management, Wireless Networking, Decentralized Management, Design Constraints, Security - Applications : Structural Health Monitoring, Traffic Control, Health Care, Pipeline Monitoring, Precision Agriculture, Active Volcano, Underground Mining	Whiteboard/PPT/Video	12
II	Node Architecture: The Sensing Subsystem, The Processor Subsystem, Communication Interfaces, Prototypes Medium Access Control: Characteristics of MAC Protocols in Sensor Networks, Contention-Free MAC Protocols, Contention-Based MAC Protocols, Hybrid MAC Protocols.	PPTs/White Board	12
III	Network Layer: Routing Metrics, Flooding and Gossiping, Data-Centric Routing, Proactive Routing, On-Demand Routing, Hierarchical Routing, Location-Based Routing, QoS-Based Routing Protocols.	Whiteboard/PPT	10
IV	IoT with Raspberry pi: Senor motes programming with python on Raspberry pi, Interfacing concepts with python Programming and data cloud concepts with raspberry pi. Remote access of Raspberry pi with Python, Interfacing of sensors & Actuators with Raspberry Pi. Localization: Ranging Techniques, Range-Based Localization, Range-Free Localization, Event-Driven Localization	PPTs/Videos	10
V	Integration of WSN to IoT: Integration approaches – stack-based approaches, topology-based approaches - SCADA network architecture - Security Challenges, Introduction to Simulation Tools of WSN like: NETSIM Simulation, COOJA Simulator, NS2 Simulator. Security: Fundamentals of Network Security, Challenges of Security in Wireless Sensor Networks, Security Attacks in Sensor Networks, Protocols and Mechanisms for Security, Security Protocols for Sensor Networks	PPT/Video	10

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
None	0	0	None	None	None
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
None	0	0	None	1. ArshdeepBahga and Vijay Madisetti Internet of Things – A Hand-on Approach Universities press, 2015 2. Dr Xuemin (Sherman) Shen Dr Yi Pan Fundamentals of Wireless Sensor Networks, Theory & Practices Wiley Series on Wireless Communications and Mobile Computing 3. Donald Norris The Internet of Things: Do-It-Yourself at Home Projects for Arduino, Raspberry Pi and Beagle Bone Black McGraw Hill Publication.	None

Part E

Books	None
Articles	Karan Bajaj, Bhisham Sharma, and Raman Singh Integration of WSN with IoT Applications: A Vision, Architecture, and Future Challenges Springer Nature Switzerland AG 2020
References Books	None
MOOC Courses	None
Videos	http://www.iot-a.eu/public NPTEL Lectures for Introduction to IoT

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	2	-	-	-	3	-	-	-	-	-
CO2	3	2	1	-	-	2	-	-	-	3	-	1	2	2	2
CO3	1	1	1	3	2	-	-	-	-	-	-	-	2	3	2
CO4	1	2	1	3	-	-	-	-	-	-	-	-	3	3	3
CO5	1	1	-	2	-	-	-	-	-	-	-	-	2	-	3
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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Syllabus-2019-2020

(SOET)(BTech-ElectricalEngineering)

Title of the Course	Advanced Microprocessors & Interfacing
Course Code	ECL0515[P]

Part A

Year		**Semester**		**Credits**	L	T	P	C
					5	3	2	10
Course Type	Embedded theory and lab							
Course Category	Foundation core							
Pre-Requisite/s	Basic knowledge of Digital System Design Course			**Co-Requisite/s**	Understanding the prerequisites of digital system design			
Course Outcomes & Bloom's Level	**CO1-** Assess and solve basic binary math operations using the microprocessor and explain the microprocessor's and Microcontroller's internal architecture and its operation within the area of manufacturing and performance.**(BL2-Understand)** **CO2-** Apply knowledge and demonstrate programming proficiency using the various addressing modes and data transfer instructions of the target microprocessor and microcontroller**(BL3-Apply)** **CO3-** Analyze assembly language programs; select appropriate assemble into machine a cross assembler utility of a microprocessor and microcontroller.**(BL4-Analyze)** **CO4-** Design electrical circuitry to the Microprocessor I/O ports in order to interface the processor to external devices.**(BL5-Evaluate)** **CO5-** Compare accepted standards and guidelines to select appropriate Microprocessor (8085 & 8086) and Microcontroller to meet specified performance requirements**(BL5-Evaluate)** **CO6-** To train their practical knowledge through laboratory experiments.**(BL6-Create)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG8(Decent work and economic growth) SDG9(Industry Innovation and Infrastructure)				

Part B

Modules	Contents	Pedagogy	Hours

4d style="border: 1px solid black;">Experiments

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	Write 8085 Assembly Language Program for Addition of two 8-bit numbers and Sum is 8 bit.	Experiments	BL3-Apply	2
2	Write 8085 Assembly Language Program for Addition of two 8-bit numbers and Sum is 16 bit.	Experiments	BL3-Apply	2
3	Write 8085 Assembly Language Program for Decimal Addition of two 8-bit numbers and Sum is 8 bit.	Experiments	BL4-Analyze	2
4	Write 8085 Assembly Language Program for 2's Complement of an 8-bit numbers.	Experiments	BL3-Apply	2
5	Write 8085 Assembly Language Program for finding the smallest number in an array of five different 8 bit numbers.	Experiments	BL4-Analyze	2
6	To study the Addressing Modes of Intel 8085 Microprocessor.	Experiments	BL2-Understand	2
7	To interface Programmable Peripheral Interface 8255 with 8085 and study its characteristics in Mode0, Mode1 and BSR Mode.	Experiments	BL5-Evaluate	2
8	To interface 8253 Interface Board with 8085 □p and verify the operation of 8253 in six different modes.	BL5-Evaluate	2	

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
	40				
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	0	40	20	60	30

Part E

Books	Ray, A.K. & Burchandi, K.M., (2012). Advanced Microprocessors and peripherals Architecture, Programming and interfacing. McGraw Hill (India) Private Limited.
Articles	
References Books	Brey, B.B., (2008).The Intel Microprocessors, Architecture , Programming and Interfacing. Pearson Education.
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	2	-	-	-	3	-	-	-	-	-
CO2	-	1	1	-	-	2	-	-	-	3	-	-	-	-	-
CO3	-	2	1	2	2	-	-	-	-	-	-	-	-	-	-
CO4	-	2	1	3	-	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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Syllabus-2019-2020

(SOET)(BTech-ElectricalEngineering)

Title of the Course	Advanced Microprocessors & Interfacing
Course Code	ECL0515[T]

Part A

Year		**Semester**		**Credits**	L	T	P	C
					3	1	1	5
Course Type	Embedded theory and lab							
Course Category	Interdisciplinary Major							
Pre-Requisite/s	Basic knowledge of Digital System Design Course			**Co-Requisite/s**	Understanding the prerequisites of digital system design			
Course Outcomes & Bloom's Level	**CO1-** Assess and solve basic binary math operations using the microprocessor and explain the microprocessor's and Microcontroller's internal architecture and its operation within the area of manufacturing and performance.**(BL1-Remember)** **CO2-** Apply knowledge and demonstrate programming proficiency using the various addressing modes and data transfer instructions of the target microprocessor and microcontroller**(BL3-Apply)** **CO3-** Analyze assembly language programs; select appropriate assemble into machine a cross assembler utility of a microprocessor and microcontroller.**(BL4-Analyze)** **CO4-** Design electrical circuitry to the Microprocessor I/O ports in order to interface the processor to external devices.**(BL5-Evaluate)** **CO5-** Compare accepted standards and guidelines to select appropriate Microprocessor (8085 & 8086) and Microcontroller to meet specified performance requirements**(BL5-Evaluate)** **CO6-** To train their practical knowledge through laboratory experiments.**(BL6-Create)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✗ Employability ✓ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✗		**SDG (Goals)**	SDG8(Decent work and economic growth)				

Part B

Modules	Contents	Pedagogy	Hours
1	Introduction to microprocessor, Evolution of Microprocessors' Overview of 8 bit microprocessor (8085): Pin configuration and Internal architecture' Registers, ALU. Interrupts. Assembly language programming'	Talks and presentations	13
2	l6 bit Microprocessor (8086) - Register organization, Architecture of 8086- BIU and EU, Memory Segmentation, Pin description' Memory Addressing,' Maximum and Minimum Modes of operation along with timing diagram' Clock generator 8284.	Talks and presentations	11
3	Addressing Modes, Instruction set of 8086, Assembly Language Programming, Assembler Directives and operators, Procedures, Macros, Interrupts, 8086 Based Multiprocessor Systems- Coprocessors (8087 NDP).	Talks and presentations	10
4	Peripheral Interfacing: 8255 Programmable peripheral interface, 8254 (8253) programmable interval timer, 8259A programmable interrupt controller, DMA Controller.	Talks and presentations	14
5	80186 Architecture, Enhancements of 80186-80286,Architecture-Real and Virtual addressing modes-80386 Architecture special Registers-Memory Management Memory Paging Mechanism 80486 Architecture Enhancements Cache Memory Techniques Exception Handling, Brief comparative overview of Pentium and Core I version of processors	Talks and presentations	12

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
Exp-1	Write 8085 Assembly Language Program for Addition of two 8-bit numbers and Sum is 8 bit	Experiments	BL3-Apply	2
Exp-2	Write 8085 Assembly Language Program for Addition of two 8-bit numbers and Sum is 16 bit.	Experiments	BL3-Apply	2
Exp-3	Write 8085 Assembly Language Program for Decimal Addition of two 8-bit numbers and Sum is 8 bit.	Experiments	BL3-Apply	2
Exp-4	Write 8085 Assembly Language Program for 2's Complement of an 8-bit numbers.	Experiments	BL5-Evaluate	2
Exp-5	Write 8085 Assembly Language Program for finding the smallest number in an array of five different 8 bit numbers.	Experiments	BL5-Evaluate	2
Exp-6	To study the Addressing Modes of Intel 8085 Microprocessor.	Experiments	BL2-Understand	2
Exp-7	To interface Programmable Peripheral Interface 8255 with 8085 and study its characteristics in Mode0, Mode1 and BSR Mode.	Experiments	BL6-Create	2
Exp-8	To interface 8253 Interface Board with 8085 □p and verify the operation of 8253 in six different modes.	Experiments	BL6-Create	2

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	40	40	12	60	28
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	50	40	20	60	30

Part E

Books	Ray, A.K. & Burchandi, K.M., (2012). Advanced Microprocessors and peripherals Architecture, Programming and interfacing. McGraw Hill (India) Private Limited.
Articles	
References Books	1.Brey, B.B., (2008).The Intel Microprocessors, Architecture, Programming and Interfacing. Pearson Education.
MOOC Courses	1.Microprocessors and Interfacing Electrical Engineering Prof. Shaik Rafi Ahamed IIT Guwahati 2.Microprocessors And Microcontrollers Electrical Engineering Prof. Santanu Chattopadhyay IIT Kharagpur 3.Microprocessor Electrical Engineering Dr. Pramod Agarwal IIT Roorkee
Videos	1.https://www.youtube.com/watch?v=ohSTR5W8UZI 2.https://www.youtube.com/watch?v=SBh6dJMM6AI 3.https://www.youtube.com/watch?v=OWCaYfPcaoI

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	2	-	-	1	3	-	-	1	-	-
CO2	-	1	1	-	-	2	1	-	-	3	-	-	-	-	-
CO3	-	2	1	2	2	-	-	-	-	-	-	-	-	-	-
CO4	-	2	1	3	-	-	-	-	-	-	-	-	-	1	-
CO5	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	1	-	-	-	-	-	-	1

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Syllabus-2019-2020

(SOET)(BTech-ElectricalEngineering)

Title of the Course	Electrical Instrumentation
Course Code	EEL0430[T]

Part A

Year		**Semester**		**Credits**	L	T	P	C
					3	1	0	4
Course Type	Embedded theory and lab							
Course Category	Disciplinary Major							
Pre-Requisite/s	Knowledge of basic measuring instruments and their units.			**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** Classify the standard devices and galvanometers for the measurement of voltage and current.**(BL1-Remember)** **CO2-** Construct the watt-meter and energy meter to measure power and energy.**(BL2-Understand)** **CO3-** Construct instrumentation transformer to measure high values of current and voltage. **(BL3-Apply)** **CO4-** Analyze the bridges for the measurement of low, medium and high resistance. **(BL4-Analyze)** **CO5-** Analyze the bridges for the measurement of inductance and capacitance measurement;**(BL5-Evaluate)** **CO6-** Construct the potentiometers to measure AC and DC values of unknown voltage**(BL6-Create)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG8(Decent work and economic growth)				

Part B

Modules	Contents	Pedagogy	Hours
Unit 1	Definition of analog & digital instruments, Classification of analog instruments, their operating principle, Operating force, Types of supports, Damping, Controlling. Theory & operation of D'arsonal galvanometer. Measurements: Measurement systems, methods of measurement, classification of instruments, Static and Dynamic Characteristics of the instruments, Errors in measurement, Classification of Errors and Error Calibration curve, Loading Effect due to shunt and series connected Instruments.	Talks and presentations	12
Unit 2	Different types of Ammeter & Voltmeter: PMMC, MI, Electrodynamometer, Hotwire, Electrostatic, Induction, Rectifier & Electro-thermic, Expression for deflection torque, their advantages, disadvantages & error, Extension of range of instruments using shunt & multiplier	Talks and presentations	14
Unit 3	Measurement of power: Power in AC and DC Circuit, Electrodynamometer type of wattmeter, Construction, theory, operation & error, Low power factor & UPF wattmeter, Double element and three element dynamometer wattmeter, Active & reactive power measurement in three phase circuits. Measurement of Energy: Single phase induction type energy meter – construction & operation – driving and braking torques – errors & compensations – Testing by phantom loading, Three phase energy meter.	Talks and presentations	10
Unit 4	Miscellaneous Instruments & Measurements: Power factor meter, Single phase and three phase Electro-dynamometer type & moving iron type. Frequency meter – Vibrating reed, Resonance type & Weston type, Resistance Measurement – Classification of low, medium & high resistance – Voltmeter, Ammeter, Wheatstone Bridge, Kelvin's double bridge & loss of charge methods for resistance measurement, Earth resistance measurement, Megger.	Talks and presentations	11
Unit 5	Instrument transformers: Potential and current transformers, ratio and phase angle errors, Difference between CT and PT, errors and reduction of errors.	Talks and presentations	13

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
Exp-1	Study of Multimeter & Measurement of Various Electrical quantity	Experiments	BL2-Understand	2
Exp-2	Calibration of Wattmeter with the help of Standard Voltmeter and Ammeter	Experiments	BL3-Apply	2
Exp-3	Measurement of Power and Power factor in a three phase circuit by two wattmeter method	Experiments	BL5-Evaluate	2
Exp-4	Calibration of Wattmeter with help of standard voltmeter and Ammeter	Experiments	BL3-Apply	2
Exp-5	Study and Measurement of insulation resistance using Megger.	Experiments	BL5-Evaluate	2
Exp-6	Measurement of Medium resistance by Wheatstone bridge	Experiments	BL5-Evaluate	2
Exp-7	Measurement of Low Resistance by Kelvin Double Bridge	Experiments	BL5-Evaluate	2
Exp-8	Study of Potential Transformer & related measurements	Experiments	BL3-Apply	2

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	40	40	12	60	28
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	50	40	20	60	30

Part E

Books	A.K. Sawhney Electrical & Electronic Measurements & Instrument Dhanpat Rai & Sons Pub
Articles	
References Books	1.E W Golding & F C Widdis Electrical Measurement & Measuring Instruments Wheeler Pub
MOOC Courses	
Videos	1.https://www.youtube.com/watch?v=7if7MSqiepg2 2.https://www.youtube.com/watch?v=h8BlWgE8bH0 3.https://www.youtube.com/watch?v=BOJqnvvWauE

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	1	1	1	1	1	1	-	1	-	1	1	1	2	2
CO2	1	1	1	1	1	1	-	-	-	-	1	1	2	3	2
CO3	1	-	1	1	-	1	1	-	-	1	1	-	3	3	2
CO4	1	1	1	1	1	1	1	-	-	-	1	1	2	2	3
CO5	1	1	1	1	1	1	1	-	-	-	1	1	3	2	3
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

OMVEER SINGH

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