Dr. Babasaheb Ambedkar Technological University, Lonere

Teaching & Evaluation Scheme for Second Year B. Tech. Civil Engg.

Semester- III										
Course Category	Course Code	Course Title	Teaching Scheme			Evaluation Scheme				Credit
			L	T	P	CA	MSE	ESE	Total	
BSC 5	BTBS301	Mathematics – III	3	1	-	20	20	60	100	4
ESC 8	BTCVES302	Mechanics of Solids	3	1	-	20	20	60	100	4
PCC 1	BTCVC303	Building Construction & Drawing	2	1	-	20	20	60	100	3
PCC 2	BTCVC304	Hydraulics -I	3	1	-	20	20	60	100	4
PCC 3	BTCVC305	Surveying	2	1	-	20	20	60	100	3
HSSMC2	BTHM306	Soft Skill Development	2	-	-	50	-	-	50	Audit
LC 1	BTCVL 307	Solid Mechanics Laboratory	-	-	2	20	-	30	50	1
LC 2	BTCVL 308	Hydraulics-I Laboratory	-	-	2	20	-	30	50	1
LC 3	BTCVL 309	Surveying Laboratory	-	-	2	20	-	30	50	1
Internship	BTES210P	Internship –I Evaluation (From Sem II)	-	-	-	-	-	50	50	Audit
		Total	**15**	**05**	**06**	**210**	**100**	**440**	**750**	**21**

Semester- IV										
Course Category	Course Code	Course Title	Teaching Scheme			Evaluation Scheme				Credit
			L	T	P	CA	MSE	ESE	Total	
PCC 4	BTCVC401	Building Planning and Drawing	2	-	-	20	20	60	100	2
PCC 5	BTCVC402	Environmental Engineering	2	-	-	20	20	60	100	2
PCC 6	BTCVC403	Structural Mechanics - I	2	1	-	20	20	60	100	3
PCC 7	BTCVC404	Water Resources Engineering	3	-	-	20	20	60	100	3
PCC 8	BTCVC405	Hydraulics - II	2	1	-	20	20	60	100	3
PCC 9	BTCVC406	Engineering Geology	2	1	-	20	20	60	100	3
LC 4	BTCVL407	Building Planning and CAD Lab.	-	-	2	20	-	30	50	1
LC 5	BTCVL408	Environmental Engg. Lab.	-	-	2	20	-	30	50	1
LC 6	BTCVL409	HE-II Lab.	-	-	2	20	-	30	50	1
Internship	BTCVP410	Field Training / Internship/Industrial Training (minimum of 4 weeks training in Summer Vacation after Semester IV and appear at examination in Semester V)	-	-	-	-	-	-	-	To be evaluated in V Sem.
		Total	**13**	**03**	**06**	**180**	**120**	**450**	**750**	**19**

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Dr. Babasaheb Ambedkar Technological University, Lonere

Teaching & Evaluation Scheme for Third Year B Tech Civil Engg.

Semester- V										
Course Category	Course Code	Course Title	Teaching Scheme			Evaluation Scheme				Credit
			L	T	P	CA	MSE	ESE	Total	
PCC 10	BTCVC501	Design of Steel Structures	2	1	-	20	20	60	100	3
PCC 11	BTCVC502	Geotechnical Engineering	3	1	-	20	20	60	100	4
PCC 12	BTCVC503	Structural Mechanics –II	2	1	-	20	20	60	100	3
PCC 13	BTCVC504	Concrete Technology	2	-	-	20	20	60	100	2
HSSMC3	BTHM505	Project Management	3	-	-	20	20	60	100	3
PEC 1	BTCVPE506	A. Advanced Environmental Engg. B. Applied Geology C. Hydraulic Engineering Design D. Advanced Water Resources E. Geomatics F. Town and Urban Planning G. Material, Testing and Evaluation H. Construction Economics & Finance	3	-	-	20	20	60	100	3
ESC10	BTCVES507	Software applications in Civil Engineering	2	-	-	50	-	-	50	Audit
LC 7	BTCVL508	SDD of Steel Structures Lab.	-	-	2	20	-	30	50	1
LC 8	BTCVL509	Geotechnical Engineering Lab.	-	-	2	20	-	30	50	1
LC 9	BTCVL510	Concrete Technology Lab.	-	-	2	20	-	30	50	1
Internship	BTCVP410	Internship – 2 Evaluation	-	-	-	-	-	-	-	Audit
		Total	**17**	**3**	**6**	**230**	**120**	**450**	**800**	**21**

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Semester- VI										
Course Category	Course Code	Course Title	Teaching Scheme			Evaluation Scheme				Credit
			L	T	P	CA	MSE	ESE	Total	
PCC 14	BTCVC601	Design of RC Structures	3	1	-	20	20	60	100	4
PCC 15	BTCVC602	Foundation Engineering	3	1	-	20	20	60	100	4
PCC 16	BTCVC603	Transportation Engineering	3	-	-	20	20	60	100	3
PEC 2	BTCVPE604	A. Industrial Waste Treatment B. Managerial Techniques C. Open Channel Flow D. Water Power Engineering E. Ground Improvement Techniques F. Structural Audit G. Intelligent Transportation Systems H. Plastic Analysis of Structures I. Numerical Methods in Civil Engg. J. Engineering Management	3	-	-	20	20	60	100	3
OEC 1	BTCVOE605	A. Environmental Impact Assessment B. Basic Human Rights C. Business Communication and Presentation Skills D. Composite Materials E. Experimental Stress Analysis F. Python Programming G. Operation Research H. Applications of Remote Sensing and Geographic Information Systems I. Civionics: Instrumentation & Sensor Technologies for Civil Engineering J. Planning for Sustainable Development K. Development Engineering	3	-	-	20	20	60	100	3
HSSMC4	BTHM606	Indian Constitution	2	-	-	50	-	-	50	Audit
LC 10	BTCVL607	SDD of RC Structures Lab.	-	-	2	20	-	30	50	1
LC 11	BTCVL608	Transportation Engineering Lab	-	-	2	20	-	30	50	1
Project	BTCVM609	Mini Project	-	-	2	20	-	30	50	1
Internship		**Mandatory (BTCVP610)** Field Training/ Internship/Industrial Training (minimum of 4 weeks training in Summer Vacation after Semester VI and appear at examination in Semester VII.)	-	-	-	-	-	-	-	Credits to be evaluated in VII Sem
Total			**17**	**2**	**6**	**210**	**100**	**390**	**700**	**20**

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Dr. Babasaheb Ambedkar Technological University

B.Tech. Civil Engineering

Course Structure for Semester VII (Fourth Year) w.e.f. 2023-2024

Course Code	Type of Course	Course Title	Weekly Teaching Scheme			Evaluation Scheme				Credits
			L	T	P	CA	MSE	ESE	Total	
BTCVC701	Core	Design of Reinforced & Prestressed Concrete Structures	3	1	--	20	20	60	100	4
BTCVC702	Core	Infrastructure Engineering	3	--	--	20	20	60	100	3
BTCVC703	Core	Construction Techniques	3	--	--	20	20	60	100	3
BTCVC704	Core	Professional Practices	3	1	--	20	20	60	100	4
BTCVE705A	Elective IV	Engineering Economics	3	--	--	20	20	60	100	3
BTCVE705B		Finite Element Method								
BTCVE705C		Limit State Design of Steel Structures								
BTCVE705D		Rock Mechanics								
BTCVE705E		Applications of Drone Technology								
BTCVE705F		Advanced RC Design								
BTCVE705G		Applied Hydrology & Flood Control								
BTCVE705H		Legal Aspects in Civil Engineering Contracts								
BTCVE705I		Bridge Engineering								
BTCVOE706A	Open Elective V	Advanced Structural Analysis	3	--	--	-	--	--	--	Audit
BTCVOE706B		Air Pollution Control								
BTCVOE706C		Applications of AI and ML in Civil Engineering								
BTCVOE706D		Introduction to Earthquake Engineering								
BTCVOE706E		Internet of Things								
BTCVOE706F		Tunneling and Underground Excavations								
BTCVOE706G		Bamboo Construction Technology								
BTHM707A		Essence of Indian Traditional Knowledge	2	--	--	--	--	--	--	Audit
BTHM707B		Foreign language##								
BTCVL708		Design & Drawing of Prestressed Concrete	--	--	2	30	--	20	50	1

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	Lab.	Structures								
BTCVL709		Professional Practices	--	--	2	30	--	20	50	1
BTCVP610	Training	Field Training / Internship/Industrial **Evaluation**	--	--	--	--	--	50	50	1
BTCVS710	BTS	Seminar	--	--	2	--	--	50	50	1
BTCVP711	BTP	Project Stage-I**	--	--	4	--	50	50	100	3
		Total	**20**	**2**	**10**	**160**	**150**	**490**	**800**	**24**

B.Tech. Civil Engineering

Course Structure for Semester VIII [Fourth Year] w.e.f. 2023-2024

Course Code	Type of Course	Course Title	Weekly Teaching Scheme			Evaluation Scheme^{s}				Credits
			L	T	P	CA	MSE	ESE	Total	
BTCVSS801A	(Self-Study Course) #	Characterization of Construction Materials	02**	--	--	20	20	60	100	3
BTCVSS801B		Geo synthetics and Reinforced Soil Structures								
BTCVSS801C		Higher Surveying								
BTCVSS801D		Maintenance and Repair Of Concrete Structures								
BTCVSS801E		Structural Dynamics								
BTCVSS801F		Engineering Systems & Development								
BTCVSS801G		Sustainable River Basin Management								
BTCVSS801H		Modern Construction Materials								
BTCVSS801J		Advanced Town & Urban Planning								
BTCVSS802A	(Self-Study Course) #	Energy Efficiency Acoustics and Day lighting in Building	02**	--	--	20	20	60	100	3
BTCVSS802B		Environmental Remediation of Contaminated Sites								
BTCVSS802C		Remote Sensing Essentials								
BTCVSS802D		Mechanical Characterization of Bituminous Materials								
BTCVSS802E		Soil Structure Interaction								
BTCVSS802F		Design of Water Supply Systems								
BTCVP803	Project Stage-II	Project Stage II or Internship	--	--	24	100	--	100	200	12
		Total	04	--	24	140	40	220	400	18

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	Lab.	Structures								
BTCVL709		Professional Practices	--	--	2	30	--	20	50	1
BTCVP610	Training	Field Training / Internship/Industrial **Evaluation**	--	--	--	--	--	50	50	1
BTCVS710	BTS	Seminar	--	--	2	--	--	50	50	1
BTCVP711	BTP	Project Stage-I**	--	--	4	--	50	50	100	3
		Total	**20**	**2**	**10**	**160**	**150**	**490**	**800**	**24**

B.Tech. Civil Engineering

Course Structure for Semester VIII [Fourth Year] w.e.f. 2023-2024

Course Code	Type of Course	Course Title	Weekly Teaching Scheme			Evaluation Schemes				Credits
			L	T	P	CA	MSE	ESE	Total	
BTCVSS801A	(Self-Study Course) #	Characterization of Construction Materials	02**	--	--	20	20	60	100	3
BTCVSS801B		Geo synthetics and Reinforced Soil Structures								
BTCVSS801C		Higher Surveying								
BTCVSS801D		Maintenance and Repair Of Concrete Structures								
BTCVSS801E		Structural Dynamics								
BTCVSS801F		Engineering Systems & Development								
BTCVSS801G		Sustainable River Basin Management								
BTCVSS801H		Modern Construction Materials								
BTCVSS801J		Advanced Town & Urban Planning								
BTCVSS802A	(Self-Study Course) #	Energy Efficiency Acoustics and Day lighting in Building	02**	--	--	20	20	60	100	3
BTCVSS802B		Environmental Remediation of Contaminated Sites								
BTCVSS802C		Remote Sensing Essentials								
BTCVSS802D		Mechanical Characterization of Bituminous Materials								
BTCVSS802E		Soil Structure Interaction								
BTCVSS802F		Design of Water Supply Systems								
BTCVP803	Project Stage-II	Project Stage II or Internship	--	--	24	100	--	100	200	12
		Total	04	--	24	140	40	220	400	18

HEAD CIVIL ENGG. DEPT.

Teaching and Evaluation Scheme for First Year B. Tech. (All Branches)

Group A

Course Code	Course Title	Teaching Scheme			Evaluation Scheme				
		L	T	P	CA	MSE	ESE	Total	Credit
	Semester I								
Mandatory	**Induction Program**	**3-weeks duration in the beginning of semester.**							
BTBS101	Engineering Mathematics- I	3	1	-	20	20	60	100	4
BTBS102	Engineering Physics	3	1	-	20	20	60	100	4
BTES103	Engineering Graphics	2	-	-	20	20	60	100	2
BTHM104	Communication Skills	2	-	-	20	20	60	100	2
BTES105	Energy and Environment Engineering	2	-	-	20	20	60	100	2
BTES106	Basic Civil and Mechanical Engineering	2	-	-	50	-	-	50	Audit
BTBS107L	Engineering Physics Lab	-	-	2	60	-	40	100	1
BTES108L	Engineering Graphics Lab	-	-	4	60	-	40	100	2
BTHM109L	Communication Skills Lab.	-	-	2	60	-	40	100	1
		14	**2**	8	330	100	420	850	18
	Semester II								
BTBS201	Engineering Mathematics-II	3	1	-	20	20	60	100	4
BTBS202	Engineering Chemistry	3	1	-	20	20	60	100	4
BTES203	Engineering Mechanics	2	1	-	20	20	60	100	3
BTES204	Computer Programming in C	3	-	-	20	20	60	100	3
BTES205	Workshop Practices	-	-	4	60	-	40	100	2
BTES206	Basic Electrical and Electronics Engineering	2	-	-	50	-	-	50	Audit
BTBS207L	Engineering Chemistry Lab	-	-	2	60	-	40	100	1
BTES208L	Engineering Mechanics Lab	-	-	2	60	-	40	100	1
BTES210S	Seminar	-	-	2	60	-	40	100	1
BTES211P	Field Training / Internship/Industrial Training (minimum of 4 weeks which can be completed partially in first semester and second Semester or in at one time).	-	-	-	-	-	-	-	Credits To be evaluated in III Sem.
		13	**3**	**10**	**430**	**80**	**440**	**950**	**19**
		27							

Teaching and Evaluation Scheme for First Year B. Tech. (All Branches)

Group B

Course Code	Course Title	Teaching Scheme			Evaluation Scheme				
		L	T	P	CA	MSE	ESE	Total	Credit
	Semester I								
Mandatory	**Induction Program**	**3 weeks duration in the beginning of semester.**							
BTBS101	Engineering Mathematics- I	3	1	-	20	20	60	100	4
BTBS102	Engineering Chemistry	3	1	-	20	20	60	100	4
BTES103	Engineering Mechanics	2	1	-	20	20	60	100	3
BTES104	Computer Programming in C	3	-	-	20	20	60	100	2
BTES105L	Workshop Practices	-	-	4	60	-	40	100	2
BTES106	Basic Electrical and Electronics Engineering	2	-	-	50	-	-	50	Audit
BTBS107L	Engineering Chemistry Lab	-	-	2	60	-	40	100	1
BTES108L	Engineering Mechanics Lab	-	-	2	60	-	40	100	1
		13	**03**	**10**	**370**	**80**	**400**	**850**	**18**
		25							
	Semester II								
BTBS201	Engineering Mathematics-II	3	1	-	20	20	60	100	4
BTBS202	Engineering Physics	3	1	-	20	20	60	100	4
BTES203	Engineering Graphics	2	-	-	20	20	60	100	2
BTHM204	Communication Skills	2	-	-	20	20	60	100	2
BTES205	Energy and Environment Engineering	2	-	-	20	20	60	100	2
BTES206	Basic Civil and Mechanical Engineering	2	-	-	50	-	-	50	Audit
BTBS207L	Engineering Physics Lab	-	-	2	60	-	40	100	1
BTES208L	Engineering Graphics Lab	-	-	3	60	-	40	100	2
BTHM209L	Communication Skills Lab.	-	-	2	60	-	40	100	1
BTES210S	Seminar	-	-	2	60	-	40	100	1
BTES211P	Field Training / Internship/Industrial Training (minimum of 4 weeks which can be completed partially in first semester and second Semester or in at one time)	-	-	-	-	-	-	-	Credits To be evaluated in III Sem.
		14	**02**	**09**	**390**	**100**	**460**	**950**	**19**
		26							

Semester –III (Second Year)

Proposed Scheme w.e.f. July – 2021

Course Category	Course Code	Course Title	Weakly Teaching Hrs			Evaluation Scheme				Credit
			L	T	P	CA	MSE	ESE	Total	
	BTBS301	Engineering Mathematics – III	3	1	-	20	20	60	100	4
	BTCOC302	Discrete Mathematics	3	1	-	20	20	60	100	4
	BTCOC303	Data Structures	3	1	-	20	20	60	100	4
	BTCOC304	Computer Architecture & Organization	3	1	-	20	20	60	100	4
	BTCOC305	Elective –I (a) Object - oriented Programming in C++ (b) Object Oriented Programming in Java	3	1	-	20	20	60	100	4
	BTCOL306	Data Structures Lab & Object Oriented Programming Lab	-	-	4	60	-	40	100	2
	BTCOS307	Seminar – I	-		4	60	-	40	100	2
	BTES211P	Field Training / Internship / Industrial Training –I Evaluation	-	-	-	-	-	-	-	Audit
		TOTAL	15	5	8	220	100	380	700	24

Semester –IV (Second Year)
Proposed Scheme w.e.f. January – 2022

Course Category	Course Code	Course Title	Weakly Teaching Hrs			Evaluation Scheme				Credit
			L	T	P	CA	MSE	ESE	Total	
	BTCOC401	Design & Analysis of Algorithms	3	1	-	20	20	60	100	4
	BTCOC402	Operating Systems	3	1	-	20	20	60	100	4
	BTHM403	Basic Human Rights	3	-	-	20	20	60	100	3
	BTBSC404	Probability and Statistics	3	-	-	20	20	60	100	3
	BTES405	Digital Logic Design & Microprocessors	3	1	-	20	20	60	100	4
	BTCOL406	Operating Systems & Python Programming Lab	1*	-	4	60	-	40	100	3
	BTCOS407	Seminar – II			4	60	-	40	100	2
	BTCOF408	Field Training / Internship / Industrial Training –II Evaluation						-	-	Audit to be evaluated in V Sem.
		TOTAL	16	3	8	220	100	380	700	23

*Note: Lecture should be conducted only for Python Programming

DR BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE

Semester –V (Thir ar)

Proposed Scheme w.e.f. . – 2022

Course Category	Course Code	Course Title	Weakly Teaching Hrs			Evaluation Scheme				Credit
			L	T	P	CA	MSE	ESE	Total	
	BTCOC501	Database Systems	3	1	-	20	20	20	100	4
	BTCOC502	Theory of Computation	3	1	-	20	20	20	100	4
	BTCOC503	Software Engineering	3	1	-	20	20	20	100	4
	BTCOE504	Elective – II (A) Human computer Interaction (B) Numerical Methods	3	-	-	20	20	20	100	3
	BTHM505	Elective – III (A) Economics and Management (B) Business Communication	3	-	-	20	20	20	100	3
	BTCOL506	Database Systems & Software Engineering Lab	-	-	4	60	-	40	100	2
	BTCOM507	Mini-project – I	-	-	4	60	-	40	100	2
	BTCOF408	Field Training / Internship / Industrial Training-II (Evaluation)	-	-	-	-	-	-	-	Audit
		TOTAL	15	3	8	220	100	380	700	22

Course Category	Course Code	Course Title	Weakly Teaching Hrs			Evaluation Scheme				Credit
			L	T	P	CA	MSE	ESE	Total	
	BTCOC601	Compiler Design	3	1	-	20	20	60	100	4
	BTCOC602	Computer Networks	3	1	-	20	20	60	100	4
	BTCOC603	Machine Learning	3	1	-	20	20	60	100	4
	BTCOE604	Elective – IV (A) Geographic Information System (B) Internet of Things (C) Embedded Systems	3	-	-	20	20	60	100	3
	BTHM605	Elective – V (A) Development Engineering (B) Employability and Skill Development (C) Consumer Behaviour	3	-	-	20	20	60	100	3
	BTCOL606	Competitive Programming & Machine Learning Lab	1*	-	4	60	-	40	100	3
	BTCOM607	Mini-project – II	-	-	4	60	-	40	100	2
	BTCOF608	Field Training / Internship / Industrial Training-III	-	-	-	-	-	-	-	Audit to be Evaluated in VII Sem.
		TOTAL	16	3	8	220	100	380	700	23

*Note: Lecture should be conducted only for Competitive Programming

Semester –VII (Final Year)

Proposed Scheme w.e.f. July – 2023

Course Category	Course Code	Course Title	Weakly Teaching Hrs			Evaluation Scheme				Credit
			L	T	P	CA	MSE	ESE	Total	
	BTCOC701	Artificial Intelligence	3	-	-	20	20	60	100	3
	BTCOC702	Cloud Computing	3	-	-	20	20	60	100	3
	BTCOE703	Elective – VI (A) Bioinformatics (B) Distributed System (C) Big Data Analytics	3	-	-	20	20	60	100	3
	BTCOE704	Open Elective – VII (A) Cryptography and Network Security (B) Business Intelligence (C) Block chain Technology	3	-	-	20	20	60	100	3
	BTCOE705	Open Elective – VIII (A) Virtual Reality (B) Deep Learning (C) Design Thinking	3	-	-	20	20	60	100	3
	BTHM706	Foreign Language Studies*	-	-	4	-	-	-	-	Audit
	BTCOL707	Artificial Intelligence & Cloud Computing Lab	-	-	4	60	-	40	100	2
	BTCOS708	Project Phase – I	-	-	-	60	-	40	100	2
	BTCOF608	Field Training / Internship / Industrial Training –III (Evaluation)	-	-	-	-	-	-	-	Audit
		TOTAL	15	-	8	220	100	380	700	19

*Any Foreign language can be opted by the students as per their need /demand conducted in online or offline mode by the institute.

Semester –VIII (Final Year)

Proposed Scheme w.e.f. January – 2024

Course Category	Course Code	Course Title	Weakly Teaching Hrs			Evaluation Scheme				Credit
			L	T	P	CA	MSE	ESE	Total	
	BTCOF801	Project phase – II (In-house) / Internship and Project in Industry	-	-	24	60	-	40	100	12
		TOTAL	-	-	24	60	-	40	100	12

Semester –III (Second Year)

Course Category	Course Code	Course Title	Weakly Teaching Hrs			Evaluation Scheme				Credit
			L	T	P	CA	MSE	ESE	Total	
	BTBS301	Engineering Mathematics – III	3	1	-	20	20	60	100	4
	BTCOC302	Discrete Mathematics	3	1	-	20	20	60	100	4
	BTCOC303	Data Structures	3	1	-	20	20	60	100	
	BTCOC304	Computer Architecture & Organization	3	1	-	20	20	60	100	
	BTCOC305	Elective –I (a) Object - oriented Programming in C++ (b) Object Oriented Programming in Java	3	1	-	20	20	60	100	4
	BTCOL306	Data Structures Lab & Object Oriented Programming Lab	-	-	4	60	-	40	100	2
	BTCOS307	Seminar – I	-		4	60	-	40	100	2
	BTES211P	Field Training / Internship / Industrial Training Evaluation-I	-	-	-	-	-	-	-	Audit
		TOTAL	15	5	8	220	100	380	700	24

Head
Computer Science and Engineering
(Data Science)
P.E.S. College of Engineering
Chh. Sambhajinagar.

Semester –IV (Second Year)

Course Category	Course Code	Course Title	Weakly Teaching Hrs			Evaluation Scheme				Credit
			L	T	P	CA	MSE	ESE	Total	
	BTCOC401	Design & Analysis of Algorithms	3	1	-	20	20	60	100	4
	BTCOC402	Operating Systems	3	1	-	20	20	60	100	4
	BTHM403	Basic Human Rights	3	-	-	20	20	60	100	3
	BTBSC404	Probability and Statistics	3	-	-	20	20	60	100	3
	BTES405	Digital Logic Design & Microprocessors	3	1	-	20	20	60	100	4
	BTCOL406	Operating Systems & Python Programming Lab	1*	-	4	60	-	40	100	3
	BTCOS407	Seminar – II			4	60	-	40	100	2
	BTCOF408	Field Training / Internship / Industrial Training-II						-	-	Audit to be evaluated in V Sem.
		TOTAL	16	3	8	220	100	380	700	23

*Note: Lecture should be conducted only for Python Programming

Head
Computer Science and Engineering
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Chh. Sambhajinagar.

BTBS 301: Engineering Mathematics-III

Unit 1: Laplace Transform

Definition – conditions for existence; Transforms of elementary functions ; Properties of Laplace transforms - Linearity property, first shifting property, second shifting property, transforms of functions multiplied by t^n, scale change property, transforms of functions divided by t, transforms of integral of functions, transforms of derivatives; Evaluation of integrals by using Laplace transform ; Transforms of some special functions- periodic function, Heaviside-unit step function, Dirac delta function.

Unit 2: Inverse Laplace Transform

Introductory remarks ; Inverse transforms of some elementary functions ; General methods of finding inverse transforms ; Partial fraction method and Convolution Theorem for finding inverse Laplace transforms ; Applications to find the solutions of linear differential equations and simultaneous linear differential equations with constant coefficients.

Unit 3: Fourier Transform

Definitions – integral transforms ; Fourier integral theorem (without proof) ; Fourier sine and cosine integrals; Complex form of Fourier integrals ; Fourier sine and cosine transforms ; Properties of Fourier transforms ; Parseval's identity for Fourier Transforms.

Unit 4: Partial Differential Equations and Their Applications

Formation of Partial differential equations by eliminating arbitrary constants and functions; Equations solvable by direct integration; Linear equations of first order (Lagrange's linear equations); Method of separation of variables – applications to find solutions of one dimensional heat flow equation ($\partial u \partial t = c2 \partial 2u \partial x2$), and one dimensional wave equation (i.e. $\partial 2y \partial t2 = c2 \partial 2y \partial x2$).

Unit 5: Functions of Complex Variables

Analytic functions; Cauchy- Riemann equations in Cartesian and polar forms; Harmonic functions in Cartesian form; Cauchy's integral theorem; Cauchy's integral formula; Residues; Cauchy's residue theorem (All theorems without proofs)

Text Books

1. Higher Engineering Mathematics by B. S. Grewal, Khanna Publishers, New Delhi.
2. Higher Engineering Mathematics by H. K. Das and Er. Rajnish Verma, S. Chand & CO. Pvt. Ltd., New Delhi.
3. A course in Engineering Mathematics (Vol III) by Dr. B. B. Singh, Synergy Knowledge ware, Mumbai.
4. Higher Engineering Mathematics by B. V. Ramana, Tata McGraw-Hill Publications, New Delhi.

Reference Books

1. Advanced Engineering Mathematics by Erwin Kreyszig, John Wiley & Sons, New York.
2. A Text Book of Engineering Mathematics by Peter O' Neil, Thomson Asia Pte Ltd. , Singapore.
3. Advanced Engineering Mathematics by C. R. Wylie & L. C. Barrett, Tata Mcgraw-Hill Publishing Company Ltd.,

New Delhi.
4. Integral Transforms and their Engineering Applications by Dr. B. B. Singh, Synergy. Knowledge ware, Mumbai.
5. Integral Transforms by I. N. Sneddon, Tata McGraw-Hill, New York.

General Instructions:

1. The tutorial classes in Engineering Mathematics-III are to be conducted batch wise. Each class should be divided into three batches for the purpose.
2. The internal assessment of the students for 20 marks will be done based on assignments, enterprise tests, quizzes, innovative approach to problem solving and percentage attendance.
3. The minimum number of assignments should be eight covering all topics.

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BTCOC302: Discrete Mathematics

[UNIT 1] Fundamental Structures and Basic Logic

[7 Hours]

Sets, Venn diagram, Cartesian product, Power sets, Cardinality and countability, Propositional logic, Logical connectives, Truth tables, Normal forms, Validity, Predicate logic, Limitations of predicate logic, Universal and existential quantification, First order logic, Principles of Mathematical Induction: The Well-Ordering Principle, Recursive definition, The Division algorithm: Prime Numbers, The Greatest Common Divisor: Euclidean Algorithm, The Fundamental Theorem of Arithmetic.

[UNIT 2] Functions and Relations

[7 Hours]

Subjective, Injective, Bijective and inverse functions, Composition of function, Reflexivity, Symmetry, Transitivity and equivalence relations.

Combinatorics: Counting, Recurrence relations, generating functions.

[UNIT 3] Graph

[7 Hours]

Basic terminology, Multi graphs and weighted graphs, Paths and circuits, Shortest path problems, Euler and Hamiltonian paths, Representation of graph, Isomorphic graphs, Planar graphs, Connectivity, Matching Colouring.

[UNIT 4] Trees

[7 Hours]

Trees: Rooted trees, Path length in rooted tree, Binary search trees, Spanning trees and cut set, Minimal spanning trees, Kruskal's and Prim's algorithms for minimal spanning tree.

[UNIT 5] Algebraic Structures and Morphism

[7 Hours]

Algebraic Structures with one Binary Operation, Semi Groups, Monoids, Groups, Congruence Relation and Quotient Structures, Free and Cyclic Monoids and Groups, Permutation Groups, Substructures, Normal Subgroups, Algebraic Structures with two Binary Operation, Rings, Integral Domain and Fields, Boolean Algebra and Boolean Ring, Identities of Boolean Algebra, Duality, Representation of Boolean Function, Disjunctive and Conjunctive Normal Form.

Text Books:

1. C. L. Liu, Elements of Discrete Mathematics, McGraw-Hill Publication, 3rd Edition, 2008.

Reference Books:

1. Lipschutz, Discrete Mathematics, McGraw-Hill Publication, 3rd Edition, 2009.
2. V. K. Balakrishnan, Schaum's Outline of Graph Theory, McGraw-Hill Publication, 1st Edition, 1997.
3. Eric Gossett, Discrete Mathematics with Proof, Wiley Publication, 2nd Edition, 2009.
4. Kenneth H. Rosen, Discrete Mathematics and its Applications, McGraw-Hill Publication, 6th Edition, 2010.Y. N. Singh, Discrete Mathematical Structures, Wiley Publication, 1st Edition, 2010.
5. Dr. Sukhendu Dey, Graph Theory with Applications, SPD Publication, 1st Edition, 2012.

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BTCOC303: Data Structures

[UNIT 1] Introduction **[7 Hours]**

Data, Data types, Data structure, Abstract Data Type (ADT), representation of Information, characteristics of algorithm, program, analyzing programs. Arrays and Hash Tables Concept of sequential organization, linear and non-linear data structure, storage representation, array processing sparse matrices, transpose of sparse matrices, Hash Tables, Direct address tables, Hash tables, Hash functions, Open addressing, Perfect hashing.

[UNIT 2] Stacks and Queues **[7 Hours]**

Introduction, stack and queue as ADT, representation and implementation of stack and queue using sequential and linked allocation, Circular queue and its implementation, Application of stack for expression evaluation and expression conversion, recursion, priority queue.

[UNIT 3] Linked list **[7 Hours]**

Concept of linked organization, singly and doubly linked list and dynamic storage management, circular linked list, operations such as insertion, deletion, concatenation, traversal of linked list, dynamic memory management, garbage collection.

[UNIT 4] Trees and Graphs **[7 Hours]**

Basic terminology, binary trees and its representation, insertion and deletion of nodes in binary tree, binary search tree and its traversal, threaded binary tree, Heap, Balanced Trees, Terminology and representation of graphs using adjacency matrix, Warshall's algorithm.

[UNIT 5] Searching and Sorting **[7 Hours]**

Sequential, binary searching, skip lists – dictionaries, linear list representation, skip list representation, operations– insertion, deletion and searching. Insertion sort, selection sort, radix sort, File handling.

Text Book:

1. Weiss, Data structures and algorithms analysis in C++, Pearson Education, 4th Edition,2013

Reference Books:

1. S. Lipschutz, Data Structures, McGraw-Hill Publication, Revised 1st Edition, 2014.
2. Y. Langsm, M. Augenstin, A. Tanenbaum , Data Structure using C and C++, Prentice Hall India Learning Private Limited,2nd edition,1998.
3. Horowitz and Sahani, Fundamentals of Data Structures, Universities Press, 2nd Edition,2008.
4. Thomas Cormen, Introduction to Algorithms, PHI Publication, 2nd Edition,2002.
5. Venkatesan& Rose, Data Structures, Wiley Publication, 1st Edition,2015.
6. Goodrich &Tamassia, Data Structure & Algorithm in C++, Wiley Publication, 2nd Edition,2011.
7. R. G. Dromey, How to Solve it by Computer, 2nd Impression, Pearson Education.
8. Kyle Loudon, Mastering Algorithms with C: Useful Techniques from Sorting to Encryption, O'Reilly Media, 1st Edition, 1999.

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BTCOC 304: Computer Architecture and Organization

[UNIT 1] Introduction **[7 Hours]**

Concept of computer organization and architecture, Fundamental unit, Computer function and interconnection, CPU structure and function

[Unit 2] Instruction Sets **[7 Hours]**

Characteristics, Types of operands, Types of operations, Assembly language, Addressing modes, Instruction format, Types of instruction, Instruction execution, Machine state and processor status, Structure of program, Introduction to RISC and CISC architecture.

[Unit 3] Computer Arithmetic **[7 Hours]**

The arithmetic and logic Unit, Integer representation, Integer arithmetic, Floating point representation, Floating point arithmetic, Introduction of arithmetic co-processor.

[Unit 4] Memory Organization **[7 Hours]**

Internal Memory: Semiconductor main memory, Error correction, Advanced DRAM organization, Virtual memory systems and cache memory systems. External Memory: Organization and characteristics of magnetic disk, Magnetic tape, Optical memory, RAID, Memory controllers.

[Unit 5] Control Unit and Input / Output Organization **[7 Hours]**

Control unit operation: Micro-operations, Control of the processor, Hardwired implementation, Micro-programmed Control Unit, Basic concepts, Micro-instruction sequencing, Micro-instruction execution, Applications of micro-programming, **Input/output Organization:** External devices, I/O module, Programmed I/O, Interrupt driven I/O, Direct memory access, I/O channels and processors, External interface, Instruction pipe-lining: Concepts. Parallel processing: Multiple processor organization, Symmetric multiprocessor, Cache coherence and the MESI protocol.

Text Book:

1. William Stalling, Computer Organization and Architecture: Designing for Performance, Prentice Hall Publication, 8th Edition, 2009.

Reference Books:

1. Hayes, Computer Architecture and Organization, McGraw-Hill Publication, 3rd Edition, 2012.
2. Zaky, Computer Organization, McGraw-Hill Publication, 5th Edition, 2011.
3. Hennessy and Patterson, Computer Architecture: A Quantitative Approach, Morgan and Kaufman Publication, 4th Edition, 2007.
4. Morris Mano, Computer System Architecture, Pearson Education India, 3rd Edition, 2007.
5. Mostafa Abd-El-Barr, Hesham El-Rewini, Fundamentals of Computer Organization and Architecture, Wiley Publication, 1st Edition, 2004.
6. Miles J. Murdocca, Vincent P. Heuring, Computer Architecture and Organization: An Integrated Approach, Wiley Publication, 1st Edition, 2007.
7. Sajjan G. Shiva, Computer Organization: Design, and Architecture, CRC Press, 5th Edition, 2013.

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Elective –I
(A) BTCOC 305: Object Oriented Programming in C++

[Unit 1] Introduction to Object Oriented Programming and Objects and Classes **[7 Hours]**

Need of object oriented programming, The object oriented approach, Characteristics of object oriented languages, class, Objects as data types, Constructors, Objects as function arguments, Returning objects.

[Unit 2] Operator Overloading, Inheritance and Polymorphism **[7 Hours]**

Overloading unary and binary operators, Data conversion. Derived and base class, Public and private inheritance, Levels of inheritance, **multiple** inheritance Examples.

[Unit 3] Polymorphism

[7 Hours]

Virtual functions, Dynamic binding, Abstract classes and pure virtual functions, Friend functions, this pointer.

[Unit 4] Streams and Files

[7 Hours]

Streams, Stream output and input, Stream manipulators, Files and streams, Creating, Reading, Updating sequential and random files.

[Unit 5] Templates, Exception Handling and STL **[7 Hours]**

Function templates, Overloading function templates, Class templates, Exception handling overview, Need of exceptions, An exception example, Multiple exceptions, Exception specifications. Standard Template Library (STL) Introduction to STL-Containers, Iterators, Algorithms, Sequence containers, Associative containers, Container adapters.

Text Book:

1. E. Balagurusamy, Object Oriented Programming with C++, McGraw-Hill Publication, 6th Edition, 2013.

Reference Books:

1. Robert Lafore, Object Oriented Programming in C++, Sams Publishing, 4th Edition, 2001.
2. Dr. B. B. Meshram, Object Oriented Paradigms with C++ Beginners Guide for C and C++, SPD Publication, 1st Edition, 2016.
3. Rajesh R. Shukla, Object-Oriented Programming in C++, Wiley India Publication, 1st Editio,2008
4. Bjarne Stroustrup, The C++ Programming Language, Addison-Wesley Publication, 4th Edition, 2013.
5. P.J. Deitel, H. M. Deitel, C++ How to Program, PHI Publication, 9th Edition, 2012.
6. John Hubbard, Programming with C++, Schaum's Outlines, McGraw-Hill Publication, 2nd Edition, 2000.
7. Nicolai M. Josuttis, Object-Oriented Programming in C++, Wiley Publication, 1st Edition, 2002.

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Elective –I
(B) BTCOC 305: Object Oriented Programming in JAVA

[Unit 1] Introduction to Java Applications **[7 Hours]**

Introduction, Java Class Libraries, Typical Java Development Environment, Memory Concepts, Arithmetic. Introduction to Classes and Objects: Introduction, Classes, Objects, Methods and Instance Variables, Declaring a Class witha Method and Instantiating an Object of a Class, Declaring a Method, Instance variables, *set* Methods and *get* Methods, Primitive Types vs. Reference type double Types ,Initializing Objects with Constructors, floating point numbers.

[Unit 2] Control Statements **[7 Hours]**

Control structures *if* single-selection statement, *if....else* double-selection statement, *while* repetition statement, *do... while* repetition statement, *switch* multi-selection statement, *break* and *continue* statements, logical operators. Methods :Introduction, Program modules in Java, *static* methods, *static* Fields and *Class Math*, declaring methods with multiple parameters, scope of declaration, method overloading and Java API packages.

[Unit3]Arrays **[7 Hours]**

Arrays,declaring and creating arrays in java, examples using arrays, passing arrays to methods, multidimensional arrays, variable-length argument lists, using command-line arguments.

[Unit 4] Inheritance and Polymorphism in Java **[7 Hours]**

Inheritance: Super classes and Subclasses, protected members, relationship between super classes and subclasses, constructors in subclasses, objectclass. Polymorphism: Abstract classes and methods, final methods and classes, polymorphism examples and Interfaces.

[Unit 5] Exception-handling and Java script **[7 Hours]**

Exception-handling overview, handling *Arithmetic Exceptions* and *Input Mismatch Exceptions*, when to use exception handling, java exception hierarchy, *finally* block. Introduction to Java Applets. Java script: Introduction to client side scripting, Syntax basics, Operators, Comparisons, Statements, Loops, Events,Objects, and User defined functions, Validations using object functions, Validations using regular expressions, JS document object model, popovers, windows

Text Book:

1. Paul Deitel and Harvey Detail, *Java: How to Program*, Pearson's Publication, 9thEdition.

Reference Books:

1. Joel Murach and Michael Urban, *Murach's Beginning Java with Eclipse*, Murach's Publication, 1st Edition, 2016. Doug Lowe, *Java All-in-One For Dummies*, Wiley Publication, 4th Edition,2014.
2. Herbert Schildt, *Java The Complete Reference*, McGraw-Hill Publication, 9thEdition.
3. Patrick Niemeyer, Daniel Leuck, *Learning Java,* O'Reilly Media, 4th Edition,2013.
4. "JavaScript: The Good Parts", Douglas Crockford, O'Reilly, ISBN: 9782744055973. "Microsoft® .NET: Architecting Applications for the Enterprise", Microsoft Press; 1st edition, ISBN:978-0735626096

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BTCOL306: Data Structure Laboratory

List of Experiments:

1. Write a program to implement stack using arrays.
2. Write a program to evaluate a given postfix expression using stacks.
3. Write a program to convert a given infix expression to postfix form using stacks.
4. Write a program to implement circular queue using arrays.
5. Write a program to implement double ended queue (dequeue) using arrays.
6. Write a program to implement a stack using two queues such that the push operation runs in constant time and the pop operation runs in linear time.
7. Write a program to implement a stack using two queues such that the push operation runs in linear time and the pop operation runs in constant time.
8. Write a program to implement a queue using two stacks such that dequeue operation runs in constant time and dequeue operation runs in linear time.
9. Write programs to implement the following data structures: (a) Single linked list (b)Double linked list.
10. Write a program to implement a stack using a linked list such that the push and pop operations of stack still take O(1)time.
11. Write a program to create a binary search tree (BST) by considering the keys in given order and perform the following operations on it. (a) Minimum key (b) Maximum key (c) Search for a given key (d) Find predecessor of a node (e) Find successor of a node (f) delete a node with given key.
12. Write a program to construct an AVL tree for the given set of keys. Also write function for deleting a key from the given AVL tree.
13. Write a program to implement hashing with (a) Separate Chaining and (b) Open addressing methods.
14. Implement the following sorting algorithms: (a) Insertion sort (b) Merge sort (c) Quick sort (d) Heap sort.
15. Write programs for implementation of graph traversals by applying: (a) BFS (b) DFS.

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Elective –I

BTCOL306: Object Oriented Programming Lab

(a) Object Oriented Programming in C++

List of Experiments:

1. Programs on Operators, Arithmetic Promotion, Method Calling.
2. Programs on dealing with Arrays.
3. Programs on Classes: String and Math.
4. Programs on Inheritance and Polymorphism.
5. Programs on Garbage collection, packaging, access Modifiers, as well as static and abstract modifiers.
6. Programs on Interfaces block initializers, final Modifier, as well as static and dynamic binding.
7. Programs on file handling and stream manipulation.
8. Programs on Dynamic Polymorphism.
9. Programs on Dynamic Memory Management.
10. Programs on Exception Handling.
11. Programs on generic programming using templates.
12. Programs on STL-containers and iterators

(b) Object Oriented Programming in JAVA

List of Experiments:

1. Programs on Operators, Arithmetic Promotion, Method Calling.
2. Programs on Classes: String and Math.
3. Write a program to demonstrate following Function concepts
   i) Function overloading
   ii) Constructors of all types
   iii) Default parameters, returning by reference
4. Programs on dealing with Arrays.
5. Programs on Classes: String and Math.
6. Programs on Inheritance and Polymorphism.
7. Programs on Garbage collection, packaging, access Modifiers, as well as static and abstract modifiers.
8. Programs on Interfaces, block initializers, final Modifier, as well as static and dynamic binding.
9. Programs on Exception Handling.
10. Write a Java program that illustrates the following
    a) Creation of simple package.
    b) Accessing a package.
    c) Implementing interfaces.
11. Programs on Java script client side scripting.
12. Programs on Java script Operators, Comparisons, Statements, Loops, Events, Objects.
13. Programs on Java script User defined functions.
14. Programs on Java script Validations using object functions.
15. Programs on Java script Validations using regular expressions.
16. Programs on Java script JS document object model, Popovers, Windows.

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BTCOC401: Design and Analysis of Algorithms

[Unit 1] Introduction to Algorithms [7 Hours]

Definition, Properties of Algorithms, Expressing Algorithm, Flowchart, Algorithm Design Techniques, Performance Analysis of Algorithms, Types of Algorithm's Analysis, Order of Growth, Asymptotic Notations, Recursion, Recurrences Relation, Substitution Method, Iterative Method, Recursion Tree, Master Theorem, Changing Variable, Heap Sort.

[Unit 2] Divide and Conquer [7 Hours]

Introduction, Binary Search, Merge Sort, Quick Sort, Strassen's Matrix Multiplication.

[Unit 3] Backtracking [7 Hours]

Backtracking Concept, N–Queens Problem, Four–Queens Problem, Eight–Queen Problem, Hamiltonian Cycle, Sum of Subsets Problem, Graph Colouring Problem, Branch and Bound: Introduction, Travelling Salesperson Problem, 15-Puzzle Problem, Comparisons between Backtracking and Branch and Bound.

[Unit 4] Greedy Algorithms [7 Hours]

Introduction to Greedy Technique, Greedy Method, Optimal Merge Patterns, Huffman Coding, Knapsack Problem, Activity Selection Problem, Job Sequencing with Deadline, Minimum Spanning Tree, Single-Source Shortest Path Algorithm

[Unit 5] Dynamic Programming [7 Hours]

Introduction, Characteristics of Dynamic Programming, Component of Dynamic Programming, Comparison of Divide-and-Conquer and Dynamic Programming Techniques, Longest Common Sub-sequence, matrix multiplication, shortest paths: Bellman Ford, Floyd Warshall, Application of Dynamic Programming. NP Completeness: Introduction, the Complexity Class P, the Complexity Class NP, Polynomial-Time Reduction, the Complexity Class NP-Complete.

Text Book:

1. T. Cormen, Introduction to Algorithms, PHI Publication, 2nd Edition, 2002.

Reference Books:

1. Aho, Ullman, Data Structure and Algorithms, Addison-Wesley Publication, 1st Edition,1983.
2. Michel Goodrich, Roberto Tamassia, Algorithm Design – Foundation, Analysis & Internet Examples, Wiley Publication, 2nd Edition,2006.
3. George T. Heineman, Gary Pollice, Stanley Selkow, Algorithms in a Nutshell, A Practical Guide, O'Reilly Media, 2nd Edition, 2016.
4. Ellise Horowitz, SartajSahni, S. Rajasekaran, Fundamentals of Computer Algorithms, University Press (India) Private Ltd, 2nd Edition, 2008.
5. Sara Base, Computer algorithms: Introduction to Design and Analysis, Addison-Wesley Publication, 2nd Edition, 1988

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BTCOC402: Operating Systems

[Unit 1] **[7 Hours]**

Introduction and Operating system structures: Definition, Types of Operating system, Real-Time operating system, System Components: System Services, Systems Calls, System Programs, System structure, Virtual Machines, System Design and Implementation, System Generations.

[Unit 2] **[7 Hours]**

Processes and CPU Scheduling: Process Concept, Process Scheduling, Operation on process, Inter-process Communication, Cooperating processes, Threads, Multithreading model, Scheduling criteria, Scheduling Algorithms, Thread Scheduling, Multiple-Processor Scheduling, Scheduling Algorithms evaluation.

[Unit 3] **[7 Hours]**

Process Synchronization: The critical-section problem, Critical regions, Peterson's Solution, Synchronization Hardware, Semaphores, Classical Problems of synchronization, and Monitors Deadlocks: Systems Model, Deadlock characterization, Methods for handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock, Combined approach to deadlock Handling.

[Unit 4] **[7 Hours]**

Memory Management: Basic concept, Logical and Physical address map, Memory allocation: Continuous Memory Allocation, Fixed and variable partition, Internal and external fragmentation and compaction, Paging: Principle of operation, Page allocation – Hardware support for paging, Protection and sharing,Disadvantages of paging; Segmentation. Virtual Memory: Basics of Virtual Memory – Hardware and control structures – Locality of reference, Page fault, Working Set, Dirty page / Dirty bit – Demand paging, Page Replacement algorithms: Optimal, First in First Out (FIFO), Second Chance (SC), Not recently used (NRU) and Least Recently used(LRU).

[Unit 5] **[7 Hours]**

File Management: File Concept, Access methods, File types, File operation, Directory and disk structure, File System Structure, File System Implementation, Allocation methods (contiguous, linked, indexed), Free-space management (bit vector, linked list, grouping), directory implementation (linear list, hash table), efficiency and performance. Mass-Storage Structure: Disk Structure, Disk attachment, Disk scheduling, Disk management, Swap Space Management.

Text Book:

1. Abraham Silberschatz, Peter B. Galvin and Greg Gagne, Operating System Concepts, Wiley Publication, 8th Edition, 2008.

Reference Books:

1. Andrew S. Tanenbaum, Modern Operating System, PHI Publication, 4th Edition, 2015.
2. D. M. Dhamdhere, Systems Programming and Operating Systems, McGraw-Hill, 2nd Edition, 1996.
3. Garry Nutt, Operating Systems Concepts, Pearson Publication, 3rd Edition, 2003.
4. Harvey M. Deitel, An Introduction to Operating Systems, Addison Wesley Publication, 2nd Edition, 1990.
5. Thomas W. Doeppner, Operating System in Depth: Design and Programming, Wiley Publication, 2011.

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BTHM403: Basic Human Rights

[Unit 1] **[6 Hours]**

The Basic Concepts: - Individual, group, civil society, state, equality, justice, Human Values, Human rights and Human Duties: - Origin, Contribution of American bill of rights, French revolution, Declaration of independence, Rights of citizen, Rights of working and exploited people.

[Unit 2] **[6 Hours]**

Fundamental rights and economic programme, Society, religion, culture, and their inter relationship, Impact of social structure on human behavior, Social Structure and Social Problems: - Social and communal conflicts and social harmony, rural poverty, unemployment, bonded labor.

[Unit 3] **[6 Hours]**

Migrant workers and human rights violations, human rights of mentally and physically challenged, State, Individual liberty, Freedom and democracy, NGOs and human rights in India: - Land, Water, Forest issues.

[Unit 4] **[6 Hours]**

Human rights in Indian constitution and law: - i) the constitution of India: Preamble ii) Fundamental rights iii) Directive principles of state policy vi) Fundamental duties v) some other provisions.

[Unit 5] **[6 Hours]**

Universal declaration of human rights and provisions of India, Constitution and law, National human rights commission and state human rights commission.

Text Book:

1. Shastry, T. S. N., India and Human rights: Reflections, Concept Publishing Company India (P Ltd.), 2005.

Reference **books:**

1. Nirmal, C.J., Human Rights in India: Historical, Social and Political Perspectives (Law in India), Oxford India

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BTBSC404: Probability and Statistics

[Unit 1] Probability Theory **[7 Hours]**

Definition of probability: classical, empirical and axiomatic approach of probability, Addition theorem of probability, Multiplication theorem of probability, Bayes' theorem of inverse probability, Properties of probabilities with proofs, Examples.

[Unit 2] Random Variable and Mathematical Expectation **[7 Hours]**

Random variables, Probability distributions, Probability mass function, Probability density function, Mathematical expectation, Join and marginal probability distributions, Properties of expectation and variance with proofs. Theoretical Probability Distributions : Binomial distribution, Poisson distribution, Normal distribution, Fitting of binomial distributions, Properties of binomial, Poisson and normal distributions, Relation between binomial and normal distributions, Relation between Poisson and normal distributions, Importance of normal distribution, Examples.

[Unit 3] Correlation **[7 Hours]**

Introduction, Types of correlation, Correlation and causation, Methods of studying correlation, Karl Pearson's correlation coefficient, Spearman's rank correlation, Coefficient, Properties of Karl Pearson's correlation coefficient and Spearman's rank correlation coefficient, Probable errors.

[Unit 4] Linear Regression Analysis **[7 Hours]**

Introduction, Linear and non-linear regression, Lines of regression, Derivation of regression lines of y on x and x on y, Angle between the regression lines, Coefficients of regression, Theorems on regression coefficient, Properties of regression coefficient.

[Unit 5] Estimation and Hypothesis **[7 Hours]**

Estimation, Large Sample Estimation of a Population Mean, Small Sample Estimation of a Population Mean, Large Sample Estimation of a Population Proportion, Sample Size Considerations, Testing Hypotheses, The Elements of Hypothesis Testing, Large Sample Tests for a Population Mean, The Observed Significance of a Test, Small Sample Tests for a Population Mean, Large Sample Tests for a Population Proportion.

Text Book:

1. S. C. Gupta, Fundamentals of Statistics, Himalaya Publishing House, 7th Revied and Enlarged Edition, 2016.

Reference Books:

1. G. V. Kumbhojkar, Probability and Random Processes, C. Jamnadas and Co., 14th Edition, 2010.
2. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
3. Veerarajan T., Engineering Mathematics (for semester III), Tata McGraw-Hill, New Delhi, 2010.
4. G. Haribaskaran, Probability, Queuing Theory and Reliability Engineering, Laxmi Publications, 2nd Edition, 2009.
5. Murray Spiegel, John Schiller, R. ALU Srinivasan, Probability and Statistics, Schaum's Outlines, 4th Edition, 2013.
6. Kishor S. Trivedi, Probability, Statistics with Reliability, Queuing and Computer Science Applications, Wiley India Pvt. Ltd, 2nd Edition, 2001.
7. Vijay K. Rohatgi, A. K. Md. Ehsanes Saleh, An Introduction to Probability and Statistics, Wiley

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Publication, 2nd Edition, 2001.

8. Roxy Peck, Chris Olsen, Jay Devore, Introduction to Statistics and Data Analysis, Third Edition, Thomson Books/Cole.
9. Ronald Walpole; Raymond Myers; Sharon Myers; Keying Ye, Probability & statistics for engineers & scientists, 9th edition, Prentice Hall.

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BTES405: Digital Logic Design & Microprocessor

[Unit1] Introduction **[7 Hours]**

Digital signals, digital circuits, AND, OR, NOT, NAND, NOR and Exclusive-OR operations, Boolean algebra, examples of IC gates, Number Systems: binary, signed binary, octal hexadecimal number, binary arithmetic, one's and two's complements arithmetic, codes, error detecting and correcting codes.

[Unit 2] Combinational Digital Circuits **[7 Hours]**

Standard representation for logic functions, K-map representation, simplification of logic functions using K-map, minimization of logical functions, Don't care conditions, Multiplexer, De-Multiplexer / Decoders,Adders, Subtractors, BCD arithmetic, carry look ahead adder, serial adder, ALU, elementary ALU design, parity checker / generator.

[Unit 3] Sequential circuits and systems **[7 Hours]**

1-bit memory, the circuit properties of Bistable latch, the clocked SR flip flop, J-K-T and D-types flip flops, applications of flip flops, shift registers, applications of shift registers, serial to parallel converter, parallel to serial converter, ring counter, sequence generator, ripple(Asynchronous) counters, synchronous counters, counters design using flip flops, special counter IC's, asynchronous sequential counters, applications of counters.

[Unit 4] Fundamentals of Microprocessors **[7 Hours]**

Fundamentals of Microprocessor, Comparison of 8-bit, (8085) 16-bit (8086), and 32-bit microprocessors (80386), The 8086 Architecture: Internal Block Diagram, CPU, ALU, address, data and control bus, Working registers, SFRs, Clock and RESET circuits, Stack and Stack Pointer, Program Counter, I/O ports, Memory Structures, Data and Program Memory, Timing diagrams and Execution Cycles.

[Unit 5] 8086 Instruction Set and Programming **[7 Hours]**

Memory Interfacing, I/O Interfacing, Direct Memory Access (DMA), Interrupts in 8086, 8086 Instruction Set and Programming: Addressing modes: Introduction, Instruction syntax, Data types, Subroutines Immediate addressing, Register addressing, Direct addressing, Indirect addressing, Relative addressing, Indexed addressing, Bit inherent addressing, bit direct addressing, Instruction timings, Data transfer instructions, Arithmetic instructions, Logical instructions, Branch instructions, Subroutine instructions, Bit manipulation instruction, Assembly language programs, C language programs, Assemblers and compilers, Programming and debugging tools.

Text Book:

1. R. P. Jain, Modern Digital Electronics, McGraw Hill Education, 2009.

Reference Books:

1. M. M. Mano, Digital logic and Computer design, Pearson Education India, 2016.
2. Kumar, Fundamentals of Digital Circuits, Prentice Hall India, 2016.
3. Douglas Hall, Microprocessors and Interfacing, McGraw-Hill Publication, Revised 2nd Edition, 2006.

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BTCOL406: Python Programming

One hour per week is for program demonstration and instruction which can be conducted as a classroom session or lab session.

[Unit 1] **[2 Hours]**

Informal introduction to programming, algorithms and data structures, downloading and installing Python, run a simple program on Python interpreter.

[Unit 2] **[2 Hours]**

Variables, operations, control flow – assignments, conditionals, loops, functions: optional arguments, default values, passing functions as arguments.

[Unit 3] **[2 Hours]**

Statements, Expressions, Strings: String processing. Exception handling, Basic input/output, handling files.

[Unit 4] **[2 Hours]**

Class and Object, Data Structure: List, Tuple and Sequences, Set, Dictionaries.

[Unit 5] **[4 Hours]**

Using Database and Structured Query Languages (SQL): SQLite manager, Spidering Twitter using a Database, Programming with multiple tables, JOIN to retrieve data.

*Programming assignments are mandatory.

Text Book:

1. Michael Urban and Joel Murach, Murach's Python Programming, Murach's Publication, 2016.

Reference Books:

1. Charles Severance, Python for Informatics: Exploring Information, University of Michigan, Version 2.7.0, 2014.
2. Dr. R. Nageswara Rao, Core Python Programming, Dreamtech Press, 1st Edition, 2016.
3. Mark Lutz, Learning Python, O'Reilly Media, 5th Edition, 2013.
4. Mark Pilgrim, Dive into Python 3, A press Publication, 2nd Edition, 2009.
5. Allen B. Downey, Think Python, O'Reilly Media, 2nd Edition, 2012.
6. Jon Kleinberg and Eva Tardos, Algorithm Design, Pearson Education, 1st Edition, 2006.

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BTCOL406: Python Programming

ist of Experiments:

1. Program to calculate area of triangle, rectangle, circle
2. Program to find the union of two lists.
3. Program to find the intersection of two lists.
4. Program to remove the "i" th occurrence of the given word in a list where words repeat.
5. Program to count the occurrences of each word in a given string sentence.
6. Program to check if a substring is present in a given string.
7. Program to map two lists into a dictionary.
8. Program to count the frequency of words appearing in a string using a dictionary.
9. Program to create a dictionary with key as first character and value as words starting with that character.
10. Program to find the length of a list using recursion.
11. compute the diameter, circumference, and volume of a sphere using class
12. Program to read a file and capitalize the first letter of every word in the file.

BTCOL406: Operating Systems Laboratory

List of Experiments:

1. Hands on Unix Commands
2. Shell programming for file handling.
3. Shell Script programming using the commands grep, awk, and sed.
4. Implementation of various CPU scheduling algorithms (FCFS, SJF, Priority).
5. Implementation of various page replacement algorithms (FIFO, Optimal, LRU).
6. Concurrent programming; use of threads and processes, system calls (fork and v-fork).
7. Study pthreads and implement the following: Write a program which shows the performance.
8. Improvement in using threads as compared with process.(Examples like Matrix Multiplication.
9. Hyper Quick Sort, Merge sort, Traveling Sales Person problem).
10. Implementation of Synchronization primitives – Semaphore, Locks and Conditional Variables.
11. Implementation of Producer-Consumer problem, Bankers algorithm.
12. Implementation of various memory allocation algorithms, (First fit, Best fit and Worst fit), Disk.
13. Scheduling algorithms (FCFS, SCAN, SSTF, C-SCAN).
14. Kernel reconfiguration, device drivers and systems administration of different operating systems. Writing utilities and OS performance tuning

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Course Structure for Second Year

B. Tech in Electronics and Computer Engineering

Semester III (Term 3)										
Course Category	Course Code	Course Title	Teaching Scheme			Evaluation Scheme				Credit
			L	T	P	CA	MSE	ESE	Total	
BSC	BTES301	Engineering Mathematics-III	3	1	-	20	20	60	100	4
PCC1	BTECPC302	Electronics Devices & Circuits	3	1	-	20	20	60	100	4
PCC2	BTECPC303	Programming, Data Structure and Algorithm using C	3	1	-	20	20	60	100	4
ESC11	BTESC304	Computer Architecture & Operating System	3	-	-	20	20	60	100	3
ESC12	BTESC305	Digital Electronics and Microprocessor	3	-	-	20	20	60	100	3
LC1	BTECPL306	Electronics Devices & Circuits Lab & Programming, Data Structure and Algorithm using C Lab	-	-	4	60	-	40	100	2
Seminar	BTECS307	Seminar-I	-	-	4	60	-	40	100	2
Internship	BTES211P	Internship –I (Evaluation)	-	-	-	-	-	-	-	Audit
			15	**3**	**8**	**220**	**100**	**380**	**700**	**22**

BSC = Basic Science Course, ESC = Engineering Science Course, PCC = Professional Core Course PEC = Professional Elective Course, OEC = Open Elective Course, LC = Laboratory Course HSSMC = Humanities and Social Science including Management Courses

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Course Structure for Second Year

B. Tech in Electronics and Computer Engineering

Semester IV (Term 4)										
Course Category	Course Code	Course Title	Teaching Scheme			Evaluation Scheme				
			L	T	P	CA	MSE	ESE	Total	Credit
PCC3	BTECPC401	Python Programming	3	1	-	20	20	60	100	4
PCC4	BTECPC402	Database Management System	3	1	-	20	20	60	100	4
HSSMC3	BTHM403	Basic Human Rights	3	-	-	20	20	60	100	3
BSC8	BTBS404	Probability Theory and Random Processes	3	-	-	20	20	60	100	3
PEC-1	**BTECPE405**	**Professional Elective Courses –I**	3	1	-	20	20	60	100	4
	BTECPE405 A	1.Microcontroller and Advanced Processor								
	BTECPE405 B	2. Data Analysis								
	BTECPE405 C	3.Electromagnetic Engineering and Wave Propagation								
	BTECPE405 D	4.Linux OS								
LC2	BTECPL406	Python Programming Lab and Database Management System Lab	-	-	4	60	-	40	100	2
Seminar	BTECS407	Seminar - II	-	-	4	60	-	40	100	2
Internship	BTECP408	Internship -II	-	-	-	-	-	-	-	Audit
			15	**3**	**8**	**220**	**100**	**380**	**700**	**22**

Note: The Lab of Professional Elective Courses –I (PEC1) (BTECPE405) should be conducted as per syllabus contents.

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Course Structure for Third Year

B. Tech in Electronics and Computer Engineering

Semester V (Term 5)										
Course Category	Course Code	Course Title	Teaching Scheme			Evaluation Scheme				Credit
			L	T	P	CA	MSE	ESE	Total	
PCC5	BTECPC501	Computer Networks and Cloud Computing	3	1	-	20	20	60	100	4
PCC6	BTECPC502	Digital Signal & Image Processing	3	-	-	20	20	60	100	3
PEC-2	**BTECPE503**	**Professional Elective Course (PEC) -II**	3	1	-	20	20	60	100	4
	BTECPE503 A	1. Sensors and Robotics Technology								
	BTECPE503 B	2. Data Warehouse & Data Mining								
	BTECPE503 C	3. Wireless & Mobile Computing								
	BTECPE503 D	4. Software Engineering								
OEC-1	**BTECOE504**	**Open Elective Course (OEC) - I**	3	1	-	20	20	60	100	4
	BTECOE504A	1. Microelectronics Devices and Circuits								
	BTECOE504B	2. Analog & Digital Communication								
	BTECOE504C	3. Programming in JAVA								
	BTECOE504D	4. Electrical Machines and Instrumentation								
HSSMEC -4	**BTECHM505**	**Humanities and Social Sciences including Management Elective Course - I**	3	-	-	20	20	60	100	3
	BTECHM505A	1. Economics and Management								
	BTECHM505B	2. Business Communication								
LC3	BTECPL506	Computer Networks and Cloud Computing Lab and Competitive Programming Lab	-	-	4	60	-	40	100	2
PROJ	BTECM507	Mini Project I	-	-	4	60	-	40	100	2
Internship	BTECP508	Internship –II (Evaluation)	-	-	-	-	-	-	-	Audit
			15	**3**	**8**	**220**	**100**	**380**	**700**	**22**

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Course Structure for Third Year

B. Tech in Electronics and Computer Engineering

Semester VI (Term 6)

Course Category	Course Code	Course Title	Teaching Scheme			Evaluation Scheme				
			L	T	P	CA	MSE	ESE	Total	Credit
PCC7	BTECPC601	Internet of Things	3	-	-	20	20	60	100	3
PCC8	BTECPC602	Artificial Intelligence and Machine Learning	3	1	-	20	20	60	100	4
PEC-3	**BTECPE603**	**Professional Elective Course (PEC) -III**	3	1	-	20	20	60	100	4
	BTECPE603A	1. Industrial Automation and Control (PLC)								
	BTECPE603B	2. Big Data Analytics								
	BTECPE603C	3.Microwave and Optical Fibre Comm								
	BTECPE603D	4. Software Testing								
OEC-2	**BTECOE604**	**Open Elective Course (OEC) - II**	3	1	-	20	20	60	100	4
	BTECOE604A	1. VLSI Design								
	BTECOE604B	2.Information Theory & Coding								
	BTECOE604C	3.Andriod Programming								
	BTECOE604D	4. Electrical Drives and Control								
HSSMEC-5	**BTECHM605**	**Humanities and Social Sciences including Management Elective Course (HSSMEC) - II**	3	-	-	20	20	60	100	3
	BTECHM605A	1. Development Engineering								
	BTECHM605B	2. Employability and Skill Development								
	BTECHM605C	3. Consumer Behaviour								
LC4	BTECPL606	Internet of Things Lab and Artificial Intelligence and Machine Learning Lab	-	-	4	60	-	40	100	2
PROJ	BTECM607	Mini Project II	-	-	4	60	-	40	100	2
Internship	BTECP608	Internship –III	-	-	-	-	-	-	-	Audit
			15	**4**	**8**	**220**	**100**	**380**	**700**	**22**

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B. Tech in Electronics & Telecommunication Engineering
Curriculum for Final Year

Semester VII

Course Category	Course Code	Course Title	Teaching Scheme			Evaluation Scheme				Credit
			L	T	P	CA	MSE	ESE	Total	
PCC 10	BTETC701	Microwave Engineering	3	1	-	20	20	60	100	4
PEC 4	BTETPE702	Group A	3	1	-	20	20	60	100	4
OEC 3	BTETOE703	Group B	3	1	-	20	20	60	100	4
OEC 4	BTETOE704	Group C	3	1	-	20	20	60	100	4
HSSMC	BTHM705	Engineering Economics and Financial Mathematics	3	-	-	20	20	60	100	3
HSSMC	BTHM706	Foreign Language Studies	-	-	-	-	-	-	-	Audit
LC	BTETL707	Microwave Engineering Lab	-	-	2	60	-	40	100	1
Project	BTETM708	Mini Project – 3	-	-	4	60	-	40	100	2
Internship	BTETP608	Internship – 3 Evaluation	-	-	-	-	-	-	-	Audit
		Total	**15**	**4**	**6**	**220**	**100**	**380**	**700**	**22**

Semester VIII

Course Category	Course Code	Course Title	Teaching Scheme			Evaluation Scheme				Credit
			L	T	P	CA	MSE	ESE	Total	
Project/ Internship	BTETP801	Project work/ Internship	-	-	24	60	-	40	100	12
		Total	**-**	**-**	**24**	**60**	**-**	**40**	**100**	**12**

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PEC = Professional Elective Course, OEC = Open Elective Course, LC = Laboratory Course
HSSMC = Humanities and Social Science including Management Courses

BTETPE702 Program Elective 4 (Group A)	BTETOE703 Open Elective 3 (Group B)	BTETOE704 Open Elective 4 (Group C)
(A) Digital Image Processing	(A) Wireless Sensor Networks	(A) Soft Computing
(B) RF Circuit Design	(B) Block Chain Technology	(B) Big Data Analytics
(C) Satellite Communication	(C) Cyber Security	(C) Data Structure & Algorithms Using Java Programming
(D) Fiber Optic Communication	(D) Mobile Computing	(D) Entrepreneurship Development
(E) Bio-medical Signal Processing	(E) Mobile Communication and Networks	(E) Software Defined Radio
(F) Principles of Modern Radar Engineering	(F) EMI and EMC	(F) E Waste Management

Total Credits: 160

SY. B.Tech
w.e.f.

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(under Maharashtra Act No. XXIX of 2014)

P.O. Lonere, Dist. Raigad, Pin 402 103, Maharashtra

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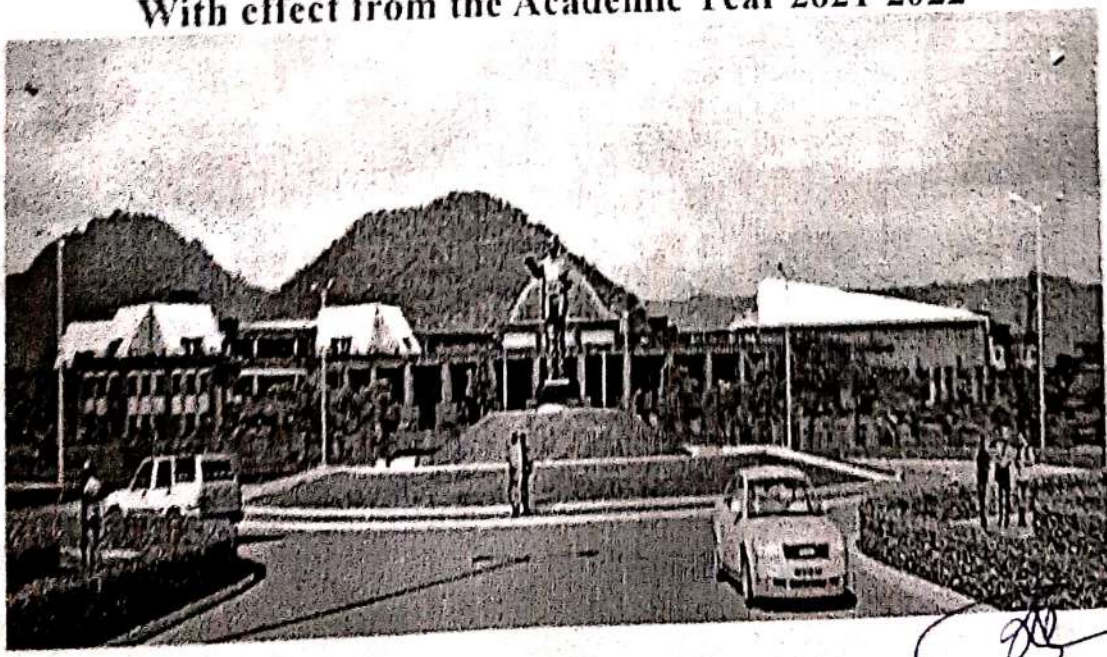
COURSE STRUCTURE AND SYLLABUS

for

Second Year B. Tech. Electrical Engineering / Electrical Engineering (Electronics and Power)/ Electrical & Electronics Engg / Electrical & Power Engineering

With effect from the Academic Year 2021-2022



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Dr. Babasaheb Ambedkar Technological University, Lonere.

B.Tech (Electrical Engineering / Electrical Engineering (Electronics and Power)/ Electrical & Electronics Engg / Electrical & Power Engineering)

Curriculum of Second Year

Semester III

Course Category	Course Code	Course Title	Teaching Scheme			Evaluation Scheme				Credit
			L	T	P	CA	MSE	ESE	Total	
BSC	BTBS301	Engineering Mathematics-III	3	1	-	20	20	60	100	4
PCC1	BTEEC302	Electrical Machines-I	3	1	-	20	20	60	100	4
PCC2	BTEEC303	Electrical and Electronics Measurement	3	1	-	20	20	60	100	4
HSSMC	BTHM304	Basic Human Rights	2	-	-					Audit
ESC	BTES305	Engineering Material Science	3	-	-	20	20	60	100	3
LC	BTEEL306	Electrical Machines-I Lab			2	60		40	100	1
LC	BTEEL307	Electrical and Electronics Measurement Lab			2	60		40	100	1
Project	BTEEP308	Mini Project-I			4	60		40	100	2
Internship	BTES211P	Internship-I Evaluation						50	50	1
			14	3	8	260	80	410	750	20

Semester IV

Course Category	Course Code	Course Title	Teaching Scheme			Evaluation Scheme				Credit
			L	T	P	CA	MSE	ESE	Total	
PCC3	BTEEC401	Network Theory	3	1	-	20	20	60	100	4
PCC4	BTEEC402	Power System	3	1	-	20	20	60	100	4
PCC5	BTEEC403	Electrical Machine-II	3	1	-	20	20	60	100	4
BSC	BTBS404	Analog and Digital Electronics	3	-	-	20	20	60	100	3
PEC1	BTEEPE405	Group A	3	-	-	20	20	60	100	3
LC	BTEEL406	Network Theory Lab	-	-	2	30		20	50	1
LC	BTEEL407	Power System Lab	-	-	2	30		20	50	1
LC	BTEEL408	Electrical Machine-II Lab	-	-	2	30		20	50	1
LC	BTEEL409	Analog and Digital Electronics lab	-	-	2	30		20	50	1
Internship	BTEEP410	Internship-II (minimum of 4 weeks which can be completed partially in third or fourth semester or in at one time)	-	-	-	-	-	-	-	-
						220	100	380	700	22

Group-A

(A)Electromagnetic Field Theory

(B) Signals and System

(C) Advance Renewable Energy Sources

(D) Electronic Devices and Circuits

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(Applicable to all the departments of UG Engineering)

New subjects being prescribed for all the students admitted to first year from A.Y. 2022 – 23.

Following subjects are made mandatory for the second year students in all the branches of engineering.

1) **Universal Human Values II** — Exam on 1 July
2) **Constitution of India** – Audit

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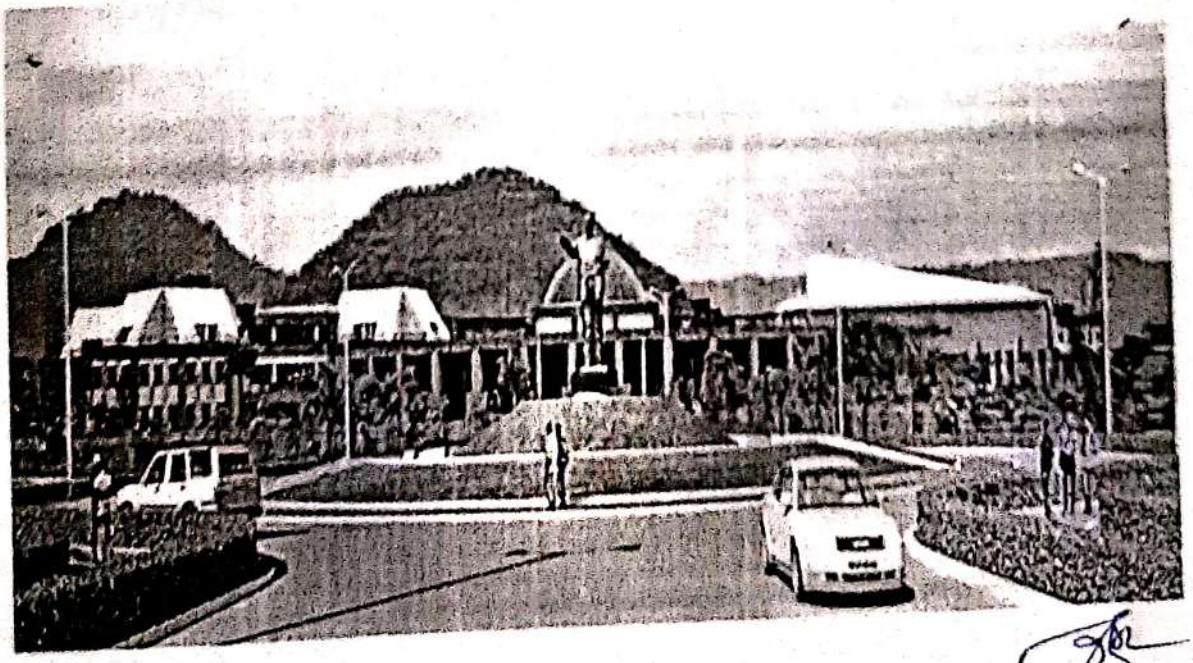
COURSE STRUCTURE AND SYLLABUS

for

Third Year B. Tech. Electrical Engineering / Electrical Engineering (Electronics and Power)/ Electrical & Electronics Engg / Electrical & Power Engineering

With effect from the Academic Year2022-2023



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B.Tech (Electrical Engineering / Electrical Engineering (Electronics and Power)/ Electrical & Electronics Engg / Electrical & Power Engineering)

Curriculum for Semester V

Course Category	Course Code	Course Title	Teaching Scheme			Evaluation Scheme				Credit
			L	T	P	CA	MSE	ESE	Total	
PCC4	BTEEC501	Power System Analysis	3	1	-	20	20	60	100	4
PCC5	BTEEC502	Microprocessor and Microcontroller	3	-	-	20	20	60	100	3
PCC6	BTEEC503	Power Electronics	3	1	-	20	20	60	100	4
PCC2	BTEEPLE504	Group B	3	-	-	20	20	60	100	3
OEC1	BTEEOE505	Group C	3	-	-	20	20	60	100	3
HSSMC	BTHM506	Foreign Language *	-	-	-	-	-	-	-	Audit
LC	BTEEL507	Power System Analysis Lab	-	-	2	60	-	40	100	1
LC	BTEEL508	Microprocessor and Microcontroller Lab	-	-	2	60	-	40	100	1
LC	BTEEL509	Power Electronics Lab	-	-	2	60	-	40	100	1
Project	BTEEPE510	Mini project-II	-	-	2	60	-	40	100	1
Internship	BTEEP410	Internship-II Evaluation	-	-	-	-	-	50	50	1
		Total	**15**	**2**	**10**	**340**	**100**	**510**	**950**	**22**

Semester VI

PCC7	BTEEC601	Switchgear and Protection	3	-	-	20	20	60	100	3
PCC8	BTEEC602	Electrical Machine Design	3	1	-	20	20	60	100	4
PCC9	BTEEC603	Control System Engineering	3	1	-	20	20	60	100	4
PEC3	BTEEPE604	Group D	3	-	-	20	20	60	100	3
OEC2	BTEEOE605	Group E	3	-	-	20	20	60	100	3
LC	BTEEL606	Switchgear and Protection Lab	-	-	2	60		40	100	1
LC	BTEEL607	Electrical Machine Design Lab	-	-	2	60		40	100	1
LC	BTEEL608	Control System Engineering Lab	-	-	2	60		40	100	1
Seminar	BTEEM609	Seminar	-	-	4	60		40	100	2
Internship	BTEEP610	Internship-III (minimum of 4 weeks which can be completed partially in third or fourth semester or in at one time)	-	-	-	-	-	-	-	Credits to be evaluated in VII sem.
		Total	**15**	**2**	**10**	**340**	**100**	**460**	**900**	**22**

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 # Online NPTEL Course

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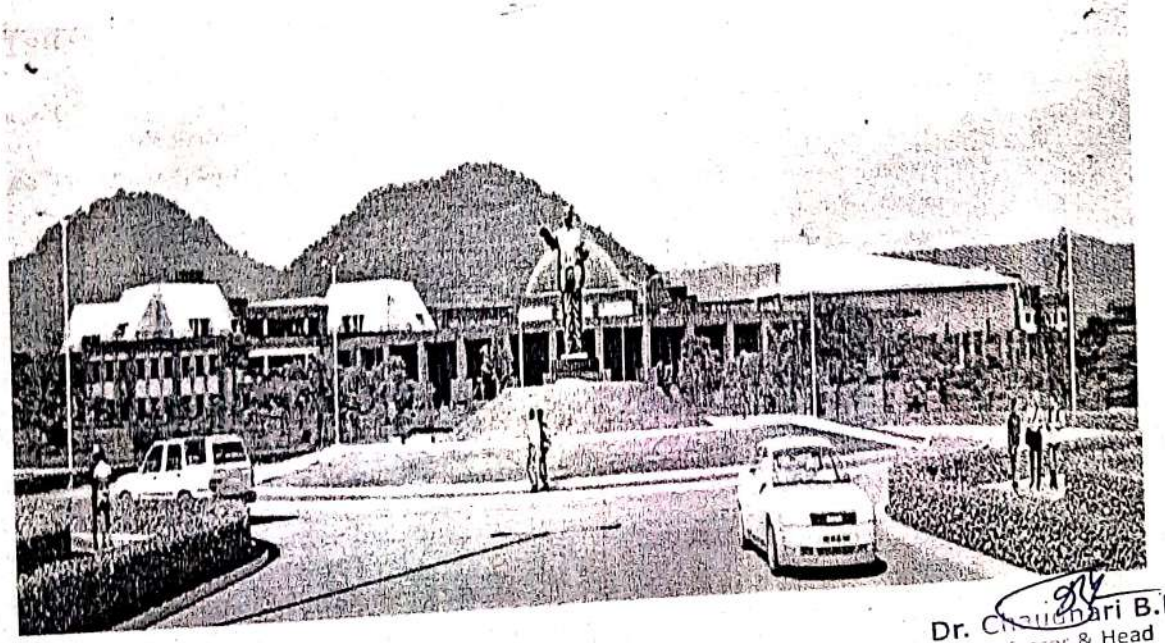
COURSE STRUCTURE AND SYLLABUS

For

Final Year Electrical Engineering / Electrical Engineering (Electronics and Power)/ Electrical & Electronics Engg / Electrical & Power Engineering

With effect from the Academic Year

2023-2024



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B.Tech (Electrical Engineering / Electrical Engineering (Electronics and Power)/ Electrical & Electronics Engg / Electrical & Power Engineering)

Curriculum for Semester VII

Course Category	Course Code	Course Title	Teaching Scheme			Evaluation Scheme				Credit
			L	T	P	CA	MSE	ESE	Total	
PCC10	BTEEC701	High Voltage Engineering	3	1	-	20	20	60	100	4
PCC11	BTEEC702	Power System Operation & Control	3	1	-	20	20	60	100	4
PEC4	BTEEPE703	Group F	3	-	-	20	20	60	100	3
OEC3	BTEEOE704	Group G	3	-	-	20	20	60	100	3
OEC4	BTEEOE705	Group H	3	-	-	20	20	60	100	3
HSSMC	BTHM706	Engineering Operations and Project Management	-	-	-	-	-	-	-	Audit
LC	BTEEL707	High Voltage Engineering Lab	-	-	2	60	-	40	100	1
Project	BTEEM708	Inhouse Project Part-I /Miniproject-III	-	-	4	60	-	40	100	2
Internship	BTEEP609	Internship-III Evaluation	-	-	-	-	-	50	50	1
		Total	**15**	**2**	**10**	**340**	**100**	**510**	**950**	**21**

Semester VIII

Course Category	Course Code	Course Title	Teaching Scheme			Evaluation Scheme				Credit
			L	T	P	CA	MSE	ESE	Total	
PEC5	BTEEPE801	NPTEL online courses	3	-	-	20	20	60	100	3
Project/Internship	BTEEP802	Inhouse Project Part-II /Internship in Industry.	-	-	26	60	-	40	100	12
		Total								15

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Important Note: Minimum Eight Experiment to perform based on the syllabus for the laboratory subject.

Semester VII

BTEEPE703 Professional Elective (Group F)	BTEEOE704 Open Elective (Group G)	BTEEOE705 Open Elective (Group H)
(A) Energy Audit and Conservation	(A) Process Control Instrumentation	(A) Testing, Maintenance and Commissioning of Electrical Equipment
(B) Electrical System Design for Building	(B) Biomedical Instrumentation	(B) Electric and Hybrid Electric Vehicles
(C) Applications of Power Electronics in Power System	(C) Mechatronics	(C) Internet of Things (IoT)
(D) Electrical Utilization		

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P.E.S. College of Engineering, Nagsenvan, Chh. Sambhajinagar

Department of Mechanical & Automation Engineering

PO , PSO & CO (Yearwise)

Second Year
Semester - III

BTBS301 Engineering Mathematics-III

Course Outcomes:

1. Solve higher order linear differential equation using appropriate techniques for modeling and analyzing electrical circuits.
2. Solve problems related to Fourier transform, Laplace transform and applications to Communication systems and Signal processing.
3. Apply vector differentiation and integration required in Electro-magnetics and Wave theory.
4. Analyze complex functions, conformal mappings, contour integration applicable to Electrostatics, Digital filters, Signal and Image processing.

BTMC302 Fluid Mechanics

Course Outcomes:

1. Explain basic properties of fluid, fluid statics, kinematics and dynamics
2. Identify various types of flow, flow patterns and their significance
3. Explain concepts of flow through pipes, boundary layer theory, forces on immersed bodies and dimensionless parameters
4. Derive various equations in fluid mechanics such as Euler's, Bernoulli's, Momentum, Continuity etc.
5. Solve the problems related to properties of fluid, fluid kinematics, fluid dynamics, laminar flow, pipe flow, dimensional analysis, boundary layer theory, and forces on immersed bodies

BTMC303 Thermodynamics

Course Outcomes:

1. Define the terms like system, boundary, properties, equilibrium, work, heat, ideal gas, entropy etc. used in thermodynamics.
2. Studied different laws of thermodynamics and apply these to simple thermal systems to study energy balance.
3. Studied Entropy, diagrams properties of steam, critical point parameters, triple point, property table, representation of processes of steam on p-v, T-s, and other diagrams, Dryness fraction and its measurement.
4. Studied various types of processes like isothermal, adiabatic, etc. considering system with ideal gas and represent them on p-v and T-s planes.

P.E.S. College of Engineering,
Nagsenvan, Chh. Sambhajinagar

Department of Mechanical & Automation Engineering

PO , PSO & CO (Yearwise)

SEM –IV

BTMAC401 Introduction to Automation

Course Outcomes:

1. Understand and learn about fundamentals of automation systems.
2. Understand and learn Architecture of Automation Systems
3. Understand and learn sensing and auction of automation systems
4. Understand and learn advanced tolls used in automation systems

BTHM403 Basic Human Rights

Course Outcomes:

1. Understand the history of human rights.
2. Learn to respect others caste, religion, region and culture.
3. Be aware of their rights as Indian citizen.
4. Understand the importance of groups and communities in the society.
5. Realize the philosophical and cultural basis and historical perspectives of human rights.
6. CO6: Make them aware of their responsibilities towards the nation.

BTMES404 Strength of Materials

1. State the basic definitions of fundamental terms such as axial load, eccentric load, stress, strain, E, μ, principle stresses, etc.
2. Analyze the stresses and strain energy in different load cases
3. Design the columns based on deflection
4. Design a beam based on bending and shafts based on torsion
5. Analyze given beam for calculations of SF and BM
6. Calculate slope and deflection at a point on cantilever /simply supported beam using double integration, Macaulay's , Area-moment and superposition methods

P.E.S. College of Engineering,
Nagsenvan, Chh. Sambhajinagar

Department of Mechanical & Automation Engineering

PO , PSO & CO (Yearwise)

Third Year
Semester - V

Subject: Heat Transfer (BTMEC501)

Course Outcomes:

1. Explain heat transfer laws, derive the general heat conduction equation, and apply it to 1-D steady-state heat transfer in regular shapes.
2. Describe critical radius of insulation, overall heat transfer coefficient, thermal conductivity, and lumped heat transfer.
3. Interpret extended surfaces.
4. Illustrate the boundary layer concept, dimensional analysis, forced and free convection under various conditions.
5. Describe boiling heat transfer, mass transfer, and evaluate heat exchangers using LMTD and NTU methods in engineering problems.
6. Explain thermal radiation, black body, emissivity, reflectivity, view factor evaluation, and radiation shields.

Subject: Applied Thermodynamics - I (BTMEC502)

Course Outcomes:

1. Define calorific value of fuel, stoichiometric air-fuel ratio, excess air, equivalent evaporation, boiler efficiency, etc., and calculate minimum air required for fuel combustion.
2. Study and analyze gas and vapor power cycles (Otto, Diesel, dual, Joule, and Rankine) and derive expressions for thermal efficiency and other performance parameters.
3. Classify various types of boilers, nozzles, steam turbines, and condensers used in steam power plants.
4. Classify various types of IC engines, sketch a typical diesel engine cut section, label its components, and define terms like TDC, BDC, and rc.
5. Draw P-v diagrams for single-stage reciprocating air compressors with and without clearance volume, evaluate their performance, and differentiate between reciprocating and rotary air compressors.

P.E.S. College of Engineering,
Nagsenvan, Chh. Sambhajinagar

Department of Mechanical & Automation Engineering

PO , PSO & CO (Yearwise)

Third Year
Semester - V

Program Outcomes

At the end of the program the student will be able to:

- PO 1: Apply the knowledge of mathematics, basic sciences, and mechanical engineering to the solution of complex engineering problems.
- PO 2: Identify, formulate, research literature, and analyze complex mechanical engineering problems reaching substantiated conclusions.
- PO 3: Design solutions for complex engineering problems and design mechanical system components that meet the specified needs.
- PO 4: Use mechanical engineering research-based knowledge related to interpretation of data and provides valid conclusions.
- PO 5: Create, select, and apply modern mechanical engineering and IT tools to complex engineering activities with an understanding of the limitations.
- PO 6: Apply reasoning acquired by the mechanical engineering knowledge to assess societal and safety issues.
- PO 7: Understand the impact of engineering solutions on the environment, and demonstrate the knowledge for sustainable development.
- PO 8: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- PO 9: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- PO 10 :Communicate effectively on complex engineering activities with the engineering community and with society at large.
- PO 11: Understand the engineering and management principles and apply these to the multidisciplinary environments.
- PO 12 :Recognize the need for life-long learning in the broadest context of technological change.

Program-Specific Outcomes (PSOs)

- PSO 1 Make the students employable in engineering industries.
- PSO 2 Motivate the students for higher studies and research.

P.E.S. College of Engineering, Nagsenvan, Chh. Sambhajinagar

Department of Mechanical & Automation Engineering

PO , PSO & CO (Yearwise)

Subject: Machine Design - I (BTMEC503)

Course Outcomes:

1. Formulate design problems by identifying customer needs and converting them into design specifications.
2. Understand component behavior under loads and identify failure criteria.
3. Analyze stresses and strains induced in components.
4. Design machine components using theories of failures.
5. Design components for finite and infinite life under fluctuating loads.
6. Design components like shafts, keys, couplings, screws, and springs.

Subject: Theory of Machines - II (BTMEC504)

Course Outcomes:

1. Identify and select the type of belt and rope drive for specific applications.
2. Evaluate gear tooth geometry and select appropriate gears/gear trains.
3. Define governors and select/suggest appropriate governors for specific applications.
4. Characterize flywheels based on engine requirements.
5. Understand gyroscopic effects in ships, airplanes, and road vehicles.
6. Understand free and forced vibrations of single-degree freedom systems.

Subject: Metrology and Quality Control (BTMEC505)

Course Outcomes:

1. Identify techniques to minimize measurement errors.
2. Identify methods/devices for measuring length, angle, gear/thread parameters, surface roughness, and geometric features of parts.
3. Choose limits for plug and ring gauges.
4. Explain measurement methods in modern machinery.
5. Select quality control techniques and their applications.
6. Plot quality control charts and suggest measures to improve product quality and reduce cost using statistical tools.

P.E.S. College of Engineering, Nagsenvan, Chh. Sambhajinagar

Department of Mechanical & Automation Engineering

PO , PSO & CO (Yearwise)

Final Year
SEM –VII

Program Outcomes

At the end of the program the student will be able to:

- PO 1 : Apply the knowledge of mathematics, basic sciences, and mechanical engineering to the solution of complex engineering problems.
- PO 2 : Identify, formulate, research literature, and analyze complex mechanical engineering problems reaching substantiated conclusions.
- PO 3:Design solutions for complex engineering problems and design mechanical system
- components that meet the specified needs.
- PO 4:Use mechanical engineering research-based knowledge related to interpretation of
- data and provide valid conclusions.
- PO 5:Create, select, and apply modern mechanical engineering and IT tools to complex
- engineering activities with an understanding of the limitations.
- PO 6:Apply reasoning acquired by the mechanical engineering knowledge to assess
- societal and safety issues.
- PO 7:Understand the impact of engineering solutions on the environment, and
- demonstrate the knowledge for sustainable development.
- PO 8:Apply ethical principles and commit to professional ethics and responsibilities and
- norms of the engineering practice.
- PO 9:Function effectively as an individual, and as a member or leader in diverse teams,
- and in multidisciplinary settings.
- PO 10:Communicate effectively on complex engineering activities with the engineering
- Community and with society at large.
- PO 11: Understand the engineering and management principles and apply these to the
- Multidisciplinary environments.
- PO 12: Recognize the need for life-long learning in the broadest context of technological
- Change.

P.E.S. College of Engineering, Nagsenvan, Chh. Sambhajinagar

Department of Mechanical & Automation Engineering

PO , PSO & CO (Yearwise)

P.E.S. College of Engineering, Mechanical Department

Program-Specific Outcomes (PSOs)

PSO 1 Make the students employable in engineering industries.

PSO 2 Motivate the students for higher studies and research.

P.E.S. College of Engineering, Nagsenvan, Chh. Sambhajinagar

Department of Mechanical & Automation Engineering

PO , PSO & CO (Yearwise)

P.E.S. College of Engineering * Mechanical Department *

Mechatronics (BTMC701)

Course Outcomes:

1.Define sensor, transducer and understand the applications of different sensors and transducers

2. Explain the signal conditioning and data representation techniques

3. Design pneumatic and hydraulic circuits for a given application

4. Write a PLC program using Ladder logic for a given application

5. Understand applications of microprocessor and micro controller

6. Analyse PI, PD and PID controllers for a given application

Industrial Engineering and Management (BTHM702)

Course Outcomes:

1. Impart fundamental knowledge and skill sets required in the Industrial Management and Engineering profession, which include the ability to apply basic knowledge of mathematics, probability and statistics, and the domain knowledge of Industrial Management and Engineering

2. Produce ability to adopt a system approach to design, develop, implement and innovate integrated systems that include people, materials, information, equipment and energy.

3. Understand the interactions between engineering, businesses, technological and environmental spheres in the modern society.

4. Understand their role as engineers and their impact to society at the national and global context.

Elective V

Design of Air Conditioning Systems (BTMPE703A)

Course Outcomes:

1. Understand the cooling load calculation

2. Explain concept of ventilation and its implementation

3. Learn duct design applied to real life situation

4. Learn and differentiate the various modern air conditioning systems/units

P.E.S. College of Engineering, Nagsenvan, Chh. Sambhajinagar

Department of Mechanical & Automation Engineering

PO , PSO & CO (Yearwise)

Mechatronics (BTMC701)

Course Outcomes:

1.Define sensor, transducer and understand the applications of different sensors and transducers

2. Explain the signal conditioning and data representation techniques

3. Design pneumatic and hydraulic circuits for a given application

4. Write a PLC program using Ladder logic for a given application

5. Understand applications of microprocessor and micro controller

6. Analyse PI, PD and PID controllers for a given application

Industrial Engineering and Management (BTHM702)

Course Outcomes:

1. Impart fundamental knowledge and skill sets required in the Industrial Management and Engineering profession, which include the ability to apply basic knowledge of mathematics, probability and statistics, and the domain knowledge of Industrial Management and Engineering

2. Produce ability to adopt a system approach to design, develop, implement and innovate integrated systems that include people, materials, information, equipment and energy.

3. Understand the interactions between engineering, businesses, technological and environmental spheres in the modern society.

4. Understand their role as engineers and their impact to society at the national and global context.

Elective V

Design of Air Conditioning Systems (BTMPE703A)

Course Outcomes:

1. Understand the cooling load calculation

2. Explain concept of ventilation and its implementation

3. Learn duct design applied to real life situation

4. Learn and differentiate the various modern air conditioning systems/units

Course Structure for Semester III
B. Tech in Mechanical and Automation (w.e.f. 2022-23)

Semester III										
Course Category	Course Code	Course Title	Teaching Scheme			Evaluation Scheme				No. of Credits
			L	T	P	CA	MSE	ESE	Total	
BSC7	BTBS301	Engineering Mathematics – III	3	1	-	20	20	60	100	4
PCC1	BTMC302	Fluid Mechanics	3	1	-	20	20	60	100	4
PCC2	BTMC303	Thermodynamics	3	1	-	20	20	60	100	4
PCC3	BTMAC304	Manufacturing Engineering	3	1	-	20	20	60	100	4
PCC4	BTMCL305	Machine Drawing and CAD Lab	-	-	4	60	-	40	100	2
PCC5	BTMACL306	Mechanical Automation Engineering Lab – I	-	-	4	60	-	40	100	2
PROJ-2	BTES209P	IT – 1 Evaluation	-	-	-	-	-	100	100	1
Total			**12**	**4**	**8**	**200**	**80**	**420**	**700**	**21**

BSC = Basic Science Course, ESC = Engineering Science Course, PCC = Professional Core Course
PEC = Professional Elective Course, OEC = Open Elective Course, LC = Laboratory Course

Course Structure for Semester IV
B. Tech in Mechanical and Automation (w.e.f. 2022-23)

HSSMC = Humanities and Social Science including Management Courses BSC = Basic Science Course, ESC = Engineering Science Course, PCC = Professional Core Course PEC = Professional Elective Course, OEC = Open Elective Course, LC = Laboratory Course HSSMC = Humanities and Social Science including Management Courses

Elective I

Sr. No	Course code	Course Name
1	BTMPE405A	Numerical Methods in Engineering
2	BTMPE405C	Fluid Machinery
3	BTMAPE405B	Electrical Drives and controls

Semester III
Engineering Mathematics-III

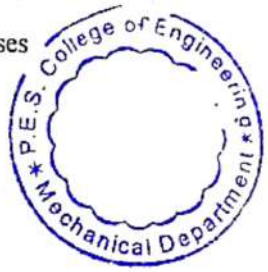
BTBS301	Engineering Mathematics-III	BSC 7	3L-1T-0P	4 Credits

Teaching Scheme:	Examination Scheme:
Lecture: 3 hrs/week Tutorial: 1hr/week	Continuous Assessment: 20 Marks Mid Semester Exam: 20 Marks End Semester Exam: 60 Marks (Duration 03 hrs)

Course Objectives:

Semester IV										
Course Category	Course Code	Course Title	Teaching Scheme			Evaluation Scheme				No. of Credits
			L	T	P	CA	MSE	ESE	Total	
PCC 6	BTMAC401	Introduction to Automation	3	1	-	20	20	60	100	4
HSSMC3	BTHM403	Basic Human Rights	3		-	20	20	60	100	3
ESC10	BTMES404	Strength of Materials	3	1	-	20	20	60	100	4
PCC7	BTMXC404	Theory of Machines and Mechanisms	3	1	-	20	20	60	100	4
PEC 1	BTMPE405A, BTMPE405C, BTMAPE405B	Elective-I	3	-	-	20	20	60	100	3
PCC8	BTMAL406	Theory of Machines and Mechanisms Lab			2	60		40	100	1
ESC11	BTARL407	Strength of Materials Lab			2	60		40	100	1
PROJ-3	BTMAI409	Field Training /Industrial Training (minimum of 4 weeks which can be completed partially in the third and fourth semester or in one semester itself)	-	-	-	-	-	-	-	Credits to be evaluated in Sem V
		Total	**15**	**2**	**4**	**220**	**100**	**380**	**700**	**20**

HSSMC = Humanities and Social Science including Management Courses



Elective I

Sr. No	Course code	Course Name
1	BTMPE405A	Numerical Methods in Engineering
2	BTMPE405B	Sheet Metal Engineering
3	BTMPE405C	Fluid Machinery

Course Structure for Semester V
B. Tech in Mechanical Engineering / B. Tech. in Mechanical Engineering (Sandwich)
(w.e.f. 2022-23)

Semester V										
Course Category	Course Code	Course Title	Teaching Scheme			Evaluation Scheme				No. of Credits
			L	T	P	CA	MSE	ESE	Total	
PCC 8	BTMC 501	Heat Transfer	3	1	-	20	20	60	100	4
PCC 9	BTMC 502	Machine Design – I	3	1	-	20	20	60	100	4
PCC 10	BTMC 503	Theory of Machines- II	3	1	-	20	20	60	100	4
PEC 2	BTMPE 504A-C BTAPE504A,D	Elective-II	3	-	-	20	20	60	100	3
OEC 1	BTMOE 505A-D	Open Elective-I	3	-	-	20	20	60	100	3
PCC 11	BTMC 506	Applied Thermodynamics	3	1	-	20	20	60	100	4
PCC12	BTMCL 507	Mechanical Engineering Lab – III	-	-	6	60	-	40	100	3
PROJ-2	BTMI 408	IT – 2 Evaluation	-	-	-	-	-	100	100	1
		Artificial Intelligence*	3							3*
		Total	**18+ 3**	**4**	**6**	**180**	**120**	**500**	**800**	**26+3***

BSC = Basic Science Course, ESC = Engineering Science Course, PCC = Professional Core Course
PEC = Professional Elective Course, OEC = Open Elective Course, LC = Laboratory Course
HSSMC = Humanities and Social Science including Management Courses

Elective II

Sr. No	Course code	Course Name
1	BTMPE504A	Refrigeration and Air conditioning
2	BTMPE504B	Steam and Gas Turbines
3	BTMPE504C	Engineering Tribology
4	BTAPE504A	Automobile Design
5	BTAPE504D	Automobile Engineering ✓

Open Elective I

Sr.No.	Course code	Course Name
1	BTMOE505A	Solar Energy
2	BTMOE505B	Renewable Energy Sources ✓
3	BTMOE505C	Human Resource Management
4	BTMOE505D	Product Design Engineering

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over and above of 160 credits

Course Structure for Semester VI
B. Tech in Mechanical Engineering / B. Tech. in Mechanical Engineering (Sandwich)
(w.e.f. 2022-23)

Semester VI										
Course Category	Course Code	Course Title	Teaching Scheme			Evaluation Scheme				No. of Credits
			L	T	P	CA	MSE	ESE	Total	
PCC12	BTMC 601	Manufacturing Processes-II	3	1	-	20	20	60	100	4
PCC13	BTMC 602	Machine Design-II	3	1	-	20	20	60	100	4
PEC3	BTMPE 603A-C BTAPE 603C,E	Elective-III	3		-	20	20	60	100	3
PEC4	BTMPE 604A-D BTAPE 604B	Elective-IV	3		-	20	20	60	100	3
OEC2	BTMOE 605A-E	Open Elective-II	3	1	-	20	20	60	100	3
PCC14	BTMCL 606	Mechanical Engineering Lab – IV	-	-	6	60	-	40	100	3
PROJ-3	BTMS607	B Tech Seminar	-	-	2	60		40	100	1
PROJ-4	BTMP 608	Mini Project (TPCS)	-	-	2	60	-	40	100	2
PROJ-5	BTMI 609 (IT-3)	Field Training / Industrial Training (minimum of 4 weeks which can be completed partially in fifth semester and sixth semester or in one semester itself).	-	-	-	-	-	-	-	Credits to be evaluated in Sem VII
		Total	**15**	**3**	**10**	**280**	**100**	**420**	**800**	**23**

BSC = Basic Science Course, ESC = Engineering Science Course, PCC = Professional Core Course
PEC = Professional Elective Course, OEC = Open Elective Course, LC = Laboratory Course
HSSMC = Humanities and Social Science including Management Courses

Elective III:

Sr.No	Course code	Course Name
1	BTMPE603A	IC Engines
2	BTMPE603B	Mechanical Vibrations
3	BTMPE603C	Machine Tool Design
4	BTMPE603D	Engineering Metrology and Quality Control
5	BTAPE603C	Automobile Body Design (Pre-requisite: Automobile Design)
6	BTAPE603E	E – Vehicles ✓

Elective IV:

SrNo	Course code	Course Name
1	BTMPE604A	Process Equipment Design
2	BTMPE604B	Product Life Cycle Management
3	BTMPE604C	Finite Element Method
4	BTMPE604D	Robotics
5	BTAPE604B	Computational Fluid Dynamics

Open Elective II:

Sr.No	Course code	Course Name
1	BTMOE605A	Quantitative Techniques and Project Management
2	BTMOE605B	Nanotechnology
3	BTMOE605C	Energy Conservation and Management
4	BTMOE605D	Wind Energy
5	BTMOE605E	Introduction to Probability Theory and Statistics

Course Structure for Semester VII

B. Tech in Mechanical Engineering / B. Tech. in Mechanical Engineering (Sandwich) (w.e.f. 2023-24)

Semester VII										
Course Category	Course Code	Course Title	Teaching Scheme			Evaluation Scheme				No. of Credits
			L	T	P	CA	MSE	ESE	Total	
PCC15	BTMC701	Mechatronics	3	1	-	20	20	60	100	4
HSSMC4	BTHM702	Industrial Engineering and Management	3	1	-	20	20	60	100	4
PEC5	BTMPE703A-G	Elective-V	3	-	-	20	20	60	100	3
OEC3	BTMOE704A-C	Open Elective-III	3	-	-	20	20	60	100	3
OEC4	BTMOE705A-C	Open Elective-IV	3	-	-	20	20	60	100	3
PCC16	BTMCL706	Mechanical Engineering Lab –V	-	-	6	60	-	40	100	3
PROJ-5	BTMI609	IT – 3 Evaluation	-	-	-	-	-	100	100	1
		Total	**15**	**2**	**06**	**160**	**100**	**440**	**700**	**21**

BSC = Basic Science Course, ESC = Engineering Science Course, PCC = Professional Core Course
PEC = Professional Elective Course, OEC = Open Elective Course, LC = Laboratory Course
HSSMC = Humanities and Social Science including Management Courses

Elective V:

Sr. No	Course code	Course Name
1	BTMPE703A	Design of Air Conditioning Systems
2	BTMPE703B	Biomechanics
3	BTMPE703C	Non-conventional Machining
4	BTMPE703D	Advanced IC Engines
5	BTMPE703E	Additive Manufacturing

Course Structure for Semester VII
B. Tech in Mechanical Engineering / B. Tech. in Mechanical Engineering (Sandwich)
(2023-24)

Semester VII										
Course Category	Course Code	Course Title	Teaching Scheme			Evaluation Scheme				No. of Credits
			L	T	P	CA	MSE	ESE	Total	
PCC15	BTMC701	Mechatronics	3	-	-	20	20	60	100	3
HSSMC4	BTHM702	Industrial Engineering and Management	3	-	-	20	20	60	100	3
PEC5	BTMPE703A-G BTPPE703D	Elective-V	3	-	-	20	20	60	100	3
OEC3	BTMOE704A-C	Open Elective-III	3	-	-	20	20	60	100	3
OEC4	BTMOE705A-C	Open Elective-IV	3	-	-	20	20	60	100	3
PCC16	BTMCL706	Mechanical Engineering Lab –V	-	-	4	60	-	40	100	2
PROJ-6	BTMP 707	Mini Project			6	30		20	50	3
PROJ-7	BTMI609	IT – 3 Evaluation	-	-	-	-	-	100	100	1
		Total	**15**	-	**10**	**190**	**100**	**460**	**750**	**21**

BSC = Basic Science Course, ESC = Engineering Science Course, PCC = Professional Core Course
PEC = Professional Elective Course, OEC = Open Elective Course, LC = Laboratory Course
HSSMC = Humanities and Social Science including Management Courses

Elective V:

Sr. No	Course code	Course Name
1	BTMPE703A	Design of Air Conditioning Systems
2	BTMPE703B	Biomechanics
3	BTMPE703C	Non-conventional Machining
4	BTMPE703D	Advanced IC Engines
5	BTMPE703E	Additive Manufacturing
6	BTMPE703F	Surface Engineering
7	BTPPE703D	Processing of Polymers
8	BTMPE703G	Stress Analysis

Open Elective III:

Sr. No	Course code	Course Name
1	BTMOE704A	Sustainable Development
2	BTMOE704B	Entrepreneurship Development
3	BTMOE704C	Plant Maintenance

Open Elective IV:

Sr.No	Course code	Course Name
1	BTMOE705A	Engineering Economics
2	BTMOE705B	Biology for Engineers
3	BTMOE705C	Intellectual Property Rights ✓

Course Structure for Semester VIII

B. Tech in Mechanical Engineering / B. Tech. in Mechanical Engineering (Sandwich) 2023-24

Semester VIII										
Course Category	Course Code	Course Title	Teaching Scheme			Evaluation Scheme				Credit
			L	T	P	CA	MSE	ESE	Total	
		Choose any two subjects from ANNEXURE-A#				20	20	60	100	3
						20	20	60	100	3
PROJ-8	BTMP801/ BTMI801	Project OR Internship	-	-	16	60	-	40	100	08
		Total	-	-	**16**	**100**	**40**	**160**	**300**	**14**

ANNEXURE-A# (Provisional)
Recommendations of 8th Semester Courses in Self-study Mode from NPTEL/ SWYAM Platform,
THE LIST MAY ALTER AND MODIFY AS PER THE AVAILABILITY OF THE SUBJECTS ON THE NPTEL/ SWYAM Platform AND USEFULNESS, EVERY YEAR

Dr. Babasaheb Ambedkar Technological University, Lonere

Sr No	Course Code	Course Name	Duration (Weeks)	Institute Offering Course	Name of Professor
1	BTMEC801A ✓	Fundamentals of Automotive Systems	12 Weeks	IITM	Prof. C. S. Shankar Ram
2	BTMEC801B	Mechanics of Fiber Reinforced Polymer Composite Structures	12 Weeks	IITG	Prof. Debabrata Chakraborty
3	BTMEC801C	Explosions and Safety	12 Weeks	IITM	Prof. K. Ramamurthi
4	BTMEC801D	Material Characterization	12 Weeks	IITM	Prof. Sankaran.S
5	BTMEC801E	Dealing with materials data : collection, analysis and interpretation	12 Weeks	IISc	Prof. M P Gururajan
6	BTMEC801F ✓ BTMEC802F	Non-Conventional Energy Resources	12 Weeks	IITM	Prof. Prathap Haridoss

Six months of Internship in the industry

= These subjects are to be studied on self –study mode using SWAYAM/NPTEL/Any other source

 # Student doing project in Industry will give NPTEL Examination/Examination conducted by the University i.e. CA/MSE/ESE

 # Students doing project in the Institute will have to appear for CA/MSE/ESE

Total Credits: 161 (Batch 20-24)

DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE
First Year B. Tech (Common to all Branches)

Subject: Engineering Mathematics-I **Subject Code: BTBS101**

Semester: I

Teaching Scheme	**Examination Scheme**
Theory: 03 Hrs/ Week	**Mid-term Test: 20 Marks**
Tutorial: 01 Hr/Week	**Internal Assessment: 20 Marks**
Credits: 04	**End Semester Exam: 60 Marks**
	Duration: 03 Hrs

Course Contents:

Unit 1:Linear Algebra- Matrices:
Inverse of a matrix by Gauss-Jordan method; Rank of a matrix; Normal form of a matrix ; Consistency of non- homogeneous and homogeneous system of linear equations ; Eigen values and Eigen vectors ; Properties of Eigen values and Eigen vectors (without proofs); Cayley-Hamilton's theorem (without proof) and its applications. [6 Hours]

Unit 2: Partial Differentiation:
Partial derivatives of first and higher orders; Homogeneous functions – Euler's Theorem for functions containing two and three variables (with proofs); Total derivatives; Change of variables.[06 Hours]

Unit 3: Applications of Partial differentiation:
Jacobians - properties; Taylor's and Maclaurin's theorems (without proofs) for functions of two variables; Maxima and minima of functions of two variables; Lagrange's method of undetermined multipliers. [06 Hours]

Unit 4: Reduction Formulae and Curve Tracing:
Reduction formula for $\int_0^{\pi/2} \boldsymbol{sin^n x\, dx}$, $\int_0^{\pi/2} \boldsymbol{cos^n x\, dx}$, $\int_0^{\pi/2} \boldsymbol{sin^n x cos^n x\, dx}$
Tracing of the curves given in Cartesian, parametric & polar forms. [06 Hours]

Unit 5: Multiple Integrals
Double integration in Cartesian and polar co-ordinates; Evaluation of double integrals by changing the order of integration and changing to polar form; Triple integral; Applications of multiple integrals to find area as double integral , volume as triple integral and surface area. [08 Hours]

Text Books
1) Higher Engineering Mathematics by B. S. Grewal, Khanna Publishers, New Delhi.
2) Advanced Engineering Mathematics by Erwin Kreyszig, John Wiley & Sons, New York.
3) A Course in Engineering Mathematics (Vol I) by Dr. B. B. Singh, Synergy Knowledgeware, Mumbai.
4) A Text Book of Applied Mathematics (Vol I & II) by P. N. Wartikar and J. N. Wartikar, Pune Vidyarthi Griha Prakashan, Pune.
5) Higher Engineering Mathematics by H. K. Das and Er. Rajnish Verma, S. Chand & CO. Pvt. Ltd., New Delhi.

Reference Books:
1) Higher Engineering Mathematics by B. V. Ramana, Tata McGraw-Hill Publications, New Delhi.

2) A Text Book of Engineering Mathematics by Peter O' Neil, Thomson Asia Pte Ltd. , Singapore.
3) Advanced Engineering Mathematics by C. R. Wylie & L. C. Barrett, Tata Mcgraw-Hill Publishing Company Ltd., New Delhi.

General Instructions:

The tutorial classes in Engineering Mathematics-I are to be conducted batchwise. Each class should
be divided into three batches for the purpose.

The internal assessment of the students for 20 marks will be done based on assignments, surprise tests, quizzes, innovative approach to problem solving and percentage attendance.

The minimum number of assignments should be eight covering all topics.

DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE
First Year B. Tech (Common to all Branches)

Subject: Engineering Mathematics-II **Subject Code:** BTBS201

Semester: II

Teaching Scheme	**Examination Scheme**
Theory: 03 Hrs/ Week	**Mid-term Test: 20 Marks**
Tutorial: 01 Hr/Week	**Internal Assessment: 20 Marks**
Credits: 04	**End Semester Exam: 60 Marks**
	Duration: 03 Hrs

Course Contents:

Unit 1: Complex Numbers [07 Hours]
Definition and geometrical representation ; De-Moivre‟s theorem(without proof) ; Roots of complex numbers by using De-Moivre‟s theorem ; Circular functions of complex variable – definition ; Hyperbolic functions ; Relations between circular and hyperbolic functions ; Real and imaginary parts of circular and hyperbolic functions ; Logarithm of Complexquantities.

Unit 2: Ordinary Differential Equations of First Order and First Degree and Their Applications [07 Hours]
Linear equations; Reducible to linear equations (Bernoulli‟s equation); Exact differential equations; Equations reducible to exact equations ; Applications to orthogonal trajectories , mechanical systems and electrical systems.

Unit 3: Linear Differential Equations with Constant Coefficients [07 Hours]
Introductory remarks - complementary function, particular integral ; Rules for finding complementary functions and particular integrals ; Method of variation of parameters ; Cauchy‟s homogeneous and Legendre‟s linear equations.

Unit 4: Fourier Series [07 Hours]
Introductory remarks- Euler‟s formulae ; Conditions for Fourier series expansion - Dirichlet‟s conditions ; Functions having points of discontinuity ; Change of interval ; Odd and even functions expansions of odd and even periodic functions ; Half-rangeseries.

Unit 5: Vector Calculus [07 Hours]
Scalar and vector fields: Gradient , divergence and curl ; Solenoidal and irrotational vector fields;
Vector identities (statement without proofs) ; Green‟s lemma , Gauss‟ divergence theorem and Stokes‟ theorem (without proofs)

Text Books
a. Higher Engineering Mathematics by B. S. Grewal, Khanna Publishers, NewDelhi.
b. Advanced Engineering Mathematics by Erwin Kreyszig, John Wiley & Sons, NewYork.
c. A Course in Engineering Mathematics (Vol II) by Dr. B. B. Singh, Synergy Knowledge ware,Mumbai.

d. A Text Book of Applied Mathematics (Vol I & II) by P. N. Wartikar and J. N. Wartikar, Pune Vidyarthi Griha Prakashan,Pune.
e. Higher Engineering Mathematics by H. K. Das and Er. Rajnish Verma, S. Chand & CO. Pvt. Ltd., New Delhi.

Reference Books

a. Higher Engineering Mathematics by B. V. Ramana, Tata McGraw-Hill Publications, New Delhi.
b. A Text Book of Engineering Mathematics by Peter O‟ Neil, Thomson Asia Pte Ltd. , Singapore.
c. Advanced Engineering Mathematics by C. R. Wylie & L. C. Barrett, Tata Mcgraw-Hill Publishing Company Ltd., NewDelhi.

General Instructions: 1. The tutorial classes in Engineering Mathematics-II are to be conducted batchwise. Each class should be divided into three batches for thepurpose. 2. The internal assessment of the students for 20 marks will be done based on assignments, surprise tests, quizzes, innovative approach to problem solving and percentageattendance. 3. The minimum number of assignments should be eight covering alltopics.

Dr. BABASAHEB AMBEDKARTECHNOLOGICAL UNIVERSITY, LONERE

Second Year B. Tech (Common to all Branches)

Subject: Engineering Mathematics-III **Subject Code:** BTBS301

Semester: III

Teaching Scheme	**Examination Scheme**
Theory: 03 Hrs/ Week	**Mid-term Test: 20 Marks**
Tutorial: 01 Hr/Week	**Internal Assessment: 20 Marks**
Credits: 04	**End Semester Exam: 60 Marks**
	Duration: 03 Hrs

Course Contents:

Unit No.1: Laplace Transform

Definition – conditions for existence ; Transforms of elementary functions ; Properties of Laplace transforms -Linearity property, first shifting property, second shifting property, transforms of functions multiplied by t^n, scale change property, transforms of functions divided by t, transforms of integral of functions, transforms of derivatives ;Evaluation of integrals by using Laplace transform ; Transforms of some special functions- periodic function, Heaviside-unit step function, Dirac delta function. **[09 Hours]**

Unit No. 2: Inverse Laplace Transform

Introductory remarks ; Inverse transforms of some elementary functions ; General methods of finding inverse transforms ; Partial fraction method and Convolution Theorem for finding inverse Laplace transforms ; Applications to find the solutions of linear differential equations and simultaneous linear differential equations with constant coefficients. **[09 Hours]**

Unit No. 3: Fourier Transform

Definitions – integral transforms ; Fourier integral theorem (without proof) ; Fourier sine and cosine integrals ; Complex form of Fourier integrals ; Fourier sine and cosine transforms ; Properties of Fourier transforms ; Parseval's identity for Fourier Transforms. **[09 Hours]**

Unit No. 4: Partial Differential Equations and Their Applications

Formation of Partial differential equations by eliminating arbitrary constants and functions; Equations solvable by direct integration; Linear equations of first order (Lagrange's linear equations); Method of separation of variables –applications to find solutions of one dimensional heat flow equation ($\frac{\partial u}{\partial t} = c^2 \frac{\partial^2 u}{\partial x^2}$) and one dimensional wave equation ($\frac{\partial^2 y}{\partial t^2} = c^2 \frac{\partial^2 y}{\partial x^2}$).

[09 Hours]

Unit No.5: Functions of Complex Variables

Analytic functions; Cauchy- Riemann equations in Cartesian and polar forms; Harmonic functions in Cartesian form; Cauchy's integral theorem; Cauchy's integral formula; Residues; Cauchy's residue theorem (All theorems without proofs**). [09 Hours]**

Text Books:

1. Higher Engineering Mathematics by B. S. Grewal, Khanna Publishers, New Delhi.
2. Advanced Engineering Mathematics by Erwin Kreyszig, John Wiley & Sons, New York.
3. A Course in Engineering Mathematics (Vol III) by Dr. B. B. Singh, Synergy Knowledge ware, Mumbai.
4. A Text Book of Applied Mathematics (Vol I & II) by P. N. Wartikar and J. N. Wartikar, Pune Vidyarthi Griha Prakashan, Pune.
5. Higher Engineering Mathematics by H. K. Das and Er. Rajnish Verma, S. Chand & CO. Pvt. Ltd., New Delhi.

Reference Books:

1. Higher Engineering Mathematics by B. V. Ramana, Tata McGraw-Hill Publications, New Delhi.
2. A Text Book of Engineering Mathematics by Peter O' Neil, Thomson Asia Pte Ltd., Singapore.
3. Advanced Engineering Mathematics by C. R. Wylie & L. C. Barrett, Tata Mcgraw-Hill Publishing Company Ltd., New Delhi.
4. Integral Transforms and Their Engineering Applications by Dr. B. B. Singh, Synergy. knowledge ware, Mumbai.
5. Integral Transforms by I. N. Sneddon, Tata McGraw-Hill, New York.

General Instructions:

1. The tutorial classes in Engineering Mathematics-III are to be conducted batch wise. Each class should be divided into three batches for the purpose.
2. The internal assessment of the students for 20 marks will be done based on assignments, surprise tests, quizzes, innovative approach to problem solving and percentage attendance.
3. The minimum number of assignments should be eight covering all topics.

DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE
First Year B. Tech (Common to all Branches)

Subject: Engineering Chemistry Subject Code: BTBS102/202

Semester: I/II

Teaching Scheme	**Examination Scheme**
Theory: 03 Hrs/ Week	**Mid-term Test: 20 Marks**
Tutorial: 01 Hr/Week	**Internal Assessment: 20 Marks**
Credits: 04	**End Semester Exam: 60 Marks**
	Duration: 03 Hrs

Course Contents:

BTBS102/202 Engineering Chemistry 4 Credits

Unit 1:Water Treatment (07 Hours)

Introduction , hard and soft water, softening of water – Zeolite process, Ion exchange process, Hot

Lime –Soda process, water characteristics- Hardness and its determination by EDTA method, Dissolve oxygen (DO) and its determination by Winkler‟s method.

Unit 2: Phase Rule (07 Hours)

Phase Rule, statement, Explanation of the terms – Phase, Components, Degrees of freedom. One component system – Water and Sulphur. Reduced phase rule equation, Two components alloy system- Phase diagram of Silver- Lead alloy system.

Unit3:Metallurgy (07 Hours)

Introduction, Occurrence of metals, types of ores, concentration of ores by physical methods Crushing and Sizing, Froth- Flotation, Magnetic Separation, Gravity separation method. Chemical methods- Calcination, Roasting, Reduction of Ore- by Pyrolysis, Chemical reductions, Electrolytic Refining of Metals.

Unit 4: Fuelsand Lubricants (07 Hours)

Fuels: Introduction, classification of fuel, Calorific value of a fuel, characteristics of a good fuel, solid fuel- Coal , Various types of Coal, Analysis of coal- Proximate and Ultimate analysis, liquid fuelRefining of Petroleum Lubricants: Introduction, classification of lubricants - Solid, Semi –solid and Liquid Lubricants , properties of lubricants ,Physical properties – Viscosity, Viscosity index, surface tension, Flash point and Fire point. Chemical properties – Acidity, Saponification.

Unit5:Electrochemistry (07 Hours)

Introduction - Basic concepts: Definition and units of Ohm‟s law, Specific resistance, Specific Conductance, Equivalent conductance, Molecular conductance, Method of conductance measurement by Wheatstone bridge method, Cell constant. Debye- Huckel theory of strong electrolyte, Conductometric titrations, Ostwald‟s theory of acid- base indicator, Quinonoid theory, Glass electrode.

Text books: 1. Jain P.C & Jain Monica, Engineering Chemistry, Dhanpat Rai & Sons, Delhi,1992. 2. Bhal &Tuli, Text book of Physical Chemistry (1995), S. Chand &Company, NewDelhi. 3. O. G. Palanna , Engineering Chemistry, Tata McGraw-Hill Publication, NewDelhi. 4. S. S. Dara, A textbook of Engineering Chemistry, McGraw-Hill Publication, NewDelhi.
Reference books: 1. Barrow G.M., Physical Chemistry, McGraw-Hill Publication, NewDelhi. 2. Shikha Agarwal, Engineering Chemistry- Fundamentals and applications,Cambridge Publishers -2015. 3. WILEY, Engineering Chemistry, Wiley India, New Delhi2014. 4. Atkins, Physicalchemistry.

BTBS207L Engineering Chemistry Laboratory: (0-0-2) 1

At least 10 experiments should be performed from the following list

1) Determination of hardness of water sample by E.D.T.A. method.
2) Determination of chloride content in water sample by precipitation titration method.
3) Determination of Viscosityof a given sample of liquid by using Ostwald‟s Viscometer.
4) Determination of Acid value of an Oil sample.
5) Conductometric Titration (Acid Base titration).
6) Determination of dissolved oxygen present in given water sample by Iodometric method (Winkler‟s Method).
7) To determine alkalinity of water sample.
8) To determine the percentage of available Chlorine in bleaching powder.
9) To determine acidity of water sample.
10) To determine the surface tension of given liquid at room temperature by drop number method.
11) pH –metric Titration (Acid Base titration).
12) To determine calorific value of a fuel.
13) Determination of saponification value of an oil sample.
14) Experiment on water treatment by using ion exchange resins.
15) To find out P-T curve diagram of steam

DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE
First Year B. Tech (Common to all Branches)

Subject: Engineering Physics **Subject Code:** BTBS101/202

Semester: I/II

Teaching Scheme	**Examination Scheme**
Theory: 03 Hrs/ Week	**Mid-term Test: 20 Marks**
Tutorial: 01 Hr/Week	**Internal Assessment: 20 Marks**
Credits: 04	**End Semester Exam: 60 Marks**
	Duration: 03 Hrs

Course Contents:

Unit I: Oscillation and Ultrasonics: (07 Hrs)
Free oscillation, damped oscillation, Forced oscillation and Resonance, differential wave equation, Ultrasonic waves, production of ultrasonics (Piezoelectric effect, Magnetostriction effect) and its applications

Unit II: Optics, Fibre Optics and Laser: (07 Hrs)
Interference of light in thin film, wedge shaped film, Newton‟s rings, polarization of light, methods for production of polarized light(Reflection, Refraction& Double refraction), Huygen‟s theory of double refraction, Principle and structure of optical fibre, acceptance angle, acceptance cone, numerical aperture. Principle of laser, Types of laser – Ruby and He-Ne laser and their applications.

Unit III: Electron Optics, Nuclear and QuantumMechanics: (07 Hrs)
Motion of electron in Electric field (parallel and perpendicular), Motion of electron in magnetic field, motion of electron in combined effect, Bainbridge mass spectrograph,G. M counter, Heisenberg‟s uncertainty principle, Schrödinger‟s time dependent and time independent wave equations, physical significance of wave function.

Unit IV: Crystal Structure, X-rays and Electrodynamics (07 Hrs)
Unit cell, Bravais lattice, cubic system, number of atoms per unit cell, coordination number, atomic radius, packing density, relation between lattice constant and density, lattice planes and Miller indices, X-ray diffraction, Line and Continuous Spectrum of X-ray, Introduction of Maxwell equations (no derivation).

Unit V: Magnetic, Superconducting and Semiconducting materials: (07 Hrs)
Types of magnetic materials (Diamagnetic, Paramagnetic and Ferromagnetic), B-H curve, Superconductivity, types of superconductors, Meissner effect, properties and applications of superconductor, Band theory of solids, conductivity of semiconductors, Halleffect.

Expected Outcome: 1.The student will be able to understand Engineering problems based on the principle of Oscillation, Ultrasonics, Optics, Laser, Fibre optics, Nuclear physics, Quantum mechanics. 2.The student will be able to understand Fundamental of Electrodynamics, Semiconductor, Dielectric, Magnetic and Superconducting materials which forms

the base of many modern devices andtechnologies.

Text books:

1. Engineering Physics M.N.Avadhanulu and P.G. Kshirsagar. S.Chandand Company LTD.
2. Engineering Physics – Dr. L. N. Singh. SynergyKnowledgeware-Mumbai.
3. Engineering Physics-R.K. Gaur and S. L.Gupta.Dhanpat Rai Publications Pvt. Ltd.-NewDelhi.
4. Fundamental of Physics - Halliday and Resnik. Willey EasternLimited.

Reference books:

1. Introduction to Electrodynamics –David R.Griffiths.
2. Concept of Modern Physics – Arthur Beizer.TataMcGraw-HillPublishing Company Limited.
3. Optics – Ajoy Ghatak, MacGraw Hill Education (India) Pvt.Ltd.
4. Science of Engineering Materials- C.M. Srivastava and C. Srinivasan. New Age International Pvt.Ltd.
5. Solid State Physics – A.J. Dekker. McMillan India–Limited.
6. The Feynman Lectures on Physics VolI,II,III.
7. Introduction to solid state physics – Charles Kittel. John Willey and Sons

BTBS107L Engineering Physics Laboratory (0-0-2)1

At least 10 experiments should be performed from the following list

1. Newton‟s rings - Determination of radius of curvature of Plano convex lens / wavelength of light
2. Wedge Shaped film - Determination of thickness of thin wire
3. Half shade Polarimeter - Determination of specific rotation of optically active material
4. Laser - Determination of wavelength of He-Ne laser light
5. Magnetron Tube - Determination of „e/m‟ of electron
6. G.M. Counter - Determination of operating voltage of G.M. tube
7. Crystal Plane – Study of planes with the help of models related Miller Indices
8. Hall Effect - Determination of Hall Coefficient
9. Four Probe Method - Determination of resistivity of semiconductor
10. Measurement of Band gap energy of Semiconductors
11. Study of I-V characteristics of P-N junction diode
12. Experiment on fibre optics
13. Ultrasonics Interferometer
14. B-H Curve Experiment
15. Susceptiblity measurement experiment

DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE

BTHM104/204 Communication Skills 2 Credits

Unit 1: Communication and Communication Processes (04hrs)

Introduction to Communication, Forms and functions of Communication, Barriers to Communication and overcoming them, Verbal and Non-verbal Communication Reading: Introduction to Reading, Barriers to Reading, Types of Reading: Skimming, Scanning, Fast Reading, Strategies for Reading, Comprehension. Listening : Importance of Listening, Types of Listening, Barriers to Listening.

Unit 2: Verbal & Non-verbal Communication (04 hrs)

Use of Language in Spoken Communication, Principles and Practice of Group Discussion, Public

Speaking (Addressing Small Groups and Making Presentation), Interview Techniques, Appropriate

Use of Non-verbal Communication, Presentation Skills, Extempore,Elocution.

Unit 3: Study of Soundsin English (02 hrs)

Introduction to phonetics, Study of Speech Organs, Study of Phonemic Script, Articulation of Different Sounds in English.

Unit 4:English Grammar (05 hrs)

Grammar: Forms of Tenses, Articles, Prepositions, Use of Auxiliaries and Modal Auxiliaries, Synonyms and Antonyms, Common Errors.

Unit 5: Writing Skills, Reading Skills & Listening Skills (04 hrs)

Features of Good Language, Difference between Technical Style and Literary Style, Writing Emails,

Formal and Informal English, Technical Reports: Report Writing: Format, Structure and Types Letter Writing: Types, Parts, Layouts, Letters and Applications, Use of Different Expressions and

Style, Writing Job Application Letter and Resume.

Text book: Mohd. Ashraf Rizvi, *Communication Skills for Engineers*, Tata McGraw Hill

Reference Books: a.Sanjay Kumar, Pushp Lata, *Communication Skills*, Oxford University Press,2016 b.Meenakshi Raman, Sangeeta Sharma, *Communication Skills*, Oxford University Press,2017 c.Teri Kwal Gamble, Michael Gamble, *Communication Works*, Tata McGraw Hill Education, 2010 d.Anderson, Kenneth. Joan Maclean and Tossny Lynch. Study Speaking: A Course inSpoken English for Academic Purposes. Cambridge: CUP, 2004. e.Aswalthapa, K. *Organisational Behaviour*, Himalayan Publication, Mumbai(1991). f. Atreya N and Guha, *Effective Credit Management*, MMC School of Management, Mumbai (1994). g.Balan,K.R. and Rayudu C.S., *Effective Communication*, Beacon New Delhi(1996). h.Bellare, Nirmala. *Reading Strategies*. Vols. 1 and 2. New Delhi. Oxford University Press, 1998. i. Bhasker, W. W. S & Prabhu, N. S.: *English through Reading*, Vols. 1 and 2. Macmillan, 1975. j. Black, Sam.

Practical Public Relations, E.L.B.S. London(1972). k.Blass, Laurie, Kathy Block and Hannah Friesan. *Creating Meaning*. Oxford: OUP,2007. l. Bovee Courtland,L and Thrill, John V. *Business Communication*, Today McGraw Hill, New York, Taxman Publication(1989).

Communication Skill Lab:

Atleast 10 experiments should be performed from the following list:

1) How to introduce oneself?

2) Introduction to Phonemic symbols

3) Articulation of sounds in English with proper manner

4) Practice and exercises on articulation of sounds

5) Read Pronunciations/transcriptions from the dictionary

6) Practice and exercises on pronunciations of words

7) Introduction to stress and intonation

8) Rapid reading sessions

9) Know your friend

10) How to introduce yourself

11) Extempore

12) Group discussion

13) Participating in a debate

14) Presentation techniques

15) Interview techniques

DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE
Second Year B. Tech (CSE/Data Science/EC)

Subject: Probability Theory and Random Process Subject Code: BTBS404

Semester: IV

Teaching Scheme	**Examination Scheme**
Theory: 03 Hrs/ Week	**Mid-term Test: 20 Marks**
Tutorial: 00 Hr/Week	**Internal Assessment: 20 Marks**
Credits: 03	**End Semester Exam: 60 Marks**
	Duration: 03 Hrs

Course Contents:

[Unit 1] Probability Theory [7 Hours]
Definition of probability: classical, empirical and axiomatic approach of probability, Addition theorem of probability, Multiplication theorem of probability, Bayes' theorem of inverse probability, Properties of probabilities with proofs, Examples.

[Unit 2] Random Variable and Mathematical Expectation [7 Hours]
Random variables, Probability distributions, Probability mass function, Probability density function, Mathematical expectation, Join and marginal probability distributions, Properties of expectation and variance with proofs. Theoretical Probability Distributions : Binomial distribution, Poisson distribution, Normal distribution, Fitting of binomial distributions, Properties of binomial, Poisson and normal distributions, Relation between binomial and normal distributions, Relation between Poisson and normal distributions,
Importance of normal distribution, Examples.

[Unit 3] Correlation [7 Hours]
Introduction, Types of correlation, Correlation and causation, Methods of studying correlation, Karl Pearson's correlation coefficient, Spearman's rank correlation, Coefficient, Properties of Karl Pearson's correlation coefficient and Spearman's rank correlation coefficient, Probable errors.

[Unit 4] Linear Regression Analysis [7 Hours]
Introduction, Linear and non-linear regression, Lines of regression, Derivation of regression lines of y on x and x on y, Angle between the regression lines, Coefficients of regression, Theorems on regression coefficient, Properties of regression coefficient.

[Unit 5] Estimation and Hypothesis [7 Hours]
Estimation, Large Sample Estimation of a Population Mean, Small Sample Estimation of a Population Mean, Large Sample Estimation of a Population Proportion, Sample Size Considerations, Testing Hypotheses, The Elements of Hypothesis Testing, Large Sample Tests for a Population Mean, The Observed Significance of a Test, Small Sample Tests for a Population Mean, Large Sample Tests for a Population Proportion.

Text Book:
1. S. C. Gupta, Fundamentals of Statistics, Himalaya Publishing House, 7th Revied and Enlarged Edition, 2016.
Reference Books:
1. G. V. Kumbhojkar, Probability and Random Processes, C. Jamnadas and Co., 14th Edition, 2010.

2. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
3. Veerarajan T., Engineering Mathematics (for semester III), Tata McGraw-Hill, New Delhi, 2010.
4. G. Haribaskaran, Probability, Queuing Theory and Reliability Engineering, Laxmi Publications,
2nd Edition, 2009.
5. Murray Spiegel, John Schiller, R. ALU Srinivasan, Probability and Statistics, Schaum's Outlines,
4th Edition, 2013.
6. Kishor S. Trivedi, Probability, Statistics with Reliability, Queuing and Computer Science Applications, Wiley India Pvt. Ltd, 2nd Edition, 2001.
7. Vijay K. Rohatgi, A. K. Md. Ehsanes Saleh, An Introduction to Probability And Statistics, Wiley Publication, 2nd Edition, 2001.
8. Roxy Peck, Chris Olsen, Jay Devore, Introduction to Statistics and Data Analysis, Third Edition, Thomson Books/Cole.
9. Ronald Walpole; Raymond Myers; Sharon Myers; Keying Ye, Probability & statistics for engineers & scientists, 9th edition.

Dr. Babasaheb Ambedkar Technological University
(Established as a University of Technology in the State of Maharashtra)
(under Maharashtra Act No. XXIX of 2014)
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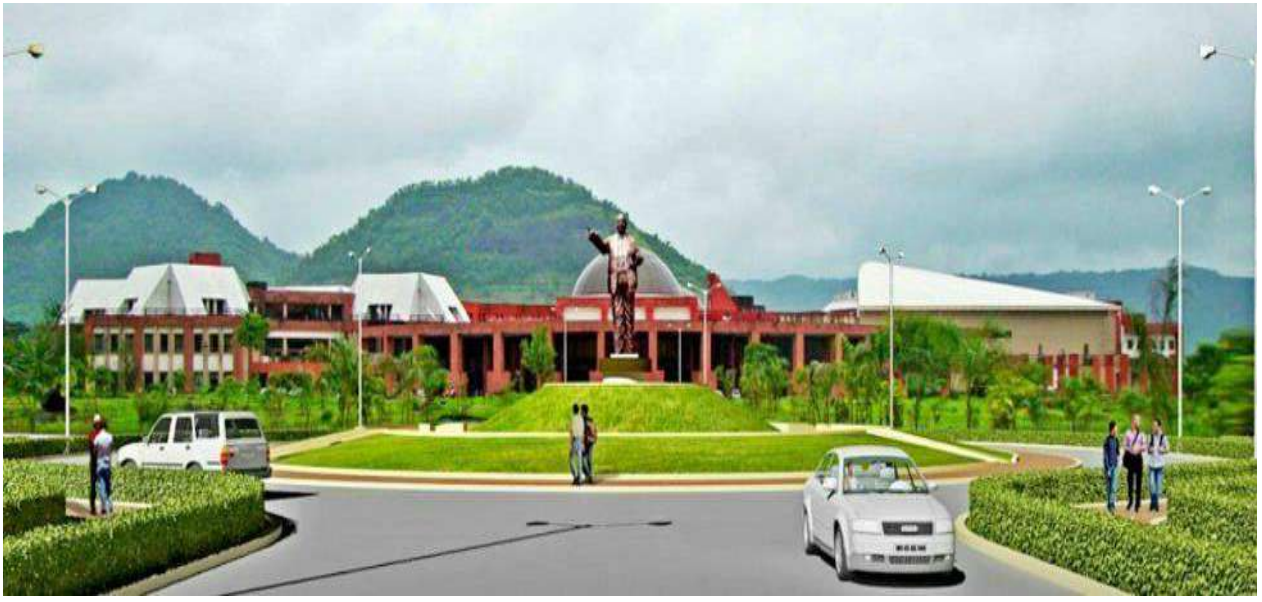
PROPOSED CURRICULUM
UNDER GRADUATE PROGRAMME
B.Tech

FIRST YEAR ENGINEERING

WITH EFFECT FROM THE ACADEMIC YEAR 2020-2021.



Rules and Regulations

1. The normal duration of the course leading to B.Tech degree will be EIGHT semesters.
2. The normal duration of the course leading to M.Tech. degree will be FOUR semesters.
3. Each academic year shall be divided into 2 semesters, each of 20 weeks duration, including evaluation and grade finalization, etc. The Academic Session in each semester shall provide for at least 90 Teaching Days, with at least 40 hours of teaching contact periods in a five to six days session per week. The semester that is typically from Mid-July to November is called the ODD SEMESTER, and the one that is from January to Mid-May is called the EVEN SEMESTER. Academic Session may be scheduled for the Summer Session/Semester as well.For 1st year B. Tech and M. Tech the schedule will be decided as per the admission schedule declared by Government of Maharashtra.
4. The schedule of academic activities for a Semester, including the dates of registration, mid-semester examination, end-semester examination, inter-semester vacation, etc. shall be referred to as the Academic Calendar of the Semester, which shall be prepared by the Dean (Academic), and announced at least TWO weeks before the Closing Date of the previous Semester.
5. The Academic Calendar must be strictly adhered to, and all other activities including co-curricular and/or extra -curricular activities must be scheduled so as not to interfere with the Curricular Activities as stipulated in the Academic Calendar.

REGISTRATION:

1. Lower and Upper Limits for Course Credits Registered in a Semester, by a Full-Time Student of a UG/PG Programme:
   A full time student of a particular UG/PG programme shall register for the appropriate number of course credits in each semester/session that is within the minimum and maximum limits specific to that UG/PG programme as stipulated in the specific Regulations pertaining to that UG/PG programme.
2. Mandatory Pre-Registration for higher semesters:
   In order to facilitate proper planning of the academic activities of a semester, it is essential for the every institute to inform to Dean (Academics) and COE regarding details of total no. of electives offered (Course-wise) along with the number of students opted for the same. This information should be submitted within two weeks from the date of commencement of the semester as per academic calendar.
3. PhD students can register for any of PG/PhD courses and the corresponding rules of evaluation will apply.
4. Under Graduate students may be permitted to register for a few selected Post Graduate courses, in exceptionally rare circumstances, only if the DUGC/DPGC is convinced of the level of the academic achievement and the potential in a student.

Course Pre-Requisites:

1. In order to register for some courses, it may be required either to have exposure in, or to have completed satisfactorily, or to have prior earned credits in, some specified courses.
2. Students who do not register on the day announced for the purpose may be permitted LATE REGISTRATION up to the notified day in academic calendar on payment of late fee.
3. REGISTRATION IN ABSENTIA will be allowed only in exceptional cases with the approval of the Dean (Academic) / Principal.
4. A student will be permitted to register in the next semester only if he fulfills the following conditions:

(a) Satisfied all the Academic Requirements to continue with the programme of Studies without termination
(b) Cleared all Institute, Hostel and Library dues and fines (if any) of the previous semesters;
(c) Paid all required advance payments of the Institute and hostel for the current semester;
(d) Not been debarred from registering on any specific ground by the Institute.

EVALUATION SYSTEM:

1. Absolute grading system based on absolute marks as indicated below will be implementeds from academic year 2019-20,starting from I year B.Tech.

Perentage of marks	Letter grade	Grade point
91-100	EX	10.0
86-90	AA	9.0
81-85	AB	8.5
76-80	BB	8.0
71-75	BC	7.5
66-70	CC	7.0
61-65	CD	6.5
56-60	DD	6.0
51-55	DE	5.5
40-50	EE	5.0
<40	EF	0.0

2. Class is awdared based on CGPA of all eigth semster of B.Tech Program.

CGPA for pass is minimum 5.0	
CGPAupto<5.50	Pass class
CGPA ≥ 5.50 &<6.00	SecondClass
CGPA ≥ 6.00 &<7.50	First Class
CGPA ≥ 7.50	Distinction
[Percentage of Marks =CGPA*10.0]	

3. A total of 100 Marks for each theory course are distributed as follows:

1.	MidSemester Exam (MSE) Marks	20
2.	ContinuousAssesment Marks	20
3.	EndSemesterExamination(ESE)Marks	60

4. A total of 100 Marks for each practical course are distributed as follows:

1.	ContinuousAssesment Marks	60
2.	EndSemesterExamination(ESE)Marks	40

It is mandatory for every student of B.Tech to score a minimum of 40 marks out of 100, with a minimum of 20 marks out of 60 marks in End Semester Examination for theory course.

This will be implemented from the first year of B.Tech starting from Academic Year 2019-20

5. Description of Grades:

EX Grade: An 'EX' grade stands for outstanding achievement.
EE Grade: The 'EE' grade stands for minimum passing grade.
The students may appear for the remedial examination for the subjects he/she failed for the current semester of admission only and his/her performance will be awarded with EE grade only.
If any of the students remain absent for the regular examination due to genuine reason and the same will be verified and tested by the Dean (Academics) or committee constituted by the University Authority.
FF Grade: The 'FF' grade denotes very poor performance, i.e. failure in a course due to poor performance .The students who have been awarded 'FF' grade in a course in any semester must repeat the subject in next semester.

6. Evaluation of Performance:

1. Semester Grade Point Average (SGPA) and Cumulative Grade Point Average (CGPA)

(A) Semester Grade Point Average (SGPA) The performance of a student in a semester is indicated by Semester Grade Point Average (SGPA) which is a weighted average of the grade points obtained in all the courses taken by the student in the semester and scaled to a maximum of 10. (SGPI is to be calculated up to two decimal places). A Semester Grade Point Average (SGPA) will be computed for each semester as follows:

$$SGPA = \frac{[\sum_{i=1}^{n} c_i g_i]}{[\sum_{i=1}^{n} c_i]}$$

Where
'n' is the number of subjects for the semester,
'ci' is the number of credits allotted to a particular subject, and
'gi' is the grade-points awarded to the student for the subject based on his performance as
per the above table.
-SGPA will be rounded off to the second place of decimal and recorded as such.
(B) Cumulative Grade Point Average (CGPA): An up to date assessment of the overall performance of a student from the time he entered the Institute is obtained by calculating Cumulative Grade Point Average (CGPA) of a student. The CGPA is weighted average of the grade points obtained in all the courses registered by the student since s/he entered the Institute. CGPA is also calculated at the end of every semester (upto two decimal places).Starting from the first semester at the end of each semester (S), a Cumulative Grade Point Average (CGPA) will be computed as follows:

$$CGPA = \frac{[\sum_{i=1}^{m} c_i g_i]}{[\sum_{i=1}^{m} c_i]}$$

Where
'm' is the total number of subjects from the first semester onwards up to and including the semester S, 'ci' is the number of credits allotted to a particular subject, and 'gi' is the grade-points awarded to the student for the subject based on his/her performance as per the above table.

-CGPA will be rounded off to the second place of decimal and recorded as such.

Award of Degree of Honours

Major Degree

The concept of Major and Minors at B.Tech level is introduced , to enhance learning skills of students, acquisition of additional knowledge in domains other than the discipline being pursued by the student, to make the students better employable with additional knowledge and encourage students to pursue cross-discipline research.

A. <u>Eligibility Criteria for Majors</u>

1. The Student should have Minimum CGPA of 7.5 up to 4th Semester
2. Student willing to opt for majors has to register at the beginning of 5th Semester
3. The Student has to complete 5 additional advanced courses from the same discipline specified in the curriculum. These five courses should be of 4 credits each amounting to 20 credits. The students should complete these credits before the end of last semester.
4. Student may opt for the courses from NPTEL/ SWAYAM platform. (if the credits of NPTEL/ SWAYAM courses do not match with the existing subject proper scaling will be done)

Student complying with these criteria will be awarded B.Tech (Honours) Degree.

B. Eligibility Criteria for Minors

1. The Student should have Minimum CGPA of 7.5 up to 4th Semester
2. Student willing to opt for minors has to register at the beginning of 5th Semester
3. The Student has to complete 5 additional courses from other discipline of their interest, which are specified in the respective discipline. These five courses should be of 4 credits each amounting to 20 credits.
4. Student may opt for the courses from NPTEL/ SWAYAM platform. (if the credits of NPTEL/ SWAYAM courses do not match with the existing subject proper scaling will be done)

Student complying with these criteria will be awarded with B.Tech Degree in ------- Engineering with Minor in ------ --Engineering.
(For e.g.: B. Tech in Civil Engineering with Minor in Computer Engineering)

For applying for Honours and Minor Degree the student has to register themselves through the proper system.

ATTENDANCE REQUIREMENTS:

1. All students must attend every lecture, tutorial and practical classes.
2. To account for approved leave of absence (e.g.representing the Institute in sports, games or athletics; placement activities; NCC/NSS activities; etc.) and/or any other such contingencies like medical emergencies, etc., the attendance requirement shall be a minimum of 75% of the classes actually conducted.

   If the student failed to maintain 75% attendance, he/she will be detained for appearing the successive examination.

   The Dean (Academics)/ Principal is permitted to give 10% concession for the genuine reasons as such the case may be.

   In any case the student will not be permitted for appearing the examination if the attendance is less than 65%.
3. The course instructor handling a course must finalize the attendance 3 calendar days before the last day of classes in the current semester and communicate clearly to the students by displaying prominently in the department and also in report writing to the head of the department concerned.
4. The attendance records are to be maintained by the course instructor and he shall show it to the student, if and when required.

TRANSFER OF CREDITS

The courses credited elsewhere, in Indian or foreign University/Institutions/ Colleges/Swayam Courses by students during their study period at DBATU may count towards the credit requirements for the award of degree. The guidelines for such transfer of credits are as follows:

a) 20 % of the total credit will be considered for respective calculations.

b) Credits transferred will be considered for overall credits requirements of the programme.
c) Credits transfer can be considered only for the course at same level i.e. UG, PG etc.
d) A student must provide all details (original or attested authentic copies)such as course contents, number of contact hours, course instructor /project guide and evaluation system for the course for which he is requesting a credits transfer. He shall also provide the approval or acceptance letter from the other side. These details will be evaluated by the concerned Board of Studies before giving approval. The Board of Studies will then decide the number of equivalent credits the student will get for such course(s) in DBATU. The complete details will then be forwarded to Dean for approval.
e) A student has to get minimum passing grades/ marks for such courses for which the credits transfers are to be made.
f) Credits transfers availed by a student shall be properly recorded on academic record(s) of the student.
g) In exceptional cases, the students may opt for higher credits than the prescribed.

Bachelor of Technology, First year Engineering

Basic Science Course (BSC)

BTBS101	Engineering Mathematics – I	(3-1-0)4
BTBS102	Engineering Physics	(3-1-0)4
BTBS107L	Engineering Physics Lab	(0-0-2)1
BTBS201	Engineering Mathematics – II	(3-1-0)4
BTBS202	Engineering Chemistry	(3-1-0)4
BTBS207L	Engineering Chemistry Lab	(0-0-2)1
BTBS301	Engineering Mathematics – III	(3-1-0)4
BTBS404	Probability Theory and Random Processes	(3-0-0)3

Engineering Science Course (ESC)

BTES103	Engineering Graphics	(2-0-0)2
BTES105	Energy and Environment Engineering	(2-0-0)2
BTES106	Basic Civil and Mechanical Engineering	(2-0-0) Audit
BTES108L	Engineering Graphics Lab	(0-0-4)2
BTES203	Engineering Mechanics	(2-1-0)3
BTES204	Computer Programming	(3-0-0)3
BTES205	Workshop Practice	(0-0-4)2
BTES206	Basic Electrical and Electronics Engineering	(2-0-0) Audit
BTES208L	Engineering Mechanics Lab	(0-0-2)1
BTES209L	Computer Programming Lab	(0-0-2)1

Humanities and Social Science including Management Courses (HSSMC)

BTHM104	Communication Skills	(2-0-0)2
BTHM109L	Communication Skills Lab	(0-0-2)1
BTHM403	Basic Human Rights	(3-0-0)3
BTHM605	Employability and Skill Development	(3-0-0)3
BTHM705	Engineering Economics and Financial Mathematics	(3-0-0)3
BTHM70	Foreign Language Studies	Audit

Seminar/Mini Project/ Internship

BTES210S	Seminar	(0-0-2)1
BTES211P	Field Training / Internship/Industrial Training (minimum of 4 weeks which can be completed partially in first semester and second Semester or in at one time). (Internship – 1)	Audit
BTETS307	Seminar I	(0-0-4)2
BTETS407	Seminar II	(0-0-4)2
BTETP408	(Internship – 2)	Audit
BTETM507	Mini Project – 1	(0-0-4)2
BTETM607	Mini Project – 2	(0-0-4)2

Suggested Plan of Study , First Year:

No.of Courses	SEMESTER I	SEMESTER II
1	BTBS101	BTBS201
2	BTBS102	BTBS202
3	BTES103	BTES203
4	BTHM104	BTES204
5	BTES105	BTES205
6	BTES106	BTES206
7	BTBS107L	BTBS207L
8	BTES108L	BTES208L
9	BTHM109L	BTES209L
10	--	BTES210S
11	--	BTES211P (Internship - 1)

Degree Requirements:

Category of courses	Minimum credits to be earned	Credits awarded to First year
Basic Science Course (BSC)	**25**	**18**
Engineering Science Course (ESC)	**19**	**15**
Humanities and Social Science including Management Courses (HSSMC)	**12**	**03**

Professional Core Course (PCC)	**48**	**--**
Professional Elective Course (PEC)	**17**	**--**
Open Elective Course (OEC)	**16**	**--**
Seminar/Mini Project/ Internship/Major Project	**23**	**01**
Total	**160**	**37**

B. Tech in Electronics & Telecommunication Engineering
Program Educational Objectives and Outcomes

A. Program Educational Objectives (PEOs)

Graduates will able to–

a. Equip graduates with a strong foundation in engineering sciences &allied discipline fundamentals to become effective collaborators, researchers and real-time problem solver with technical competencies.

b. Perceive the limitation and impact of engineering solutions in social, legal, environmental, economical and multidisciplinary contexts.

c. Excel in Industry/technical profession, higher studies, and entrepreneurship exhibiting global competitiveness.

B. Program Outcomes

Engineering Graduate will be able to –

1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specific needs with appropriate consideration for the public health and safety, and the cultural, social, and environmental considerations.
4. **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6. **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. **Environment and sustainability:** Understand the impact of the professional

engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

C. Program Specific Outcomes (PSOs)

1. Apply basic knowledge related to the discipline to solve engineering/ societal problems.
2. Recognize and adapt to technical developments and to engage in lifelong learning and develop consciousness for professional, social, legal and ethical responsibilities.
3. Excellent adaptability to the changing industrial and real world requirements

Teaching and Evaluation Scheme for First Year B. Tech. (All Branches)

Group A

Semester I									
Course Code	**Course Title**	**Teaching Scheme**			**Evaluation Scheme**				
		L	T	P	CA	MSE	ESE	Total	Credit
Mandatory	**Induction Program**	**3-weeks duration in the beginning of semester.**							
BTBS101	Engineering Mathematics- I	3	1	-	20	20	60	100	4
BTBS102	Engineering Physics	3	1	-	20	20	60	100	4
BTES103	Engineering Graphics	2	-	-	20	20	60	100	2
BTHM104	Communication Skills	2	-	-	20	20	60	100	2
BTES105	Energy and Environment Engineering	2	-	-	20	20	60	100	2
BTES106	Basic Civil and Mechanical Engineering	2	-	-	50	-	-	50	Audit
BTBS107L	Engineering Physics Lab	-	-	2	60	-	40	100	1
BTES108L	Engineering Graphics Lab	-	-	4	60	-	40	100	2
BTHM109L	Communication Skills Lab.	-	-	2	60	-	40	100	1
		14	**2**	8	330	100	420	850	18
Semester II									
BTBS201	Engineering Mathematics-II	3	1	-	20	20	60	100	4
BTBS202	Engineering Chemistry	3	1	-	20	20	60	100	4
BTES203	Engineering Mechanics	2	1	-	20	20	60	100	3
BTES204	Computer Programming in C	3	-	-	20	20	60	100	3
BTES205	Workshop Practices	-	-	4	60	-	40	100	2
BTES206	Basic Electrical and Electronics Engineering	2	-	-	50	-	-	50	Audit
BTBS207L	Engineering Chemistry Lab	-	-	2	60	-	40	100	1
BTES208L	Engineering Mechanics Lab	-	-	2	60	-	40	100	1
BTES210S	Seminar	-	-	2	60	-	40	100	1
BTES211P	Field Training / Internship/Industrial Training (minimum of 4 weeks which can be completed partially in first semester and second Semester or in at one time).	-	-	-	-	-	-	-	Credits To be evaluated in III Sem.
		13	**3**	**10**	**430**	**80**	**440**	**950**	**19**
		27							

Teaching and Evaluation Scheme for First Year B. Tech. (All Branches)

Group B

Semester I									
Course Code	**Course Title**	**Teaching Scheme**			**Evaluation Scheme**				
		L	T	P	CA	MSE	ESE	Total	Credit
Mandatory	**Induction Program**	**3-weeks duration in the beginning of semester.**							
BTBS101	Engineering Mathematics- I	3	1	-	20	20	60	100	4
BTBS102	Engineering Chemistry	3	1	-	20	20	60	100	4
BTES103	Engineering Mechanics	2	1	-	20	20	60	100	3
BTES104	Computer Programming in C	3	-	-	20	20	60	100	2
BTES105L	Workshop Practices	-	-	4	60	-	40	100	2
BTES106	Basic Electrical and Electronics Engineering	2	-	-	50	-	-	50	Audit
BTBS107L	Engineering Chemistry Lab	-	-	2	60	-	40	100	1
BTES108L	Engineering Mechanics Lab	-	-	2	60	-	40	100	1
		13	**03**	**10**	**370**	**80**	**400**	**850**	**18**
		25							
Semester II									
BTBS201	Engineering Mathematics-II	3	1	-	20	20	60	100	4
BTBS202	Engineering Physics	3	1	-	20	20	60	100	4
BTES203	Engineering Graphics	2	-	-	20	20	60	100	2
BTHM204	Communication Skills	2	-	-	20	20	60	100	2
BTES205	Energy and Environment Engineering	2	-	-	20	20	60	100	2
BTES206	Basic Civil and Mechanical Engineering	2	-	-	50	-	-	50	Audit
BTBS207L	Engineering Physics Lab	-	-	2	60	-	40	100	1
BTES208L	Engineering Graphics Lab	-	-	3	60	-	40	100	2
BTHM209L	Communication Skills Lab.	-	-	2	60	-	40	100	1
BTES210S	Seminar	-	-	2	60	-	40	100	1
BTES211P	Field Training / Internship/Industrial Training (minimum of 4 weeks which can be completed partially in first semester and second Semester or in at one time)	-	-	-	-	-	-	-	Credits To be evaluated in III Sem.
		14	**02**	**09**	**390**	**100**	**460**	**950**	**19**
		26							

Guide to Induction Program

When new students enter an institution, they come with diverse thoughts, backgrounds and preparations. It is important to help them adjust to the new environment and inculcate in them the ethos of the institution with a sense of larger purpose. Precious little is done by most of the institutions, except for an orientation program lasting a couple of days.

We propose a 3-week long induction program for the UG students entering the institution, right at the start. Normal classes start only after the induction program is over. Its purpose is to make the students feel comfortable in their new environment, open them up, set a healthy daily routine, create bonding in the batch as well as between faculty and students, develop awareness, sensitivity and understanding of the self, people around them, society at large, and nature.

The time during the Induction Program is also used to rectify some critical lacunas, for example, English background, for those students who have deficiency in it.

The following are the activities under the induction program in which the student would be fully engaged throughout the day for the entire duration of the program.

- **Physical Activity** This would involve a daily routine of physical activity with games and sports. It would start with all students coming to the field at 6 am for light physical exercise or yoga. There would also be games in the evening or at other suitable times according to the local climate. These would help develop team work. Each student should pick one game and learn it for three weeks. There could also be gardening or other suitably designed activity where labour yields fruits from nature.
- **Creative Arts** Every student would chose one skill related to the arts whether visual arts or performing arts. Examples are painting, sculpture, pottery, music, dance etc. The student would pursue it every day for the duration of the program. These would allow for creative expression. It would develop a sense of aesthetics and also enhance creativity which would, hopefully, flow into engineering design later.
- **Universal Human Values:** It gets the student to explore oneself and allows one to experience the joy of learning, stand up to peer pressure, take decisions with courage, be aware of relationships with colleagues and supporting staff in the hostel and department, be sensitive to others, etc. Need for character building has been underlined earlier. A module in Universal Human Values provides the base. Methodology of teaching this content is extremely important. It must not be through dos and don’ts, but get students to explore and think by engaging them in a dialogue. It is best taught through group discussions and real life activities rather than lecturing. The role of group discussions, however, with clarity of thought of the teachers cannot be over emphasized. It is essential for giving exposure, guiding thoughts, and realizing values. The teachers must come from all the departments rather than only one department like HSS or from outside of the Institute. Discussions would be conducted in small groups of about 20 students with a faculty mentor each. It is to open thinking towards the self. Universal Human Values discussions could even continue for rest of the semester as a normal course, and not stop with the induction program. Besides drawing the

attention of the student to larger issues of life, it would build relationships between teachers and students which last for their entire 4-year stay and possibly beyond.

- **Literary:** Literary activity would encompass reading, writing and possibly, debating, enacting a play etc.
- **Proficiency Modules:** This period can be used to overcome some critical lacunas that students might have, for example, English, computer familiarity etc. These should run like crash courses, so that when normal courses start after the induction program, the student has overcome the lacunas substantially. We hope that problems arising due to lack of English skills, wherein students start lagging behind or failing in several subjects, for no fault of theirs, would, hopefully, become a thing of the past.
- **Lectures by Eminent People:** This period can be utilized for lectures by eminent people, say, once a week. It would give the students exposure to people who are socially active or in public life.
- **Visits to Local Area** A couple of visits to the landmarks of the city, or a hospital or orphanage could be organized. This would familiarize them with the area as well as expose them to the under privileged.
- **Familiarization to Dept./Branch & Innovations :** The students should be told about different method of study compared to coaching that is needed at IITs. They should be told about what getting into a branch or department means what role it plays in society, through its technology. They should also be shown the laboratories, workshops & other facilities.

Schedule

The activities during the Induction Program would have an ***Initial Phas***e, a ***Regular Phase*** and a ***Closing Phase***. The Initial and Closing Phases would be two days each.

Initial Phase

Time	Activity
Day 0	
Whole day	Students arrive - Hostel allotment. (Preferably do pre-allotment)
Day 1	
9.00 AM to 3.00 PM	Academic Registration
4.30 PM to 6.00 PM	Orientation
Day 2	
9.00 AM to 10.00 AM	Diagnostic test (for English etc.)
10.15 AM to 12.25PM	Visits to Respective Departments
12.30 PM to 2.00 PM	Lunch time
2.00 PM to 3.00 PM	Director's Speech
3.00 PM to 4.00 PM	Interaction with Parents
4.00 PM to 5.30 PM	Mentor-Mentee groups- Introduction within group

Regular Phase

After two days is the start of the Regular Phase of induction. With this phase there would be regular program to be followed every day.

Daily Schedule

Some of the activities are on a daily basis, while some others are at specified periods within the Induction Program. We first show a typical daily timetable.

Session	Time	Activity	Remark
Day 3 Onwards			
I	9.00 AM to 11.00 AM	Creative Arts / Universal Human Values	Half the groups will do creative arts
II	11.00 AM to 1.00 PM	Universal Human Values/ Creative Arts	Complementar y Alternate
Lunch Time			
IV	2.00 PM to 4.00 PM	Afternoon Session	See below
V	4.00 PM to 5.00 PM	Afternoon Session	See below

Sundays are off. Saturdays have the same schedule as above or have outings.

Afternoon Activities (Non-Daily) : The following five activities are scheduled at different times of the Induction Program, and are not held daily foreveryone:

1. Familiarization to Dept./Branch &Innovations
2. Visits to LocalArea
3. Lectures by EminentPeople
4. Literary
5. Proficiency Modules

Closing Phase

Time	Activity
Last But one day	
9.00 AM to 12.00 PM	Discussions and finalizations of presentations within each group
2.00 PM to 5.00 PM	Presentation by each group in front of 4 other groups besides their own (about 100 students)
Last Day	
Whole day	Examinations if any

- **Follow Up after Closure**

A question comes up as to what would be the follow up program after the formal 3-week Induction Program is over? The groups which are formed should function as mentor- mentee network. A student should feel free to approach his faculty mentor or the student guide, when facing any kind of problem, whether academic or financial or psychological 6etc. (For every 10 undergraduate first year students, there would be a senior student as a student guide, and for every 20 students, there would be a faculty mentor.) Such a group should remain for the

entire 4-5 year duration of the stay of the student. Therefore, it would be good to have groups with the students as well as teachers from the same department/discipline Here we list some important suggestions which have come up and which have been experimentedwith.

- **Follow Up after Closure – Same Semester:** It is suggested that the groups meet with their faculty mentors once a month, within the semester after the 3-week Induction Program is over. This should be a scheduled meeting shown in the timetable. (The groups are of course free to meet together on their own more often, for the student groups to be invited to their faculty mentor's home for dinner or tea, nature walk,etc.)

- **Follow Up – Subsequent Semesters:** It is extremely important that continuity be maintained in subsequent semesters. It is suggested that at the start of the subsequent semesters (upto fourth semester), three days be set aside for three full days of activities related to follow up to Induction Program. The students be shown inspiring films, do collective art work, and group discussions be conducted. Subsequently, the groups should meet at least once amonth.

Summary

Engineering institutions were set up to generate well trained manpower in engineering with a feeling of responsibility towards oneself, one's family, and society. The incoming undergraduate students are driven by their parents and society to join engineering without understanding their own interests and talents. As a result, most students fail to link up with the goals of their own institution. The graduating student must have values as a human being, and knowledge and meta-skills related to his/her profession as an engineer and as a citizen. Most students, who get de-motivated to study engineering or their branch, also lose interest inlearning.

The Induction Program is designed to make the newly joined students feel comfortable, sensitize them towards exploring their academic interests and activities, reducing competition and making them work for excellence, promote bonding within them, build relations between teachers and students, give a broader view of life, and building of character.

The Universal Human Values component, which acts as an anchor, develops awareness and sensitivity, feeling of equality, compassion and oneness, draw attention to society and 4

We are aware that there are advantages in mixing the students from different depts. However, in mixing, it is our experience that the continuity of the group together with the faculty mentor breaks down soon after. Therefore, the groups be from the same dept. but hostel wings have the mixed students from different depts. For example, the hostel room allotment should be in alphabetical order irrespective of dept. 7nature, and character to follow through. It also makes them reflect on their relationship with their families and extended family in the college (with hostel staff and others). It also connects students with each other and with teachers so that they can share any difficulty they might be facing and seekhelp.

References:

Motivating UG Students Towards Studies, Rajeev Sangal, IITBHU Varanasi, Gautam Biswas, IIT Guwahati, Timothy Gonsalves, IIT Mandi, Pushpak Bhattacharya, IIT Patna, (Committee of IIT Directors),31 March 2016, IIT Directors' Secretariat, IIT Delhi.

BTBS101EngineeringMathematics-I 4 Credits

Course Objectives:

1. To know the application of the matrix technique (Linear algebra) to find solutions of system of linear equations arising in many engineering problem
2. To know and apply the concept partial derivatives and their applications to Maxima/ Minima , series expansion of multi valued functions.
3. To understand Computation of Jacobian of functions of several variables and their applications to engineering problems
4. To identify and sketch of curves in various coordinate system.
5. To evaluate multiple integrals and their applications to area and volume.

Course Outcomes:

Students will be able to :

1. Apply the matrix technique (Linear algebra) to find solutions of system of linear equations arising in many engineering problem
2. Demonstrate the concept partial derivatives and their applications to Maxima/ Minima , series expansion of multi valued functions.
3. Compute Jacobian of functions of several variables and their applications to engineering problems
4. Identify and sketch of curves in various coordinate system.
5. Evaluate multiple integrals and their applications to area and volume.

Unit 1:Linear Algebra- Matrices [07 Hours]

Inverse of a matrix by Gauss-Jordan method; Rank of a matrix; Normal form of a matrix ; Consistency of non- homogeneous and homogeneous system of linear equations ; Eigen values and eigen vectors ; Properties of eigen values and eigen vectors (without proofs); Cayley- Hamilton's theorem (without proof) andits applications.

Unit 2:Partial Differentiation [07 Hours]

Partial derivatives of first and higher orders; Homogeneous functions – Euler's Theorem for functions containing two and three variables (with proofs); Total derivatives; Change of variables.

Unit 3:Applications of Partial differentiation [07Hours]

Jacobians - properties; Taylor's and Maclaurin's theorems (without proofs) for functions of two variables; Maxima and minima of functions of two variables; Lagrange's method of undetermined multipliers.

Unit 4: Reduction Formulae and Tracing of Curves [07Hours]

Reduction formulae for $\int_0^{\frac{\pi}{2}} \sin^n x\,dx$, $\int_0^{\frac{\pi}{2}} \cos^n x\,dx$, $\int_0^{\frac{\pi}{2}} \sin^m x \cos^n x\,dx$; Tracing of standard curves given in Cartesian, parametric & polar forms.

Unit 5: Multiple Integra [08 Hours]

Double integration in Cartesian and polar co-ordinates; Evaluation of double integrals by changing the order of integration and changing to polar form; Triple integral; Applications of multiple integrals to find area as double integral , volume as triple integral and surface area.

Text Books

1. Higher Engineering Mathematics by B. S. Grewal, Khanna Publishers, NewDelhi.
2. Advanced Engineering Mathematics by Erwin Kreyszig, John Wiley & Sons, NewYork.
3. A Course in Engineering Mathematics (Vol I) by Dr. B. B. Singh, Synergy Knowledgeware, Mumbai.
4. A Text Book of Applied Mathematics (Vol I & II) by P. N. Wartikar and J. N. Wartikar, Pune Vidyarthi Griha Prakashan,Pune.
5. Higher Engineering Mathematics by H. K. Das and Er. Rajnish Verma, S. Chand & CO. Pvt. Ltd., New Delhi.

Reference Books

1. Higher Engineering Mathematics by B. V. Ramana, Tata McGraw-Hill Publications, New Delhi.
2. A Text Book of Engineering Mathematics by Peter O' Neil, Thomson Asia Pte Ltd. , Singapore.
3. Advanced Engineering Mathematics by C. R. Wylie & L. C. Barrett, Tata Mcgraw-Hill Publishing Company Ltd., NewDelhi.

General Instructions:

The tutorial classes in Engineering Mathematics-I are to be conducted batchwise. Each class should be divided into three batches for the purpose.

The internal assessment of the students for 20 marks will be done based on assignments, surprise tests, quizzes, innovative approach to problem solving and percentage attendance.

The minimum number of assignments should be eight covering all topics.

BTBS102/202 Engineering Physics **4 Credits**

Course Objectives:

1. To provide a firm grounding in the basic physics principles and concept to resolve many Engineering and technological problems.

2. To understand and study the Physics principles behind the developments of Engineering materials.

Course Outcomes:

Students will be able to :

1. Explain & apply the concept of types of Oscillation,Dielectric properties & ultrsonics
2. Explain & compare between Interference & Polarisation of light ,working Principle of Lasers & Fiber optics
3. Interprete,apply &demonstrate principle of motion of charged particles in EF&MF,BAinbridge Mass spectrograph &G M counter
4. Identify Types of crystals & crystal planes using Miller indices,Experemental apprroach.

Unit I: Oscillation and Ultrasonics: (07 Hrs)

Free oscillation, damped oscillation, Forced oscillation and Resonance, differential wave equation, Ultrasonic waves, production of ultrasonics (Piezoelectric effect, Magnetostriction effect) and its applications

Unit II: Optics, Fibre Optics and Laser: (07 Hrs)

Interference of light in thin film, wedge shaped film, Newton's rings, polarization of light, methods for production of polarized light(Reflection, Refraction& Double refraction), Huygen's theory of double refraction, Principle and structure of optical fibre, acceptance angle, acceptance cone, numerical aperture.
Principle of laser, Types of laser – Ruby and He-Ne laser and their applications.

Unit III: Electron Optics, Nuclear and QuantumMechanics: (07 Hrs)

Motion of electron in Electric field (parallel and perpendicular), Motion of electron in magnetic field, motion of electron in combined effect, Bainbridge mass spectrograph,
G. M counter, Heisenberg's uncertainty principle, Schrödinger's time dependent and time independent wave equations, physical significance of wave function.

Unit IV: Crystal Structure, X-rays and Electrodynamics (07 Hrs)

Unit cell, Bravais lattice, cubic system, number of atoms per unit cell, coordination number, atomic radius, packing density, relation between lattice constant and density, lattice planes and Miller indices, X-ray diffraction, Line and Continuous Spectrum of X-ray, Introduction of Maxwell equations (no derivation).

Unit V: Magnetic, Superconducting and Semiconducting materials: (07 Hrs)

Types of magnetic materials (Diamagnetic, Paramagnetic and Ferromagnetic), B-H curve, Superconductivity, types of superconductors, Meissner effect, properties and applications of superconductor, Band theory of solids, conductivity of semiconductors, Halleffect.

Expected Outcome:

1. The student will be able to understand Engineering problems based on the principle of Oscillation, Ultrasonics, Optics, Laser, Fibre optics, Nuclear physics, Quantum mechanics.
2. The student will be able to understand Fundamental of Electrodynamics, Semiconductor, Dielectric, Magnetic and Superconducting materials which forms the base of many modern devices andtechnologies.

Text books:

1. Engineering Physics M.N.Avadhanulu and P.G. Kshirsagar. S.Chandand Company LTD.
2. Engineering Physics – Dr. L. N. Singh. SynergyKnowledgeware-Mumbai.
3. Engineering Physics-R.K. Gaur and S. L.Gupta.Dhanpat Rai Publications Pvt. Ltd.-NewDelhi.
4. Fundamental of Physics - Halliday and Resnik. Willey EasternLimited.

Reference books:

1. Introduction to Electrodynamics –David R.Griffiths.
2. Concept of Modern Physics – Arthur Beizer.TataMcGraw-HillPublishing Company Limited.
3. Optics – Ajoy Ghatak, MacGraw Hill Education (India) Pvt.Ltd.
4. Science of Engineering Materials- C.M. Srivastava and C. Srinivasan. New Age InternationalPvt.Ltd.
5. Solid State Physics – A.J. Dekker. McMillan India–Limited.
6. The Feynman Lectures on Physics VolI,II,III.
7. Introduction to solid state physics – Charles Kittel. John Willey andSons

Engineering physics Lab:

Atleast 10 experiments should be performed from the following list

1. Newton's rings - Determination of radius of curvature of Plano convex lens / wavelength of light

2. Wedge Shaped film - Determination of thickness of thin wire

3. Half shade Polarimeter - Determination of specific rotation of optically active material

4. Laser - Determination of wavelength of He-Ne laser light

5. Magnetron Tube - Determination of 'e/m' of electron

6. G.M. Counter - Determination of operating voltage of G.M. tube

7. Crystal Plane – Study of planes with the help of models related Miller Indices

8. Hall Effect - Determination of Hall Coefficient

9. Four Probe Method - Determination of resistivity of semiconductor

10. Measurement of Band gap energy of Semiconductors

11. Study of I-V characteristics of P-N junction diode

12. Experiment on fibre optics

13. Ultrasonics Interferometer

14. B-H Curve Experiment

15. Susceptiblity measurement experiment

BTES103/203 Engineering Graphics **2 Credits**

First Year B. Tech Classes (Common to all Branches)

Course Objectives:

1. To make use of drawing instruments effectively for drawing and dimensioning.
2. To understand the conventions and methods of engineering drawing.
3. To know the concept of projections of points, lines, planes, solids and section of solids.
4. To understand the Construction isometric and orthographic views of given objects.

Course Outcomes:

Students will be able to :

1. Use of drawing instruments effectively for drawing and dimensioning.
2. Explain conventions and methods of engineering drawing.
3. Apply concept of projections of points, lines, planes, solids and section of solids.
4. Construct isometric and orthographic views of given objects.

Unit 1: Drawing standards andgeometricalconstruction: 4 hrs

Drawing standard SP: 46, Type of lines, lettering, dimensioning, scaling conventions. Geometrical construction: Dividing a given straight line into any number of equal parts, bisecting a given angle, drawing a regular polygon given one side, special methods of constructing a pentagon and a hexagon.

Unit 2: Orthographic Projections and Projections of Points: 4hrs

Introduction to orthographic projection, drawing of orthographic views of objects from their isometric views. Projection of points lying in four quadrants.

Unit 3: Projections of Straight Lines and Planes and their Traces: 4hrs

Projections of lines parallel and perpendicular to one or both planes, projections of lines inclined to one or both planes. Traces oflines.

Projections of planes parallel and perpendicular to one or both planes, projection of planes inclined to one or both planes.

Unit4:Projections of Solids 4hrs

Types of solids, projections of solids with axis perpendicular and parallel to HP and VP, solids with axis inclined to one or both the planes. Projections of spheres touching each other.

Unit 5: Sectioning of Solids, Isometric Projections 4hrs

Sectioning of solids: Section planes perpendicular to one plane and parallel or inclined to other plane. Isometric projections: Isometric scale, drawing of isometric projections from given orthographic views.

Reference/Text Books:
1. N. D. Bhatt, *Engineering Drawing*, Charotar Publishing House, 46th Edition,2003.
2. K. V. Nataraajan, *A text book of Engineering Graphic*, Dhanalakshmi Publishers, Chennai, 2006.
3. K. Venugopal and V. Prabhu Raja, *Engineering Graphics*, New Age International (P) Ltd, 2008.
4. DhananjayA.Jolhe,*EngineeringDrawingwithanIntroductiontoAutocad*,Mc GrawHill Education, 2017

BTES108L Engineering Graphics Lab

Practical Scheme:	**Examination Scheme:**
Practical: 3 hrs/batch	Internal Assessment: 60 Marks External Exam: 40 Marks

Course Contents:

Llist of Experiment

1. Lines, lettering and dimensioning.
2. Geometrical Constructions.
3. Orthographic projections.
4. Projections of points and straight lines
5. Projections of planes.
6. Projections of solids.
7. Section of solids.
8. Isometric Projections.

BTHM104/204 Communication Skills 2 Credits

Course Objectives:

1. To know and apply speaking and writing skills in professional as well as social situations
2. To Overcome Mother Tongue Influence and demonstrate neutral accent while exercising English
3. To know and apply communication skills for Presentations, Group Discussion and interpersonal interactions.
4. To know and apply grammar correctly during Speaking and Writing situations especially in context with Presentations, Public Speaking, Report writing and Business Correspondence

Course Outcomes:

Students will be able to:

1. Apply speaking and writing skills in professional as well as social situations
2. Overcome Mother Tongue Influence and demonstrate neutral accent while exercising English
3. Apply communication skills for Presentations, Group Discussion and interpersonal interactions.
4. Apply grammar correctly during Speaking and Writing situations especially in context with Presentations, Public Speaking, Report writing and Business Correspondence

Unit 1: Communication and Communication Processes (04hrs)

Introduction to Communication, Forms and functions of Communication, Barriers to Communication and overcoming them, Verbal and Non-verbal Communication Reading: Introduction to Reading, Barriers to Reading, Types of Reading: Skimming, Scanning, Fast Reading, Strategies for Reading, Comprehension. Listening : Importance of Listening, Types of Listening, Barriers to Listening.

Unit 2: Verbal & Non-verbal Communication (04 hrs)

Use of Language in Spoken Communication, Principles and Practice of Group Discussion, Public Speaking (Addressing Small Groups and Making Presentation), Interview Techniques, Appropriate Use of Non-verbal Communication, Presentation Skills, Extempore,Elocution.

Unit 3: Study of Soundsin English (02 hrs)

Introduction to phonetics, Study of Speech Organs, Study of Phonemic Script, Articulation of Different Sounds in English.

Unit 4:English Grammar (05 hrs)

Grammar: Forms of Tenses, Articles, Prepositions, Use of Auxiliaries and Modal Auxiliaries, Synonyms and Antonyms, Common Errors.

Unit 5: Writing Skills, Reading Skills & Listening Skills (04 hrs)

Features of Good Language, Difference between Technical Style and Literary Style, Writing Emails, Formal and Informal English, Technical Reports: Report Writing: Format, Structure and Types Letter Writing: Types, Parts, Layouts, Letters and Applications, Use of Different Expressions and Style, Writing Job Application Letter and Resume.

Text book:

Mohd. Ashraf Rizvi, *Communication Skills for Engineers*, Tata McGraw Hill

Reference Books:

a. Sanjay Kumar, Pushp Lata, *Communication Skills*, Oxford University Press,2016
b. Meenakshi Raman, Sangeeta Sharma, *Communication Skills*, Oxford University Press,2017
c. Teri Kwal Gamble, Michael Gamble, *Communication Works*, Tata McGraw Hill Education, 2010
d. Anderson, Kenneth. Joan Maclean and Tossny Lynch. Study Speaking: A Course inSpoken English for Academic Purposes. Cambridge: CUP, 2004.
e. Aswalthapa, K. *Organisational Behaviour*, Himalayan Publication, Mumbai(1991).
f. Atreya N and Guha, *Effective Credit Management*, MMC School of Management, Mumbai (1994).
g. Balan,K.R. and Rayudu C.S., *Effective Communication*, Beacon New Delhi(1996).
h. Bellare, Nirmala. *Reading Strategies*. Vols. 1 and 2. New Delhi. Oxford University Press, 1998.
i. Bhasker, W. W. S & Prabhu, N. S.: *English through Reading*, Vols. 1 and 2. Macmillan, 1975.
j. Black, Sam. *Practical Public Relations*, E.L.B.S. London(1972).
k. Blass, Laurie, Kathy Block and Hannah Friesan. *Creating Meaning*. Oxford: OUP,2007.
l. Bovee Courtland,L and Thrill, John V. *Business Communication*, Today McGraw Hill, New York, Taxman Publication(1989).

Communication Skill Lab:

Atleast 10 experiments should be performed from the following list

1) How to introduce oneself?
2) Introduction to Phonemic symbols
3) Articulation of sounds in English with proper manner
4) Practice and exercises on articulation of sounds
5) Read Pronunciations/transcriptions from the dictionary
6) Practice and exercises on pronunciations of words
7) Introduction to stress and intonation
8) Rapid reading sessions
9) Know your friend
10) How to introduce yourself
11) Extempore
12) Group discussion
13) Participating in a debate
14) Presentation techniques
15) Interview techniques

BTES105/205 Energy and Environment Engineering 2 Credits

Course Objectives:

1. To Identify conventional ,non conventional energy sources.
2. To understand the power consuming and power developing devices for effective utilization and power consumption
3. To Identify various sources of air, water pollution and its effects.
4. To understand noise,soil, thermal pollution and Identify solid, biomedical and hazardous waste.

Course Outcomes:

Students will be able to:

1. Identify conventional ,non conventional energy sources.
2. Knowand discuss power consuming and power developing devices for effective utilization and power consumption
3. Identify various sources of air, water pollution and its effects.
4. Know and discuss noise,soil, thermal pollution and Identify solid, biomedical and hazardous waste.

Unit 1: Conventional Power Generation: (4 hours)
Steam power station, Nuclear power plant – Gas turbine power plant- Hydro power station: Schematic arrangement, advantages and disadvantages, Thermo electric and thermionic generators, Environmental aspects for selecting the sites and locations of power plants.

Unit 2: Renewable Power Generation: (4 hours)
Solar, Wind, Biogas and Biomass, Ocean Thermal energy conversion (OTEC), Tidal, Fuel cell, Magneto Hydro Dynamics (MHD): Schematic arrangement, advantagesanddisadvantages.

Unit 3: Energy conservation (4 hours)
Scope for energy conservation and its benefits Energy conservation Principle– Maximum energy efficiency, Maximum cost effectiveness, Methods and techniques of energy conservation in ventilation and air conditioners, compressors, pumps, fans and blowers, Energy conservation in electric furnaces, ovens and boilers.,lightingtechniques.

Unit 4: Air Pollution (4 hours)
Environment and Human health - Air pollution: sources- effects- control measures - Particulate emission, air quality standards, and measurement ofairpollution.

Unit 5: Water Pollution (4 hours)
Water pollution- effects- control measures- Noise pollution –effects and control measures, Disposal of solid wastes, Bio-medical wastes-Thermal pollution – Soil pollution -Nuclear hazard.

Reference/Text Books:

1. A Chakrabarti, M. L Soni, P. V. Gupta, U. S. Bhatnagar, A Text book of Power System Engineering, Dhanpat Rai Publication.
2. Rai. G. D., Non Conventional Energy Sources, Khanna Publishers, Delhi,2006.
3. Rao S., Parulekar B.B., Energy Technology-Non conventional, Renewable And Conventional, Khanna Publishers, Delhi,2005.

4. Glynn Henry J., Gary W. Heinke, Environmental Science and Engineering, Pearson Education, Inc,2004.
5. J. M. Fowler, Energy and the Environment, McGraw-Hill, 2 nd Edition,1984.
6. Gilbert M. Masters, Introduction to Environmental Engineering and Science, 2nd Edition, Prentice Hall,2003.

BTES106/206 Basic Civil and Mechanical Engineering Audit

Course Objectives:

1. To Identify various Civil Engineering materials and choose suitable material among various options.
2. To know and apply principles of surveying to solve engineering problem
3. To Identify various Civil Engineering structural components and select appropriate structural system among various options
4. To Explain and define various properties of basic thermodynamics, materials and manufacturing processes.
5. To know and discuss the working principle of various power consuming and power developing devices

Course Outcomes:

Students will be able to:

1. Identify various Civil Engineering materials and choose suitable material among various options.
2. Apply principles of surveying to solve engineering problem
3. Identify various Civil Engineering structural components and select appropriate structural system among various options
4. Explain and define various properties of basic thermodynamics, materials and manufacturing processes.
5. Know and discuss the working principle of various power consuming and power developing devices

Part I Basic Civil Engineering

Module 1: Introduction to civil engineering (4hrs)

Various Branches, role of civil engineer in various construction activities, basic engineering properties and uses of materials: earth, bricks, timber, stones, sand, aggregates, cement, mortar, concrete, steel, bitumen, glass, FRP, composite materials.

Module 2: Building Components & Building Planning (4 hrs)

Foundation and superstructure, functions of foundation, types of shallow and deep foundations, suitability in different situation, plinth, walls, lintels, beams, columns, slabs, roofs, staircases, floors, doors, windows, sills, Study of Building plans, ventilation, basics of plumbing and sanitation

Module3: Surveying (4 hrs)

Principles of survey, elements of distance and angular measurements, plotting of area, base line and offsets, introduction to Plane table surveying, introduction to levelling, concept of bench marks, reduced level, contours

Part II Basic Mechanical Engineering

Unit 1: Introduction to Mechanical Engineering: (4 hrs)

Introduction to Laws of Thermodynamics with simple examples pertaining to respective branches, IC Engines: Classification, Applications, Basic terminology, 2 and 4 stroke IC engine working principle, Power Plant: Types of Power plant; Gas power plant, Thermal power plant, Nuclear power plant, Automobiles: Basic definitions and objectives

Unit 2: **(4 hrs)**

Design Basics, Machine and Mechanisms, Factor of safety, Engineering Materials: types and applications, basics of Fasteners Machining and Machinability, Introduction to Lathe machine, Drilling machine, Milling machine, basics of machining processes such as turning, drilling and milling, Introductiontocasting

Text Books

- Anurag Kandya, "Elements of Civil Engineering", Charotar Publishing,Anand
- M. G. Shah, C. M. Kale, and S. Y. Patki, "Building Drawing", Tata McGrawHill
- Sushil Kumar, "Building Construction", Standard PublishersDistributors
- M. S. Palani Gamy, "Basic Civil Engineering", Tata Mc-Graw Hill Publication
- Kanetkar T. P. and Kulkarni S. V., "Surveying and Levelling", Vols. I, II and III, Vidyarthi Gruh Prakashan,Pune
- Punmia, "Surveying", Vol.- I, Vol.-II, Vol.-III, Laxmi Publications
- G. K. Hiraskar, "Basic Civil Engineering", Dhanpat RaiPublications
- Gopi Satheesh, "Basic Civil Engineering", PearsonEducation
- P. K. Nag "Engineering Thermodynamics", Tata McGraw Hill, New Delhi 3rd ed.2005
- Ghosh, A K Malik, "Theory of Mechanisms and Machines", Affiliated East West Press Pvt. Ltd. NewDelhi.
- Serope Kalpakaji and Steven R Schimd " Amanufacturing Engineering and Techology" Addision Wsley Laongman India 6th Edition2009
- V. B. Bhandari, " Deisgn of Machine Elements", Tata McGraw Hill Publications, NewDelhi.

BTBS201 Engineering Mathematics – II 4 Credits

Course Objectives:

1. To know and discuss the need and use of complex variables to find roots ,to separate complex quantities and to establish relation between circular and hyperbolic functions.
2. To understand and solve first and higher order differential equations and apply them as a mathematical modeling in electric and mechanical systems.
3. To determine Fourier series representation of periodic functions over different intervals.
4. To Demonstrate the concept of vector differentiation and interpret the physical and geometrical meaning of gradient, divergence &curl in various engineering streams.
5. To know and apply the principles of vector integration to transform line integral to surface integral,surface to volume integral &vice versa using Green's , Stoke's and Gauss divergence theorems.

Course Outcomes:

Students will be able to:

1. Discuss the need and use of complex variables to find roots ,to separate complex quantities and to establish relation between circular and hyperbolic functions.
2. Solve first and higher order differential equations and apply them as a mathematical modeling in electric and mechanical systems.
3. Determine Fourier series representation of periodic functions over different intervals.
4. Demonstrate the concept of vector differentiation and interpret the physical and geometrical meaning of gradient, divergence &curl in various engineering streams.
5. Apply the principles of vector integration to transform line integral to surface integral ,surface to volume integral &vice versa using Green's , Stoke's and Gauss divergence theorems.

Unit 1: Complex Numbers [07 Hours]

Definition and geometrical representation ; De-Moivre's theorem(without proof) ; Roots of complex numbers by using De-Moivre's theorem ; Circular functions of complex variable – definition ; Hyperbolic functions ; Relations between circular and hyperbolic functions ; Real and imaginary parts of circular and hyperbolic functions ; Logarithm of Complexquantities.

Unit 2: Ordinary Differential Equations of First Order and First Degree and Their Applications [07 Hours]

Linear equations; Reducible to linear equations (Bernoulli's equation); Exact differential equations; Equations reducible to exact equations ; Applications to orthogonal trajectories , mechanical systems and electrical systems.

Unit 3: Linear Differential Equations with Constant Coefficients [07 Hours]

Introductory remarks - complementary function, particular integral ; Rules for finding complementary functions and particular integrals ; Method of variation of parameters ; Cauchy's homogeneous and Legendre's linear equations.

Unit 4: Fourier Series [07 Hours]

Introductory remarks- Euler's formulae ; Conditions for Fourier series expansion - Dirichlet's conditions ; Functions having points of discontinuity ; Change of interval ; Odd and even functions expansions of odd and even periodic functions ; Half-rangeseries.

Unit 5: Vector Calculus [07 Hours]

Scalar and vector fields:Gradient , divergence and curl ; Solenoidal and irrotational vector fields; Vector identities (statement without proofs) ; Green's lemma , Gauss' divergence theorem and Stokes' theorem (without proofs)

Text Books

a. Higher Engineering Mathematics by B. S. Grewal, Khanna Publishers, NewDelhi.
b. Advanced Engineering Mathematics by Erwin Kreyszig, John Wiley & Sons, NewYork.
c. A Course in Engineering Mathematics (Vol II) by Dr. B. B. Singh, Synergy Knowledge ware,Mumbai.
d. A Text Book of Applied Mathematics (Vol I & II) by P. N. Wartikar and J. N. Wartikar, Pune Vidyarthi Griha Prakashan,Pune.
e. Higher Engineering Mathematics by H. K. Das and Er. Rajnish Verma, S. Chand & CO. Pvt. Ltd., New Delhi.

Reference Books

a. Higher Engineering Mathematics by B. V. Ramana, Tata McGraw-Hill Publications, New Delhi.
b. A Text Book of Engineering Mathematics by Peter O' Neil, Thomson Asia Pte Ltd. , Singapore.
c. Advanced Engineering Mathematics by C. R. Wylie & L. C. Barrett, Tata Mcgraw-Hill Publishing Company Ltd., NewDelhi.

General Instructions:

1. The tutorial classes in Engineering Mathematics-II are to be conducted batchwise. Each class should be divided into three batches for thepurpose.
2. The internal assessment of the students for 20 marks will be done based on assignments, surprise tests, quizzes, innovative approach to problem solving and percentageattendance.
3. The minimum number of assignments should be eight covering alltopics.

BTBS102/202 Engineering Chemistry **4 Credits**

Course Objectives:

1. To know the demonstration of knowledge of Chemistry in technical fields.
2. To bring adaptability to new developments in Engineering Chemistry and to acquire the skills required to become a perfect engineer.
3. To understand and develop the importance of water in industrial and domestic usage.
4. To identify the concepts of Chemistry to lay the ground work for subsequent studies in various engineering fields.
5. To examine a fuel and suggest alternative fuels.

Course Outcomes:

Students will be able to:

1. Demonstrate knowledge of chemistry in technical fields.
2. Bring adaptability to new developments in Engineering Chemistry and to acquire the skills required to become a perfect engineer.
3. Develop the importance of water in industrial and domestic usage.
4. Identify the concepts of Chemistry to lay the ground work for subsequent studies in various engineering fields.
5. Examine a fuel and suggest alternative fuels.

Unit 1: Water Treatment **(7L)**

Introduction , Hard and Soft water, Disadvantages of hard water –In Domestic use, In Industrial use, Softening of water – Zeolite process, Ion exchange process, Hot Lime –Soda process, water characteristics- Hardness and its determination by EDTA method, Dissolved oxygen (DO) and its determination by Winkler's method.

Unit 2: Phase Rule **(6L)**

Phase Rule, statement, Explanation of the terms – Phase, Component, Degrees of freedom. One component system – Water and Sulphur. Reduced Phase rule equation, Two component alloy system- Phase diagram of Silver- Lead alloy system.

Unit 3: Corrosion and its Control **(7L)**

Introduction, Fundamental reason of corrosion, Electrochemical Corrosion(Wet corrosion) , Direct Chemical Corrosion(Dry corrosion), Factors affecting the rate of corrosion, Types of corrosion- Galvanic, Microbiological Corrosion, Methods to minimise the rate of corrosion- Proper designing , Cathodic and Anodic protection method.

Unit 4: Fuels and Lubricants **(7L)**

Fuels: Introduction, Classification of fuel, Calorific value of a fuel, Characteristics of a good fuel, solid fuel- Coal and Various types of Coal, Analysis of coal- Proximate and Ultimate analysis, Liquid fuel- Refining of Petroleum.

Lubricants: Introduction, classification of lubricants - Solid, Semi –solid and Liquid Lubricants, Properties of lubricants: Physical properties – Viscosity, Viscosity index, surface tension, Flash point and Fire point. Chemical properties – Acidity, Saponification.

Unit 5: Electrochemistry **(7L)**

Introduction – Definition and units of Ohm's Law, Specific Resistance, Specific Conductance, Equivalent and Molecular Conductance. Method of conductance measurement by Wheatstone bridge method, Cell constant, Conductometric titrations, Nernst equation and its application for the calculation of half-cell potential, Glass electrode, Fuel cell (H2O2), Advantages of fuel cell, Ostwald's theory of acid- base indicator.

Text books:

1. Jain P.C & Jain Monica, Engineering Chemistry, Dhanpat Rai & Sons, Delhi, 1992.
2. Bhal & Tuli, Text book of Physical Chemistry , S. Chand & Company, New Delhi.
3. Shikha Agarwal, Engineering Chemistry- Fundamentals and applications, Cambridge Publishers - 2015

Reference books:

1. Barrow G.M., Physical Chemistry, McGraw-Hill Publication, New Delhi.
2. O. G. Palanna , Engineering Chemistry, Tata McGraw-Hill Publication, New Delhi.
3. WILEY, Engineering Chemistry, Wiley India, New Delhi 2014.
4. S.S.Dara, Engineering Chemistry,McGraw Hill Publication, New Delhi.

Engineering Chemistry Lab:
At least 10 experiments should be performed from the following list

1. Determination of Hardness of water sample by EDTA method.
2. Determination of Chloride content in water sample by precipitation titration method.
3. Determination of Dissolve Oxygen in water by Iodometric method.
4. Determination of Percent purity of Bleaching Powder.
5. pH – metric Titration (Acid Base titration)
6. Conductometric Titration (Acid Base titration)
7. Surface tension
8. Viscosity
9. To determine Acidity of water sample.
10. To determine Calorific value of a fuel.
11. Determination of Acid value of an oil sample.
12. Determination of Saponification value of an oil sample.
13. Experiment on water treatment by using Ion exchange resins.
14. To find out P-T curve diagram of steam.
15. To determine Alkalinity water sample.
16. Determination of rate of corrosion of metal.

Reference Books:

1. Systematic experiments in Chemistry, A. Sethi, New Age International Publication, New Delhi.
2. Practical Inorganic Chemistry, A. I. Vogel, ELBS Pub.
3. Practical in Engineering Chemistry, S. S. Dara.

BTES103/203 Engineering Mechanics 3 Credits

Course Objectives:

1. To know and apply fundamental Laws of Engineering Mechanics
2. To know and apply Conditions of static equilibrium to analyze given force system
3. To compute Centre of gravity and Moment of Inertia of plane surfaces
4. To compute the motion characteristics of a body/particle for a Rectilinear and Curvilinear Motion
5. To know and discuss relation between force and motion characteristics

Course Outcomes:

Students will be able to:

1. Apply fundamental Laws of Engineering Mechanics
2. Apply Conditions of static equilibrium to analyze given force system
3. Compute Centre of gravity and Moment of Inertia of plane surfaces
4. Compute the motion characteristics of a body/particle for a Rectilinear and Curvilinear Motion
5. Know and discuss relation between force and motion characteristics

Module1:BasicConcepts (7Lectures)

Objectives of Engineering Analysis and Design, Idealization of Engineering Problems, Simplification of real 3D problems to 2-D and 1-D domain,Basis of Assumptions, types of supports, types of load, free body diagram, Laws of Motion, Fundamental principles, Resolution and composition of a forces, Resultant, couple, moment, Varignon's theorem, force systems, Centroid of composite shapes, moment of inertia of planer sectionsand radius of gyration

Module2: Equilibrium (7 Lectures)

Static equilibrium, analytical and graphical conditions of equilibrium, Lami's theorem, equilibrium of coplanar concurrent forces, coplanar non concurrent forces, parallel forces,beams reactionsSimple trusses (plane and space), method of joints for plane trusses, method of sections for plane trusses Friction:Coulomb law, friction angles, wedge friction, sliding friction and rolling resistance

Module3:Kinematics (7 Lectures)

Types of motions, kinematics of particles, rectilinear motion, constant and variable acceleration, relative motion, motion under gravity, study of motion diagrams, angular motion, tangential and radial acceleration, projectile motion, kinematics of rigid bodies, concept of instantaneous center of rotation, concept of relativevelocity,

Module4:Kinetics (6 Lectures)

Mass moment of inertia, kinetics of particle, D'Alembert's principle:applications in linear motion, kinetics of rigid bodies, applications in translation, applications in fixed axisrotation

Module5: Work, Power, Energy (6 Lectures)

Principle of virtual work, virtual displacements for particle and rigid bodies, work done by a force, spring, potential energy, kinetic energy of linear motion and rotation, work energyequation, conservation of energy, power, impulse momentum principle, collision of elasticbodies.

Text Books

- S. Timoshenko, D. H. Young, "Engineering Mechanics", McGraw Hill,1995.
- Tayal A. K., "Engineering Mechanics", Umesh Publications,2010.
- Bhavikatti S. S., Rajashekarappa K. G., "Engineering Mechanics", New Age International Publications, 2ndEdition.
- Beer, Johnston, "Vector Mechanics for Engineers", Vol. 1: Statics and Vol. 2: Dynamics, McGraw HillCompany Publication, 7th edition,1995.
- Irving H. Shames, "Engineering Mechanics - Statics and Dynamics", Pearson Educations, Fourth edition, 2003.
- McLean, Nelson, "Engineering Mechanics", Schaum's outline series, McGraw Hill Book Company, NDelhi, Publication.
- Singer F. L., "Engineering Mechanics - Statics & Dynamics", Harper and Row Pub.York.
- Khurmi R. S., "Engineering Mechanics", S. Chand Publications, N.Delhi

Engineering Mechanics Lab:

Atleast 10 experiments should be performed from the following list

1.Polygon law of coplanar forces

2. Bell crank lever.

3. Support reaction for beam.

4. Problems on beam reaction by graphics statics method

.

5. Simple / compound pendulum.

6. Inclined plane (to determine coefficient of friction).

7. Collision of elastic bodies (Law of conservation of momentum).

8. Moment of Inertia of fly wheel.

9. Verification of law of Machine using Screw jack

10. Assignment based on graphics statics solutions

11. Any other innovative experiment relevant to Engineering Mechanics.

12.Centroid of irregular shaped bodies.

13. Verification of law of Machine using Worm and Worm Wheel

14. Verification of law of Machine using Single and Double Gear Crab.

15. Application of Spreadsheet Program for conceptslike law of moments, beam reactions, problems in kinematics, etc

BTES104/204 Computer Programming in C 2 Credits

Course Objectives:

1.To give a broad perspective about the uses of computers in engineering industry and C Programming.

2. To develop the basic concept of algorithm, algorithmic thinking and flowchart.

3. To apply the use of C programming language to implement various algorithms and develops the basic concepts and terminology of programming in general.

4. To make familiar the more advanced features of the C language.

5. To identify tasks in which the numerical techniques learned are applicable and apply them to write programs and hence use computers effectively to solve the task.

Course Outcomes:

Students will be able to:

1. Gain a broad perspective about the uses of computers in engineering industry and C Programming.

2. Develop the basic concept of algorithm, algorithmic thinking and flowchart.

3. Apply the use of C programming language to implement various algorithms and develops the basic concepts and terminology of programming in general.

4. Use the more advanced features of the C language.

5. Identify tasks in which the numerical techniques learned are applicable and apply them to write programs and hence use computers effectively to solve the task.

Unit 1: Process of programming: (4 Lectures)

Editing, Compiling, Error Checking, executing, testing and debugging of programs. IDE commands. Eclipse for C Program development, Flowcharts, Algorithms. (4 Lectures)

Unit 2: Types,Operators and Expressions: (4 Lectures)

Variablenames, Data types, sizes, constants, declarations, arithmetic operators, relational and logical operators, type conversions, increment and decrement operators, bitwise operators, assignment operators and expressions, conditional expressions precedence and orderofevaluation.

Unit 3: Control Flow: **(4 Lectures)**

Statements and Blocks. If-else, else-if switch Loops while and for, do-while break and continue goto and Labels. Functions and Program Structure: Basic of functions, functions returning non-integers external variablesscoperules.

Unit 4: Arrays **in C:** **(4 Lectures)**

Initializing arrays, Initializing character arrays, multidimensional arrays.

Unit 5: Structures C: **(4 Lectures)**

Basics of structures, structures and functions arraysofstructures,

Pointer in C. Pointers to integers, characters, floats, arrays,structures.

Special Note: Topic of Pointers in C is only for lab exercises and not for end semester examinations.

Reference/Text Books:

1. Brain W. Kernighan & Dennis Ritchie, The C Programming Language, Prentice Hall, 2nd Edition, 1988.
2. R. S. Bichkar, Programming with C, Orient Blackswan, 1st Edition,2012.
3. Herbert Schildit, C the Complete Reference, McGraw-Hill Publication,2000.
4. Balguruswamy, Programming in C,PHI.
5. Yashwant Kanitkar, Let Us C,PHI

Computer Programming in C Lab:

Atleast 10 experiments should be performed from the following list

1. Assignment on Flow Chart.
2. A Simple program to display a message “Hello world” on screen.
3. A Program to take input from user and display value entered by user on screen.
4. Basic example for performing different C Operations using operator. (With and without using scanf()).
5. Basic Program on Operator. (Using scanf()).

a) Program to find and print area, perimeter and volume of geometric objects.

b) Program to check a number entered by user is Perfect number or not.

6. Program to find maximum and minimum between two numbers given by user using if-else and conditional Operators.
7. Program to swap two numbers.
8. Program to print square and factorial of an entered number using while loop.

9. Program to check a number is Palindrome number or not.

10. Program to check Armstrong number.

11. Program to check and generate prime numbers up to n.

12. Program to find GCD of two entered numbers.

13. Program to find maximum and minimum from n entered numbers.

14. Program to print alternate numbers from n entered numbers.

15. Program to search an element in an Array using linear and binary search.

16. Program to print entered numbers in ascending order using sorting.

17. Program to print addition, subtraction and multiplication of Matrices.

18. Program to find length of string. (With and without using library function).

19. Programs demonstrating use of Structures, Arrays of Structures and Structure containing arrays.

20. Programs demonstrating use of pointers to integers, floats, char, strings, structures and arrays.

BTES106/206 Basic Electrical and Electronics Engineering Audit

Course Objectives:

1. To know and apply basic ideas and principles of electrical engineering.
2. To Identify protection equipment and energy storage devices.
3. To differentiate electrical and electronics domains and explain the operation of diodes and transistors.
4. To acquire knowledge of digital electronics
5. To design simple combinational and sequential logic circuits.

Course Outcomes:

Students will be able to:

1. Apply basic ideas and principles of electrical engineering.
2. Identify protection equipment and energy storage devices.
3. Differentiate electrical and electronics domains and explain the operation of diodes and transistors.
4. Acquire knowledge of digital electronics
5. Design simple combinational and sequential logic circuits.

Unit 1: Elementary Electrical Concepts: [07 Hours]

Fundamental of Electrical system Potential difference, Ohm's law, Effect of temperature on resister, resistance temperature coefficient, Electrical wiring system: Study of different wire gauges and their applications in domestic and industry. Energy Resources and Utilization: Conventional and nonconventional energy resources; Introduction to electrical energy generation from different resources, transmission, distribution and utilization,Advantages & Disadvantages of AC & DC transmission. Concept of Supply Demand, Power Factor, Need of unityfactor.

Unit 2: Measurement of Electrical Quantities: [07 Hours]

Measurement of Voltage, Current, and Power; Measurement of 3 phase power; Study of Energy meters. Study of Electrical Storage devices: Batteries such as Nickel-cadmium (NiCd), Lithium- ion (Li-ion), Lithium Polymer (Li-pol.) batteries. Study of circuit breakers & Actuators (MCB & MPCB, Power Contactors & Aux contactors, Electro-Mechanical & Solid state Relays)

Unit 3: Diodes and Circuits: [07 Hours]

The P-N Junction Diode, V-I characteristics, Diode as Rectifier, specifications of Rectifier Diodes, Half Wave, Full wave, Bridge rectifiers, Equations for IDCVDC VRMS, IRMS, Efficiency and Ripple Factor for each configuration. Filters: Capacitor Filter, Choke Input Filter, Capacitor InputFilter(Π Filter), Zener Diode, Characteristics, Specifications, Zener Voltage Regulator, Types of Diodes: LED,Photodiode

Unit 4: Semiconductor Devices and Applications: [07 Hours]

Transistors: Introduction, Classification, CE, CB, and CC configurations, α, β, concept of gain and bandwidth. Operation of BJT in cut-off, saturation and active regions (DC analysis). BJT as an amplifier, biasing techniques of BJT, BJT as a switch.
Introduction to Digital Electronics: Number System, Basic logic Gates, Universal Gates, Boolean Postulates, De-Morgan Theorems

Reference/Text Books:

1. V. N. Mittal and Arvind Mittal, Basic Electrical Engineering, McGraw-HillPublication.
2. Brijesh Iyer and S. L. Nalbalwar, A Text book of Basic Electronics, Synergy Knowledgeware Mumbai, 2017.ISBN:978-93-8335-246-3
3. Vincent DelToro, Electrical engineering Fundamentals, PHI Publication, 2nd Edition,2011.
4. Boylstad, Electronics Devices and Circuits Theory, PearsonEducation.
5. Edward Hughes, Electrical Technology, PearsonEducation.
6. D. P. Kothari and Nagrath, Theory and Problems in Electrical Engineering, PHI Publication,2011.
7. B. L. Theraja, Basic Electronics, S. Chand Limited,2007.
8. Millman Halkias, Integrated Electronics-Analog and Digital Circuits and Systems, McGraw-Hill Publication,2000.
9. Donald Neaman, Electronic Circuit Analysis and Design, McGraw-Hill Publication, 3rd Edition.
10. Donald Neaman, Electronic Circuit Analysis and Design, McGraw-Hill Publication, 3rd Edition.
11. Printed Circuit Boards Design &Technology,WalterC. Bosshart, McGraw-Hill Publication.

Note: Students are advised to use internet resources whenever required

BTES206L Workshop Practice

Teaching Scheme:	Examination Scheme:
Practical: 4 hrs/batch	Internal Assessment: 60 Marks External Exam: 40 Marks

Instruction to Students:
Each student is required to maintain a „workshop diary" consisting of drawing / sketches of the jobsand a brief description of tools, equipment, and procedure used for doing the job.

List of Practical: (any six)

1. Wood sizing exercises in planning, marking, sawing, chiseling and grooving to make half lap joint and cross lapjoint.
2. A job involving cutting, filing to saw cut, filing all sides and faces, corner rounding, drilling and tapping on M. S.plates.
3. A job on use of plumbing tools and preparation of plumbing line involving fixing of water tap and use of elbow, tee, union and coupling, etc.
4. Making a small parts using GI sheet involving development, marking, cutting, bending, brazing and soldering operations- i)Tray ii) Funnel and similararticles.
5. Exercise in Arc welding (MMAW) to make a square buttjoint.
6. Exercise in Resistance (Spot) welding to make a lap joint.
7. Ajobusing power operated tools related to sheet metal work, Welding, Fitting, Plumbing, Carpentry and patternmaking.
8. A job on turning of a Mild Steel cylindrical job using center lathe.

Contents:
a) **Carpentry:** Technical Terms related to wood working, Types of wood, Joining materials, Types of joints - Mortise and Tenon, Dovetail, Half Lap, etc., Methods of preparation and applications, Wood working lathe, safety precautions.
b) **Welding:** Arc welding - welding joints, edge preparation, welding tools and equipment, Gas welding - types of flames, tools and equipment, Resistance welding - Spot welding, joint preparation, tools and equipment, safety precautions.
c) **Fitting and Plumbing:** Fitting operation like chipping, filing, right angle, marking, drilling, tapping etc., Fitting hand tools like vices, cold chisel, etc. Drilling machine and its operation, Different types of pipes, joints, taps, fixtures and accessories used in plumbing, safetyprecautions.
d) **Sheet Metal Work:** Simple development and cutting, bending, Beading, Flanging, Lancing and shearing of sheet metal, Sheet metal machines - Bending Machine, Guillotine shear, Sheet metal joints, Fluxes and their use.
e) **Machine shop**: Lathe machine, types of lathes, major parts, cutting tool, turning operations, safety precautions

Reference/Text Books:
1. K. C. John, Mechanical Workshop Practice, Prentice Hall Publication, New Delhi,2010.

Hazra and Chaudhary, Workshop Technology-I, Media promoters & Publisher private limited.

Dr. Babasaheb Ambedkar Technological University, Lonere
First Year -Bachelor of Technology
with effect from the Academic Year 2020-2021

Course Mapping with NPTEL /SWAYAM Online Platform
First Year of B. Tech. (All Branches) Group A (Sem-I and Sem-II)

Sr. No.	SEMESTER	Course Code	Name of Subject as per Curriculum	SWAYAM/ NPTEL Course	Name of Institute offering course	Name of Instructor	Relevance (%)	Duration of Course
1	Sem I	BTBS101	Engineering Mathematics-I	Engineering Mathematics – I (noc20-ma37)	IIT KGP	Prof. Jitendra Kumar	90	12 weeks
2		BTBS102	Engineering Physics	Solid state Physics	IIT KGP	Dr. Amal Kumar Dar	50	12 weeks
3		BTES103	Engineering Graphics	Engineering drawing and computer graphics (noc20-me79)	IIT KGP	Dr, Rajaram Lakka Raju	70	12 weeks
4		BTHM104	Communication Skill	Developing Soft skills and personality	IIT Kanpur	Rof. T. Ravichandran	80	08 weeks
				Soft skills (noc20-hs60)	IITR	Dr. Bindo Mishra	80	12 weeks
5		BTES105	Energy and Environmental Engineering	Conventional Energy Sources	IIT KGP	Prof Pratab Haridoss	20	08 weeks
				Non Conventional Energy Sources	IIT KGP	Prof Pratab Haridoss	20	08 weeks
				Solar Energy	IIT KGP	Dr, V. V Satyamurthy	10	04 weeks
				Wind Energy	IIT KGP		10	04 weeks
6		BTES106	Basic Civil and Mechanical Engineering	-	-		-	Course not available
7	Sem II	BTBS201	Engineering Mathematics-II	Engineering Mathematics – II (111105134)	IIT KGP	Prof. Jitendra Kumar	70	Video lectures
8		BTBS202	Engineering Chemistry	-	-		-	Course not available
9		BTES203	Engineering Mechanics	Applied mechanics (noc20-me46)	IITM	Prof. K. Ramesh	80	12 weeks
10		BTES204	Computer Programming in C	Introduction to Programming	IIT KANPUR	Prof. Anup Basu	80	08 weeks

				In C (noc20-cs91)				
11		BTES206	Basic Electrical & Electronics Engineering	Fundamentals of Electrical Engineering (noc20-ee68)	IIT KGP	Prof. Debpriya Das	25	12 weeks
				Basic Electrical circuits	IIT KGP	Prof. Ankush Sharma	25	12 weeks
				Digital circuits	IIT M	Prof, Nagendra Krishraru	25	14 weeks
				Fundamentals of semiconductor devices	IISc Bengluru	Prof. Digbijoy N. Nath	25	12 weeks

First Year of B. Tech. (All Branches) Group B (Sem-I and Sem-II)

Sr. No.	SEMESTER	Course Code	Name of Subject as per Curriculum	SWAYAM/ NPTEL Course	Name of Institute offering course	Name of Instructor	Relevance (%)	Duration of Course
1	Sem I	BTBS101	Engineering Mathematics-I	Engineering Mathematics – II (111105134)	IIT KGP	Prof. Jitendra Kumar	70	Video lectures
2		BTBS102	Engineering Chemistry	-	-		-	Course not available
3		BTES103	Engineering Mechanics	Applied mechanics (noc20-me46)	IITM	Prof. K. Ramesh	80	12 weeks
4		BTES104	Computer Programming in C	Introduction to Programming In C (noc20-cs91)	IIT KANPUR	Prof. Anup Basu	80	08 weeks
5		BTES106	Basic Electrical & Electronics Engineering	Fundamentals of Electrical Engineering (noc20-ee68)	IIT KGP	Prof. Debpriya Das	25	12 weeks
				Basic Electrical circuits	IIT KGP	Prof. Ankush Sharma	25	12 weeks
				Digital circuits	IIT M	Prof, Nagendra Krishraru	25	14 weeks

				Fundamentals of semiconductor devices	IISc Bengluru	Prof. Digbijoy N. Nath	25	12 weeks
7	Sem II	BTBS201	Engineering Mathematics-II	Engineering Mathematics – I (noc20-ma37)	IIT KGP	Prof. Jitendra Kumar	90	12 weeks
8		BTBS202	Engineering Physics	Solid state Physics	IIT KGP	Dr. Amal Kumar Dar	50	12 weeks
9		BTES203	Engineering Graphics	Engineering drawing and computer graphics (noc20-me79)	IIT KGP	Dr, Rajaram Lakka Raju	70	12 weeks
10		BTHM204	Communication Skill	Developing Soft skills and personality	IIT Kanpur	Rof. T. Ravichandran	80	08 weeks
				Soft skills (noc20-hs60)	IITR	Dr. Bindo Mishra	80	12 weeks
11		BTES205	Energy and Environmental Engineering	Conventional Energy Sources	IIT KGP	Prof Pratab Haridoss	20	08 weeks
				Non Conventional Energy Sources	IIT KGP	Prof Pratab Haridoss	20	08 weeks
				Solar Energy	IIT KGP	Dr, V. V Satyamurthy	10	04 weeks
				Wind Energy	IIT KGP		10	04 weeks
12		BTES206	Basic Civil and Mechanical Engineering	-	-		-	Course not available

Note: Blank field indicates there is no direct course addressing the course content available of NPTEL/ SWAYAM Platform
Registration link:

Engineering Mathematics-I

https://www.google.com/url?q=https://swayam.gov.in/nd1_noc20_ma37/preview&sa=D&ust=1591543184294000&usg=AFQjCNGHDgqXqI9K0fcvY-oaKjT-bJYvzw

Engineering Mathematics –II

https://nptel.ac.in/courses/111/105/111105134/

Engineering Mechanics

https://swayam.gov.in/nd1_noc20_me46/preview

Engineering Graphics

https://www.google.com/url?q=https://swayam.gov.in/nd1_noc20_me79/preview&sa=D&ust=1591543184334000&usg=AFQjCNFYPjKDLGuCij6dBV0D2BysdeB_2Q

Basics of Electrical Engineering

https://www.google.com/url?q=https://swayam.gov.in/nd1_noc20_ee68/preview&sa=D&ust=15

91543184179000&usg=AFQjCNEZyH4O7lwTSdoD1Uo5CbXX7xUdnw

Communication skills

https://nptel.ac.in/courses/109/104/109104030/#

https://www.google.com/url?q=https://swayam.gov.in/nd1_noc20_hs60/preview&sa=D&ust=1591543184224000&usg=AFQjCNFu4uUp-i8EbTSW-yIVq-iTXaD1gQ

Computer Programming in C

https://www.google.com/url?q=https://swayam.gov.in/nd1_noc20_cs56/preview&sa=D&ust=1591543184129000&usg=AFQjCNHjSl1ome1khLIBuRhZBNKsSM7tcQ

Engineering Physics

https://swayam.gov.in/nd1_noc20_ph15/preview