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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CURRICULUM

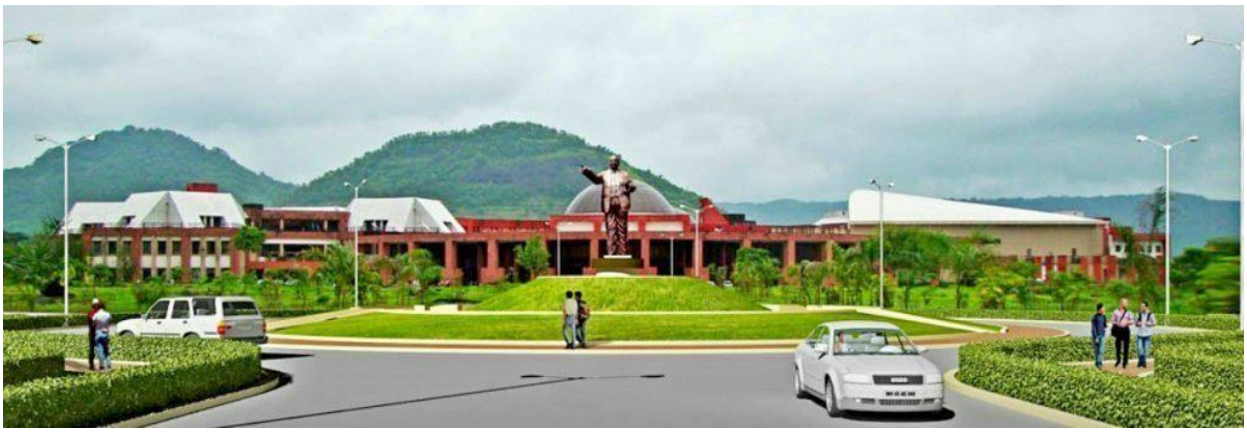
for

UNDER GRADUATE PROGRAMME

B. Tech.
First Year Engineering
in
Electronics and Telecommunication Engineering and Allied Branches

[Electronics and Telecommunication Engineering, Biomedical Engineering, Electronics & Communication Engineering (Sandwich), Electronics Engineering, Electronics and Computer Engineering, VLSI Design and Technology, 5G, VLSI]

In line with New Education Policy 2020 guidelines
[With Effect from the Academic Year 2024-2025 for Affiliated Colleges Only]



Credit Framework under Four-Years UG Engineering Programme with Multiple Entry and Multiple Exit options:

- The Four-year Bachelor's Multidisciplinary Engineering Degree Programme allows the students to experience the full range of holistic and multidisciplinary education in addition to a focus on the chosen major and minors as per their choices and the feasibility of exploring learning from different institutions.
- The minimum and maximum credit structure for different levels under the Four-year Bachelor's Multidisciplinary Engineering UG Programme with multiple entry and multiple exit options are as given below:

Credit Framework

Levels	Qualification Title	Credit Requirements		Semester	Year
		Minimum	Maximum		
4.5	One Year UG Certificate in Engg./ Tech.	40	44	2	1
5.0	Two Years UG Diploma in Engg./ Tech.	80	88	4	2
5.5	Three Years Bachelor's Degree in Vocation (B. Voc.) or B. Sc. (Engg./ Tech.)	120	132	6	3
	4-Years Bachelor's degree				

Levels	Qualification Title	Credit Requirements		Semester	Year
		Minimum	Maximum		
6.0	(B.E./ B.Tech. or Equivalent) in Engg./ Tech. with Multidisciplinary Minor	160	176	8	4
6.0	4-Years Bachelor's degree (B.E./ B.Tech. or Equivalent) in Engg./ Tech.- Honors and Multidisciplinary Minor	180	194	8	4
6.0	4-Years Bachelor's degree (B.E./ B.Tech. or Equivalent) in Engg./ Tech.- Honors with Research and Multidisciplinary Minor	180	194	8	4
6.0	4-Years Bachelor's degree (B.E./ B.Tech. or Equivalent) in Engg./ Tech.- Major Engg. Discipline with Double Minors (Multidisciplinary and Specialization Minors)	180	194	8	4

- There are multiple exit options at each level. Student will be given a specific Qualification mentioned in the table depending on the level at which he/she decide to have an exit. Ex. If a student decides to exit after completion of two years (level 5.0) of the program, he will be given a Diploma in Engineering with specific exit condition mentioned in the syllabus of the specific branch. He/she can rejoin the program with the multiple entry option at the level next where he/she chose to exit previously. (Student can join at level 5.5 if successfully completed level 5.0 previously at the time of exit).

- Minimum credit requirements of each level are mentioned in the credit framework table.
- There are 4 distinct options available at level 6.0.
- First one is basic level 6.0 option where minimum 160-maximum 176 credits are mandatory which can be completed as per the Semester-wise Credit distribution structure mentioned in the table given below.
  Here, the Bachelor's Engineering Degree in chosen Engg./ Tech. Discipline with multidisciplinary minor (min.160-max.176 Credits) i.e. "**B. Tech in Electronics and Telecommunication Engineering with Computer Engineering**" (160-176 credits) enables students to take up five-six or required additional courses of 14 credits in the discipline other than Electronics and Telecommunication Engineering distributed over semesters III to VIII. Here in the case of "**B. Tech in Electronics and Telecommunication Engineering with Computer Engineering**" (160-176 credits) student is supposed to take up 50% or more courses to complete the 50% or more credits (from assigned 14 credits) from **Computer Engineering minor bucket**. The remaining courses to complete the assigned 14 credits can be covered from other discipline's minor buckets.
- Remaining three level 6.0 options are the advanced options where the student is given an opportunity to get extra qualification by earning some extra credits(18-20 extra credits). These three options are given below:
- Level 6.0: The **Bachelor's Engineering Degree with Honours** in chosen Major Engg./ Tech. Discipline i.e. in Electronics and Telecommunication Engineering with Honours with Multidisciplinary Minor (180-194 credits) enables students of Electronics and Telecommunication Engineering to take up five-six additional courses of 18 to 20 credits in the Electronics and Telecommunication Engineering discipline distributed over semesters III to VIII. The decision regarding the mechanism of distribution of these 18-20 credits over semesters III to VIII, which are over and above the min.160-max.176 Credits prescribed for the duration of four years will be taken by Academic Authorities of University. **Student must have CGPA equal to or greater than 7.5 at the end of second semester to go for this option**.
- Level 6.0: The **Bachelor's Engineering Degree with Research** in i.e. in Electronics and Telecommunication Engineering with Research with Multidisciplinary Minor (180-194 credits) enables students of Electronics and Telecommunication Engineering to take up a research project of 18 to 20 credits in the Electronics and Telecommunication Engineering discipline distributed over semesters VII to VIII. **Student must have CGPA equal to or greater than 7.5 at the end of sixth semester to go for this option**.
- Level 6.0: The **Bachelor's Engineering Degree in chosen Engg./ Tech. Discipline with Double Minor** (Multidisciplinary and Specialization Minor, 180-194 credits), i.e. "**B. Tech in Electronics and Telecommunication Engineering with *other selected discipline in* Engineering (as MDM) with Specialization Minor in Computer Engineering**" (180-194 credits) enables students to take up five-six additional courses of 14 credits in the discipline other than Electronics and Telecommunication Engineering(for completion of multidisciplinary minor) and 18 to 20 extra credits in the **Computer Engineering discipline** distributed over semesters III to VIII. Here, the ***other selected discipline* in Engineering should be different from Specialization Minor i.e. Computer Engineering**. This enables students to take up five-six or required additional courses of 18 to 20 credits in the **Computer Engineering** discipline distributed over semesters III to VIII, which are

over and above the min.160-max.176 Credits. The decision regarding the mechanism of distribution of these 18-20 credits over semesters III to VIII, prescribed for the duration of four years will be taken by Academic Authorities of University. **Student must have CGPA equal to or greater than 7.5 at the end of second semester to go for this option**.

Semester-wise Credit distribution structure for Four Year UG Engineering Program - One Major, One Minor

Semester		I	II	III	IV	V	VI	VII	VIII	Total Credits
Basic Science Course	BSC/ESC	06-08	08-10		--	--	--	--	--	14-18
Engineering Science Course		10-08	06-04		--	--	--	--	--	16-12
Programme Core Course (PCC)	Program Courses	--	02	08-10	08-10	10-12	08-10	04-06	04-06	44-56
Programme Elective Course (PEC)		--	--	--	--	04	08	02	06	20
Multidisciplinary Minor (MD M)	Multidisciplinary Courses		-	02	02	04	02	02	02	14
Open Elective (OE) Other than a particular program		--	--	04	02	02	--	--	--	08
Vocational and Skill Enhancement Course (VSEC)	Skill Courses	02	02	--	02	--	02	--	--	08
Ability Enhancement Course (AEC -01, AEC-02)	Humanities Social Science and Management (HSSM)	02	--	--	02	--	--	--	--	04
Entrepreneurship/Economics/ Management Courses		--		02	02	--	--	--	--	04
Indian Knowledge System (IKS)			02		--	--	--	--	--	02
Value Education Course (VEC)		--	--	02	02	--	--	--	--	04
Research Methodology	Experiential Learning Courses	--	--	--	--	--	--		04	04
Comm. Engg. Project (CEP)/Field Project (FP)		--	--	02	--	--	--	-	-	02
Project		--	--	--	--	--	--		04	04
Internship/ OJT		--	---			--	--	12	-	12
Co-curricular Courses (CC)	Liberal Learning Courses	02	02		--	--	--	--	-	04
Total Credits (Major)		**20-22**	**20-22**	**20-22**	**20-22**	**20-22**	**20-22**	**20-22**	**20-22**	**160-176**

Student need to follow the Semester-wise Credit distribution structure for Four Year UG Engineering Program as prescribed in the table given above.

- There are seven vertical categories with specific credits distributed in specific semesters.

- Student can choose a Program Elective Course (PEC) in that specific semester from the given subjects.
- Multidisciplinary course(MDM) and Open Elective(OE) courses can be chosen from the MDM and OE Buckets depending on students choice. Completion of total credits given in the last column of the table for each vertical is mandatory.
- Students can complete 40% of the courses through online platforms like NPTEL/SWAYAM. The NPTEL SWAYAM course content should be at least 80% similar to the course content in the syllabus.

General 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:

i. Satisfied all the Academic Requirements to continue with the programme of Studies without termination
ii. Cleared all Institute, Hostel and Library dues and fines (if any) of the previous semesters;
iii. Paid all required advance payments of the Institute and hostel for the current semester;
iv. 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 implemented from academic year 2023-24, from I year B. Tech.

Percentage 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

1.	Continuous Assessment Marks	40
2.	End Semester Examination (ESE)Marks	60

2. Class is awarded based on CGPA of all eighth semester of B.Tech Program.

CGPA for pass is minimum 5.0	
CGPA upto <5.50	Pass class
CGPA ≥ 5.50&<6.00	Second Class
CGPA ≥ 6.00&<7.5	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:

Mid Semester Exam (MSE) Marks	20
Continuous Assessment Marks	20
End Semester Examination(ESE)Marks	60

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

- It is mandatory for every student of B. Tech to score a minimum of 40 marks out of 100, M. Tech to score a minimum of 45 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 2023-24

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

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,
'c_i' is the number of credits allotted to a particular subject, and
'g_i' 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.

7. Attendance Requirements:

a. All students must attend every lecture, tutorial and practical classes.

b. To account for approved leave of absence (eg. 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%.

c. 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.

d. The attendance records are to be maintained by the course instructor and he shall show it to the student, if and when required.

8. 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.

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First Year Teaching and Evaluation Scheme

Semester I (Term 1)											
Sr. No.	**Course Category**	**Course Code**	**Course Title**	**Teaching Scheme**			**Evaluation Scheme**				**Credit**
				L	**T**	**P**	**CA**	**MSE**	**ESE**	**Total**	
1	BSC	24AF1000BS101	Engineering Mathematic – I	3	0	0	20	20	60	100	3
2	BSC	24AF1CHEBS102	Engineering Chemistry	3	0	0	20	20	60	100	3
3	BSC	24AF1CHEBS103L	Engineering Chemistry Lab	0	0	2	60	--	40	100	1
4	ESC	24AF1000ES104	Basic Electrical and Electronics Engineering	3	0	0	20	20	60	100	3
5	ESC	24AF1000ES105L	Basic Electrical and Electronics Engineering Lab	0	0	2	60	--	40	100	1
6	ESC	24AF1000ES106	Programming for Problem Solving	2	0	0	20	20	60	100	2
7	ESC	24AF1000ES107L	Programming for Problem Solving Lab	0	0	2	60	--	40	100	1
8	BSC	24AF1EEEES108	Energy and Environmental Engineering	2	0	0	20	20	60	100	2
9	VSEC	24AF1000VS109L	Workshop Practices	0	0	4	60	--	40	100	2
10	AEC-01	24AF1000VS110	Communication Skills	2	0	0	20	20	60	100	2
11	AEC-01	24AF1000VS111L	Communication Skills Lab	0	0	2	60	--	40	100	1
12	CC	24AF1000CC112	A. Yoga Education B. NSS-I C. NCC	1	0	2	60	--	40	100	2
	Total for Semester I			**16**	**0**	**14**	**440**	**120**	**600**	**1160**	**23**

Semester II (Term 2)											
Sr. No.	**Course Category**	**Course Code**	**Course Title**	**Teaching Scheme**			**Evaluation Scheme**				**Credit**
				L	**T**	**P**	**CA**	**MSE**	**ESE**	**Total**	
1	BSC	24AF1000BS201	Engineering Mathematics – II	3	0	0	20	20	60	100	3
2	BSC	24AF2PHYBS202	Engineering Physics	3	0	0	20	20	60	100	3
3	BSC	24AF2PHYBS203L	Engineering Physics Lab	0	0	2	60	--	40	100	1
4	PCC	24AF2PCCES204	Digital Electronics	2	0	0	20	20	60	100	2
5	PCCL	24AF2PCCES205L	Digital Electronics Lab	0	0	2	60	--	40	100	1
6	ESC	24AF2EGRES206	Engineering Graphics	2	0	0	20	20	60	100	2
7	ESC	24AF2EGRES207L	Engineering Graphics Lab	0	0	2	60	--	40	100	1
8	ESC	24AF2FPPES208	Fundamentals of Python Programming	2	0	0	20	20	60	100	2
9	ESC	24AF2FPPES209L	Fundamentals of Python Programming Lab	0	0	2	60	--	40	100	1
10	IKS	24AF1000VS210	IKS Bucket #	2	0	0	60	--	40	100	2
11	VSEC	24AF1000VS211	Design Thinking	2	0	0	60	--	40	100	2
12	CC	24AF1000CC212	A. Integrated Personality Development B. NSS-II C. Health and Wellness	1	0	2	60	--	40	100	2
	Total for Semester II			**17**	**0**	**10**	**520**	**100**	**580**	**1200**	**22**

Note: Students can complete online courses of 40% of total credits through online platform NPTEL / SWAYAM/ Sector Skill council of India and other online platforms identified by the University time to time. At least 80% contents of the NPTEL / SWAYAM/ Sector Skill council of India course should match with syllabus contents of the subject prescribed by the university.

Exit after First Year: Students can exit the program after first year and earn One Year UG certificate in Engg./Tech. after successful completion of 4-6 weeks of industrial training or internship.

First Year (Semester –I)
Engineering Mathematics-I

BTECE101	Engineering Mathematics-I	BSC	3L- 0T - 0P	3 Credits

Teaching Scheme	Examination Scheme
Lecture: 3 hrs./week Tutorial: 0 hr./week	Continuous Assessment: 20 Marks Mid Semester Exam: 20 Marks End Semester Exam: 60 Marks

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 problems.
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.

Course Outcomes:

After completion of this course, students will be able to

CO1: Apply the matrix technique (Linear algebra) to find solutions of system of linear equations arising in many engineering problems.

CO2: Demonstrate the concept partial derivatives and their applications to Maxima/ Minima,series expansion of multi valued functions.

CO3: Compute Jacobian of functions of several variables and their applications to engineering problems.

CO4: Identify and sketch of curves in various coordinate system.

CO5: Evaluate multiple integrals and their applications to area and volume.

Course Contents:

UNIT-I: 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.

UNIT-II: 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.

UNIT-III: Applications of Partial differentiation

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

UNIT-IV: Reduction Formulae and Tracing of Curves

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 and polar forms.

UNIT-V: Multiple Integral

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., New Delhi.

First Year (Semester –I)

Engineering Chemistry

BTECE102	Engineering Chemistry	BSC	3L- 0T - 0P	3 Credits

Teaching Scheme	Examination Scheme
Lecture: 3 hrs./week Tutorial: 0 hr./week	Continuous Assessment: 20 Marks Mid Semester Exam: 20 Marks End Semester Exam: 60 Marks

Course Objectives:

1. To impart the knowledge of Chemistry in the area of Engineering and Technology.
2. To capable the student to explain the importance of chemistry in various fields of Engineering.
3. To identify the concept of Chemistry to lay the ground work for subsequent studies.

Course Outcomes:

It is expected that by the end semester, student will develop the following competencies.

CO1: Students should be able to understand and explain the basic concepts of Water treatment and capable to explain softening processes and water characteristics..

CO2: Students should be able to explain analysis, Calorific value of fuel and explain lubricants, its properties and industrial importance.

CO3: Students should know the concepts of Electrochemistry and its importance.

CO4: Student should be able to understand and explain various instrumental methods of Analysis.

CO5: Student should be able to understand and explain properties and uses of engineering materials such as Cement, Gypsum plaster, Rubber etc.

Course Contents:

UNIT-I: Water Treatment

Introduction, Hard and Soft water, Disadvantages of hard water, Softening of water :Ion exchange process, Hot lime –soda process, Reverse Osmosis (RO), Hardness and its determination by EDTA method, Dissolved oxygen (DO) and its determination by Winkler's method, Numerical based on hardness, Treatment of water for domestic purpose- aeration, sedimentation and disinfection.

UNIT-II: Fuels and Lubricants

Fuels: Introduction, Classification of fuel, Calorific value of a fuel, Characteristics of a good fuel, Calorific value by- Bomb Calorimeter, Boy's Calorimeter and its numerical. Analysis of coal: Proximate and Ultimate analysis, Liquid fuel- Refining of petroleum.

Lubricant: Introduction, classification of lubricant - Solid, Semi –solid and Liquid lubricant, Properties of lubricant: Physical and Chemical properties of lubricant – viscosity surface tension, Flash point and Fire point, Acid value, Saponification value.

UNIT-III: Electrochemistry:
Introduction, Electrical conductance, Conductance measurement by Wheatstone bridge method, Cell constant, Conductometric titrations, Glass electrode and its application for pH measurement, Ostwald's theory of acid- base indicator, Fuel cell , working of H_2-O_2 fuel cell and its applications, Rechargeable Batteries: Lithium ion batteries and Lithium batteries.

UNIT-IV: Instrumental Methods of Analysis
UV-Visible spectroscopy: Introduction, Laws of absorption: Lambert's- Beer's law, Instrumentation and working of double beam spectrophotometer.
Flame Photometry: Introduction, Principle and working
Chromatography: Introduction, Classification, Thin layer chromatography (TLC).
IR spectroscopy: Introduction, Principle, Range of IR radiations, Double beam IR Spectrophotometer and applications of IR Spectroscopy.

UNIT-V: Engineering Materials
Cement: Introduction, Portland cement, Chemical Composition of Cement
Gypsum: Plaster of Paris, Properties and Uses
High polymers: Introduction. Types of Polymerization, Thermoplastic and Thermosetting resin, Constituent of Plastic, Synthesis of Urea formaldehyde and its Properties and Uses, Brief discussion on Natural Rubber, Synthesis of Styrene - butadiene rubber and its Properties and uses.

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.
4. Gurudeep Chatwal and Sham Anand, Instrumental methods of Chemical Analysis, Himalaya Publishing House, New Delhi
5. V. R. Gowarikar , Polymer Science, New Age International Publication

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.
5. Willard, Hobart H.; Merritt, Lynne L., Jr.; Dean, John A. Instrumental Methods of Analysis, American Chemical Society

First Year (Semester –I)
Engineering Chemistry Lab

BTECE102L	Engineering Chemistry Lab	BSC	0L- 0T - 2P	1 Credits

Teaching Scheme	Examination Scheme
Practical: 2 hr./week	Continuous Assessment: 60 Marks End Semester Exam: 40 Marks

Minimum 8-10 experiments are to be performed based on contents from syllabus

Sample List of Experiments:

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. To verify Beer's-Lambert's law.
14. To determine Alkalinity water sample.
15. To determine the maximum wavelength of absorption of a given solution by colorimeter.
16. Experiments on Chromatography.

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

First Year (Semester –I)

Basic Electrical and Electronics Engineering

BTECE103	Basic Electrical and Electronics Engineering	ESC	3L- 0T - 0P	3 Credits

Teaching Scheme	Examination Scheme
Lecture: 3 hrs./week Tutorial: 0 hr./week	Continuous Assessment: 20 Marks Mid Semester Exam: 20 Marks End Semester Exam: 60 Marks

Course Objectives:

1. To equip the students with an understanding of the fundamental principles of DC and AC electrical circuits.
2. To introduce the working principles and applications of fundamental electronic devices and circuits.
3. To identify various measurement instruments and their use in electric and electronic measurements.

Course Outcomes:

After completion of this course, students will be able to:

CO 1. Apply fundamental concepts and circuit laws to solve simple DC and AC circuits
CO 2. Interpret the construction and working of different types of electrical machines
CO 3. Analyze building blocks of basic dc power supply.
CO 4. Outline the principle of BJT as an amplifier.
CO 5. Apply the knowledge of measuring instruments in electronic instrumentation system.

Contents:

UNIT-I: Electrical Circuits

DC Circuits: Circuit Components: Conductor, Resistor, Inductor, Capacitor, Ohm's Law, Kirchhoff's Laws, Independent and Dependent Sources, Simple problems - Nodal Analysis, Mesh analysis with independent sources only (Steady state), Star-Delta Transformation.

AC Circuits: AC Signal Parameters, Waveforms, Average value, RMS Value, Instantaneous power, active power, reactive power and apparent power, power factor – Steady state analysis of RLC circuits (Simple problems only).

UNIT-II: Electrical Machines

Difference between Generator & motors, DC motors: Construction, working principle, types, characteristics, Back emf and Torque Equation. Working principle of Induction motor.

Single Phase Transformer: Construction and working (no load & on load), EMF Equation, Losses, Efficiency, Regulation.

UNIT-III: Rectifiers and Power Supplies

PN Junction diode: Principle of operation, V-I characteristics, Diode current equation, principle of avalanche breakdown. Block diagram description of a dc power supply, Working of a full wave bridge rectifier, capacitor filter (no analysis), working of Zener diode and its application as voltage regulator. Working of linear voltage regulators – 78xx and 79xx.

UNIT-IV: BJT and Amplifiers

Bipolar Junction Transistors: PNP and NPN structures, Principle of operation, relation between current gains in CE, CB and CC, input and output characteristics of common emitter configuration, DC load line, stability factor, Biasing Techniques.

Amplifiers: Transistor as an amplifier, Operation of single stage RC coupled amplifier with its frequency response.

UNIT-V: Measurements and Instrumentation

Functional elements of an instrument, working principle of: Moving Coil and Moving Iron instruments, Ammeter, voltmeter, wattmeter, Energy meter,

Block diagram & working of: Multi-meter, Function Generator and Digital Storage Oscilloscope.

TEXT BOOKS: -

1. Kothari DP and I.J Nagrath, "Basic Electrical and Electronics Engineering", Second Edition, McGraw Hill Education, 2020
2. Boylstad, Electronics Devices and Circuits Theory, Pearson Education
3. A.K. Sawhney, Puneet Sawhney 'A Course in Electrical & Electronic Measurements & Instrumentation', Dhanpat Rai and Co, New Delhi, 2015

REFERENCE BOOKS: -

1. Millman Halkias: Electronic Devices and Circuits, McGraw-Hill Publication, 2000.
2. Donald Neaman, Electronic Circuit Analysis and Design, McGraw-Hill Publication, 3rd Edition
3. B. L. Theraja, Electrical Technology – Volume - I, S. Chand.
4. V. N. Mittal and Arvind Mittal, Basic Electrical Engineering, McGraw-Hill Publication.
5. D C Kulshreshtha, "Basic Electrical Engineering", Tata McGraw Hill, 2010
6. B. L. Theraja, Fundamentals of Electrical Engineering and Electronics, S. Chand, 2006
7. H.S. Kalsi, 'Electronic Instrumentation', Tata McGraw-Hill, New Delhi, 2010

First Year (Semester –I)

Basic Electrical and Electronics Engineering Lab

BTECE103L	**Basic Electrical and Electronics Engineering Lab**	**ESC**	**0L- 0T - 2P**	**1 Credits**

Teaching Scheme	**Examination Scheme**
Practical: 2 hr./week	Continuous Assessment: 60Marks End Semester Exam: 40 Marks

Minimum 8-10 experiments are to be performed based on contents from syllabus

Sample List of Experiments:

1. To verify KCL and KVL.
2. To analyze series RLC circuit
3. Calculate RMS, average and peak value of the signal using multi-meter and DSO.
4. Study of V-I characteristics of PN Junction Diode
5. Study of Full Wave Rectifier using PN Junction Diode
6. Study of Zener diode as voltage regulator
7. Study of V-I Characteristics of BJT
8. Calculate Q point on DC load line using voltage divider biasing.
9. Study of BJT as an amplifier.
10. Frequency response of RC coupled amplifier.
11. Measurement and testing of various electronic components using multimeter.
12. Mini-project.

First Year (Semester –I)
Programming for Problem Solving

BTECE104	Programming for Problem Solving	ESC	2L- 0T - 0P	2 Credits

Teaching Scheme	Examination Scheme
Lecture: 3 hrs./week Tutorial: 0 hr./week	Continuous Assessment: 20 Marks Mid Semester Exam: 20 Marks End Semester Exam: 60 Marks

Course Objectives:

1. To develop logical skills and programming skills to solve basic and advanced computing problems.
2. To learn the c-programming language concepts for problem solving

Course Outcomes:

After completion of this course, students will be able to:

- **CO 1.** Gain a broad perspective about the uses of computers in engineering industry and C Programming.
- **CO 2.** Understand the use of Types, operators and expressions in programming.
- **CO 3.** Apply the knowledge of flow statements and functions for control based computational algorithms.
- **CO 4.** Understand the concepts of arrays ad pointers in C.
- **CO 5.** Apply the knowledge of structure in OS file management.

Course Contents:

UNIT-I: Fundamental of the Computer and Computing Concepts

Generation of computers, Classification of computers, Basic Anatomy of Computer System, Input Devices, Processor, Output Devices, Memory Management, Types of Computer Software, Overview of Operating system, Concept of Networking.

Process of programming:

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

UNIT-II: Types, Operators and Expressions

C Tokens, Data types, sizes, initialization and declarations, arithmetic operators, relational and logical operators, increment and decrement operators, bitwise operators, assignment operators and expressions, conditional expressions precedence and order of evaluation, type conversions.

UNIT-III: Control Flow

Statements and Blocks: If-else, if-else ladder, nested if-else, switch-case, Loops: while, for, do-while, break, continue, goto and Labels.

Functions and Program Structure: Basic of functions, In build functions, user defined functions, function returning various data types, external variables scope rules.

UNIT-IV: Arrays and Pointers in C

Initializing arrays, initializing character arrays, multidimensional arrays.

Pointer: Definition and uses of pointers, Pointers to integers, characters, floats, arrays.

UNIT-V: Structures in C and File Management:

Basics of structures, structures and functions arrays of structures, Pointers in structures.
Introduction to File Management: Defining and Opening File, Closing File, Input/output Operations on File.

Text Books:

1. R. S. Bichkar, Programming with C, Orient Blackswan, 1st Edition, 2012.
2. Herbert Schildit, C the Complete Reference, McGraw-Hill Publication, 2000.
3. Balguruswamy, Programming in C, PHI.
4. Yashwant Kanitkar, Let Us C, PHI

Reference Books: -

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India.
2. R G Dromey, "How to Solve it by Computer", 1st Edition, Pearson Education, 2006.
3. Rajaraman V, The Fundamentals of Computer, 6th Edition, Prentice-Hall of India, 2014.
4. Steve Oualline, Practical C Programming, 3 Edition, O'Reilly Press, 2006.
5. Jeri R. Hanly, Elliot B. Koffman, Problem Solving and Program Design in C, 7th Edition, Pearson Education, 2012.
6. Balagurusamy E, Programming in ANSI C, 8th Edition, Tata McGraw-Hill,2019.
7. Gottfried, Programming with C, 3 Edition, Tata McGraw-Hill, 2018.

First Year (Semester –I)
Programming for Problem Solving Lab

BTECE104L	**Programming for Problem Solving Lab**	**ESC**	**0L- 0T - 2P**	**1 Credits**

Teaching Scheme	**Examination Scheme**
Practical: 2 hr./week	Continuous Assessment: 60Marks End Semester Exam: 40 Marks

Minimum 8-10 experiments are to be performed based on contents from syllabus

Sample List of Experiments:

1. Write a C program to declare and initialize variables of different data types and display their sizes.
2. Implement arithmetic, relational, and logical operations in C programs and display the results.
3. Write a program to demonstrate the use of conditional expressions and explain the order of evaluation.
4. Create a C program to perform bitwise operations on integer variables and print the results.
5. Develop a C program to demonstrate the use of assignment operators and evaluate expressions involving them.
6. Write a C program to implement various control flow statements such as if-else, switch-case, and loops, to solve a given problem.
7. Create a function in C to calculate the factorial of a given number and display the result.
8. Write a program to find the sum of digits of a number using recursion.
9. Implement a menu-driven program in C using switch-case statements to perform arithmetic operations.
10. Develop a C program to print the Fibonacci series using a loop.
11. Write a C program to initialize and display elements of a one-dimensional array.
12. Implement a program to find the largest and smallest elements in an array.
13. Create a C program to transpose a matrix using a two-dimensional array.
14. Write a program to demonstrate the use of pointers to access elements of an array.
15. Develop a C program to swap two numbers using pointers.
16. Define a structure to represent a student record with attributes like name, roll number, and marks, and write a program to display the student details.
17. Create an array of structures to store details of multiple students and perform operations like searching and sorting based on roll number.
18. Write a program to read data from a text file, perform some operations (e.g., calculation), and write the results to another file.
19. Implement file handling operations in C to copy the contents of one file to another.
20. Mini-project.

First Year (Semester –I)
Energy and Environmental Engineering

BTECE105	**Energy and Environmental Engineering**	**BSC**	**2L- 0T - 0P**	**2 Credits**

Teaching Scheme	**Examination Scheme**
Practical: 2 hr./week	Continuous Assessment: 40 Marks End Semester Exam: 60 Marks

Course Objectives
1. To impart the knowledge of Environmental education to the students of Engineering and Technology.
2. To explain basic concepts of sources, causes, effects and control measures of environmental pollution
3. To impart the knowledge of energy sources and power generation
4. To understand the role of individual for the protection of Environment.

Course Outcomes
Student should able to:
1. Know and understand about components and segments of environment, ecosystem and its types.
2. Understand power consuming and power developing devices for the effective utilization
3. Understand and to explain types of Energies such as wind energy, solar energy, hydro energy etc.
4. Understand and explain various types of air pollution, their effects and control measures.
5. Know the various types of water pollution, sources, waste water treatment, effect of water pollution on health and soil pollution

Unit 1: Environment (5L)
Introduction, Components of Environment, Types of Environment, Brief discussion on Segments of Environment, Environmental Pollution, Ecosystem: Types of Ecosystem, Components of Ecosystem.

Unit 2: Conventional Power Generation (7L)
Gas Turbine Power Plant: Introduction, Simple Gas Turbine Plant, Open and closed cycle gas turbine plant, Fuels for Gas Turbine Plant. Hydro Power Plant: Introduction, Selection of site for hydro power station, Role of Hydroelectric station in power industry, Classification of Hydroelectric plant, General arrangement and operation. Nuclear Power Plant: Introduction, Nuclear materials, Selection of site, Main parts of nuclear reactor and their functions, Working of Nuclear Power Plant

Unit 3: Energy and Environment (6L)
Introduction, Sources of Energy, Renewable sources of Energy: Solar Energy, Hydro Energy, Tidal Energy, Wind Energy, Biomass Energy, Geothermal Energy, Non Renewable Energy Sources Coal, Petroleum, Natural Gas.

Unit 4: Air Pollution (5L)

Introduction, Brief discussion on air pollutants, Sources of Air Pollution: Pollutants from Industry, Pollution by Automobiles, Effect of Air Pollutions: Acid rain, Green House Effect, Global warming; Brief discussion on Control of Air Pollution.

Unit 5: Water and Soil Pollution (7L)

Introduction, Types of Water Pollutants, Sources of Water Pollution, Methods to remove impurities in water, Treatment of Industrial waste water: Activated Sludge Process, Impact of Water Pollution on Human Health, Water as a carrier for the transmission of diseases. Sources of Soil Pollution, Harmful effects of Soil Pollution, Control of Soil Pollution.

Text Books:

1. A Textbook on Power System Engineering, A, Chakrabarti, M. L. Soni, P. V. Gupta, U. S. Bhatnagar, Dhanpat Rai and Co. Pvt. Ltd
2. Environmental Chemistry (II edition), Ane Books Pvt.Ltd. V. K. Ahluwalia
3. Environmental Chemistry (sixth edition), A. K. De
4. Essential Environmental Studies, S. P. Mishra and S. N. Pandey

Reference Books:

1. Environmental Science, sixteenth edition, G. Tyler Miller and S. E. Spoolman, Cengage publication.
2. A Textbook of Engineering Chemistry, Dr. S. S. Dara and Dr. S. S. Umare
3. Textbook On Experiments & Calculations In Engineering Chemistry: S. S. Dara, S Chand & Company Pvt Ltd.

First Year (Semester –I)
Workshop Practices

BTECE106L	Workshop Practices	ESC	0L- 0T - 4P	2 Credits

Teaching Scheme	Examination Scheme
Practical: 4 hr./week	Continuous Assessment: 60Marks End Semester Exam: 40 Marks

Course Objectives:

1. To provide exposure to the students with hands on experience on various basic engineering practices in Civil, Mechanical, Electrical and Electronics Engineering.
2. To have a study and hands-on-exercise on plumbing and carpentry components.
3. To have a practice on gas welding, foundry operations and fitting.
4. To have a study on measurement of electrical quantities, energy and resistance to earth.
5. To have a practice on soldering.

Laboratory Outcomes:

Students will be able to:

1. Upon completion of this laboratory course, students will be able to fabricate components with their own hands.
2. They will also get practical knowledge of the dimensional accuracies and dimensional tolerances possible with different manufacturing processes.
3. By assembling different components, they will be able to produce small devices of their interest.

Workshop Practices

1. Machine shop
2. Fitting shop
3. Carpentry
4. Electrical & Electronics
5. Welding shop
6. Casting
7. Smithy
8. Plastic moulding & Glass Cutting

Examinations could involve the actual fabrication of simple components, utilizing one or more of the techniques covered above.

Text/Reference Books:

1. AICTE‟s Prescribed Textbook: Workshop / Manufacturing Practices (with Lab Manual) ISBN: 978-93-91505-332.
2. Hajra Choudhury S.K., Hajra Choudhury A.K. and Nirjhar Roy S.K., “Elements of
Workshop Technology”, Vol. I 2008 and Vol. II 2010, Media promoters and publishers private limited, Mumbai.

3. Kalpakjian S. And Steven S. Schmid, “Manufacturing Engineering and Technology”, 4th edition, Pearson Education India Edition, 2002.
4. Gowri P. Hariharan and A. Suresh Babu,” Manufacturing Technology – I” Pearson Education, 2008.
5. Roy A. Lindberg, “Processes and Materials of Manufacture”, 4th edition, Prentice Hall India, 1998.

First Year (Semester –II)
Communication Skills

BTECE107	Communication Skills	AEC-01	2L- 0T - 0P	2 Credits

Teaching Scheme	Examination Scheme
Lecture: 2 hrs./week Tutorial: 0 hr./week	Continuous Assessment : 20 Marks Mid Semester Exam: 20 Marks End Semester Exam: 60 Marks

Course Objectives:
1. Groom the students to use correct English
2. Enhance the linguistic abilities with the help of language learning skills LSRW
3. Revision of basic grammar units in English
4. Prepare the students for competitive examinations and the examinations required for higher studies in Indian and foreign universities
5. Ability to develop well-worded communications and resumes
6. Improve listening, note-taking and observational skills

Course Outcomes:
1. Students would be more confident while using English
2. Engage in analysis of speeches or discourses and several articles
3. Identify and control anxiety while delivering speech
4. Write appropriate communications(Academic/Business)
5. Prepared to take the examinations like GRE/TOFEL/IELTS
6. Identify and control the tone while speaking
7. Develop the ability to plan and deliver the well-argued presentations

Unit 1: Communication and Communication Processes (04 hrs)
Introduction to Communication, Forms and functions of Communication, Barriers to Communication and overcoming them, Verbal and Non-verbal Communication
Reading Skills: Introduction to Reading, Types of Readers and Reading, Barriers to Reading, Strategies for Reading, Comprehension.
Listening Skills: Importance of Listening, Types of Listening, Barriers to Listening.

Unit 2: Speaking & 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 Sounds in 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 (04 hrs)

Features of Good Language, Writing Emails, Technical Reports: Report Writing: Format, Structure and Types

Letter Writing: Types & 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:

1. Sanjay Kumar, Pushp Lata, Communication Skills, Oxford University Press, 2016
2. Meenakshi Raman, Sangeeta Sharma, Communication Skills, Oxford University Press, 2017
3. Teri Kwal Gamble, Michael Gamble, Communication Works, Tata McGraw Hill Education, 2010
4. Anderson, Kenneth. Joan Maclean and Tossny Lynch. Study Speaking: A Course in Spoken English for Academic Purposes. Cambridge: CUP, 2004.
5. Aswathappa, K. Organisational Behaviour, Himalayan Publication, Mumbai (1991).
6. Atreya N and Guha, Effective Credit Management, MMC School of Management, Mumbai (1994).
7. Balan,K.R. and Rayudu C.S., Effective Communication, Beacon New Delhi (1996).
8. Bellare, Nirmala. Reading Strategies. Vols. 1 and 2. New Delhi. Oxford University Press, 1998.
9. Bhaskar, W. W. S & Prabhu, N. S.: English through Reading, Vols. 1 and 2. Macmillan, 1975.
10. Black, Sam. Practical Public Relations, E.L.B.S. London (1972).
11. Blass, Laurie, Kathy Block and Hannah Friesan. Creating Meaning. Oxford: OUP, 2007.
12. Bovee Courtland,L and Thrill, John V. Business Communication, Today McGraw Hill, New York, Taxman Publication (1989).

First Year (Semester –I)

Communication Skills Lab

BTECE108L	Communication Skills Lab	AEC	0L- 0T - 2P	1 Credit

Teaching Scheme	Examination Scheme
Practical: 2 hr./week	Continuous Assessment: 60Marks End Semester Exam: 40 Marks

List of Practicals:

1. How to introduce oneself ? (02 hrs)
2. Know your friend (02 hrs)
3. Introduction to Phonemic symbols (02 hrs)
4. Articulation of sounds in English with proper manner (02 hrs)
5. Practice and exercises on articulation of sounds (02 hrs)
6. Read Pronunciations/transcriptions from the dictionary (02 hrs)
7. Practice and exercises on pronunciations of words (02 hrs)
8. Introduction to stress and intonation (02 hrs)
9. Rapid reading sessions (02 hrs)
10. Extempore (02 hrs)
11. Group discussion (02 hrs)
12. Participating in a debate (02 hrs)
13. Presentation techniques (02 hrs)
14. Interview techniques (02 hrs)

First Year (Semester –I)
Yoga Education

BTECE108A	Yoga Education	CC	1L- 0T - 2P	2 Credits

Teaching Scheme	Examination Scheme
Lecture: 0 hrs./week Tutorial: 1 hr./week Practical: 2 hrs/week	Continuous Assessment: 60 Marks End Semester Exam: 40 Marks

Course Objectives:

1. To learn Message of Vedas and Upanishads
2. To learn Four Streams of Yoga,
3. To learn Shaddarshanas or the SIX systems of Indian Philosophy,
4. To understand Life and message of spiritual masters and Indian Culture
5. To understand Anatomy and Physiology, Yoga and Exercise Physiology

Course Outcomes:

After completion of this course, students will be able to:

CO 1. Learn Message of Vedas and Upanishads.
CO 2. Learn Four Streams of Yoga.
CO 3. Learn Shaddarshanas or the SIX systems of IndianPhilosophy.
CO 4. Understand Life and message of spiritual masters and IndianCulture.
CO 5. Understand Anatomy and Physiology, Yoga and ExercisePhysiology.

Course Contents:

UNIT-I: Message of Vedas and Upanishads: Search for Happiness, Search for Reality.

UNIT-II: Streams of Yoga: Bhakti Yoga, Raja Yoga, Antaranga Yoga, Bahiranga Yoga, Karma Yoga, Secrets of Action, Jnana Yoga.

UNIT-III: Shaddarshanas – Nyaya, Vaishesika, Sankhya, Uttaramimamsa, Purvamimamsa, Yoga.

UNIT-IV: Life and Message of Spiritual Masters –Sri Ramakrishna Paramahamsa, Maa Sharada Devi,Swami Vivekananda, Indian Culture.

UNIT-V: Anatomy and Physiology, Yoga and Exercise Physiology, Yoga & Health - Concept ofHealth and Pancha Kosha Vivek, Yogic Concept of Health and Disease.

Text Books:

1. Rajayoga - Swami Vivekananda - Ramakrishna Ashrama Publications.
2. Hathayoga Pradipika of Swatmarama - Kaivalyadhama, Lonavala
3. The Science of Yoga - Taimini - Theosophical Publishing House, Adyar, Madras.
4. Yogasutras of Patanjali - Harihārananda Aranya, University of Calcutta Press, Calcutta.

Reference Books:

1. Patanjal Yoga Pradeepa Omananda Tirtha- Geeta Press, Gorakhpur.
2. Gherandasamhita - Bihar School of Yoga, Munger, Bihar.
3. Shivayogadipika - Sadashivabrahmendra, Ananda Ashramagranthavali, Choukhamba Press.
4. Yoga Darshan: Swami Niranjanananda-Sri Panchadashanam Paramahamsa Alakh Bara, Deoghar.
5. Four chapters on Freedom (commentary on the Yoga sutras of Patanjali), Swami Satyananda (1983), Bihar School of Yoga, Munger.

First Year (Semester –I)

NSS-1

BTECE108B	**NSS-1**	**CC**	**1L- 0T - 2P**	**2 Credits**

Teaching Scheme	**Examination Scheme**
Lecture: 0 hrs./week Tutorial: 1 hr./week Practical: 2 hrs/week	Continuous Assessment: 60 Marks End Semester Exam: 40 Marks

Unit 1: Introduction and Basic Concepts of NSS History, Philosophy, Aims & objectives of NSS Organizational structure, Concept of regular activities, Special camping, Day Camps. Basis of adoption village/slums, Methodology of conducting Survey.

Unit 2: Youth and community mobilizationDefinition, Profile of youth, Categories of youth, Issues, Challenges and opportunities for youth, Youth as an agent of social change, Youth-adult partnership, Mapping of community stakeholders, Identifying methods of mobilization, Needs & importance of volunteerism.

Unit 3: Importance and Role of Youth Leadership Meaning and types of leadership, Qualities of good leaders; Traits of leadership, Importance and role of youth leadership

First Year (Semester –II)

Engineering Mathematics-II

BTECE201	Engineering Mathematics-II	BSC	3L- 0T - 0P	3 Credits

Teaching Scheme	Examination Scheme
Lecture: 3 hrs./week Tutorial: 0 hr./week	Continuous Assessment : 20 Marks Mid Semester Exam: 20 Marks End Semester Exam: 60 Marks

Course Objectives:

1. To know and discuss the need and use of complex variables to find roots, to separate complex quantities, and to establish a 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 Gree's, Stoke's and Gauss divergence theorems.

Course Outcomes:

After completion of this course, students will be able to:

CO1: Discuss the need and use of complex variables to find roots, separate complexquantities, and to establish relation between circular and hyperbolic functions.

CO2: Solve first and higher order differential equations and apply them as mathematicalmodeling in electric and mechanical systems.

CO3: Determine Fourier series representation of periodic functions over different intervals.

CO4: Demonstrate the concept of vector differentiation and interpret the physical and geometrical meaning of gradient, divergence &curl in various engineering streams.

CO5: 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 Contents:

UNIT-I: Complex Numbers

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 Complex quantities.

UNIT-II: Ordinary Differential Equations of First Order and First Degree and Their Applications

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-III: Linear Differential Equations with Constant Coefficients

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-IV: Fourier series

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-range series.

UNIT-V: Vector Calculus

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

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 II) by Dr. B. B. Singh, SynergyKnowledge 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.

First Year (Semester –II)
Engineering Physics

BTECE202	Engineering Physics	BSC	3L- 0T - 0P	3 Credits

Teaching Scheme	Examination Scheme
Lecture: 3 hrs./week Tutorial: 0 hr./week	Continuous Assessment: 20 Marks Mid Semester Exam: 20 Marks End Semester Exam: 60 Marks

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:

After completion of this course, students will be able to:

1. Familiar with the principles of acoustic design of a hall and also methods of production of ultrasonic and its applications in various fields and also understand the concept of dielectric and polarization types.
2. Acquire the basic knowledge of interference, polarization. Students are able to understand the light propagation in fibre and use of Laser in Science and Engineering.
3. Apply the knowledge of quantum mechanics to set Schrödinger's equations.
4. Understand key principle and application of nuclear physics. Identify planes in crystal and characteristics measurements of cubic system.
5. Assimilate wide scope of advanced materials in modern developments and its role in emerging innovating applications.

Course Contents:

Unit 1: Acoustics, Ultrasonics and Dielectrics

Acoustics: Introduction, Reflection of sound (reverberation and echo), absorption coefficient, Sabine's formula, Acoustical planning of building and factors affecting architectural acoustics of building.

Ultrasonic Waves: properties, Production of ultrasonics waves: Magnetostriction method and Piezoelectric method, Applications (any three in detail).

Dielectrics: Polar and non-polar dielectrics, Polarization, Types of Dielectric polarization.

UNIT-2: Engineering Optics

Interference in thin film due to reflected light, Wedge shaped film, Newton' Rings, Applications, Polarization: Introduction, types of polarization, definition of optical activity & specific rotation, Lasers: Characteristics, spontaneous emission and stimulated emission; metastable state, population inversion, types of pumping, resonant cavity, He-Ne Laser, semiconductor laser, Applications of Lasers, Optical fibre: Acceptance cone, Numerical aperture, applications of fibre optics.

UNIT-3: Quantum Mechanics

De- Broglie hypothesis of matter waves, Wave function and its physical significance,

Heisenberg's uncertainty principle and its application, Schrodinger's time dependent wave equation, Schrodinger's time independent wave equation, Introduction to quantum computing (bits & qubits, difference between classical and quantum computers).

UNIT-4: Crystal Structure & Nuclear Physics

Crystal Structure: Fundamental concepts (lattice, basis, unit cell, crystal systems), Cubic structure: Number of atoms per unit cell, atomic radius, co-ordination number, packing fraction, Comparison of Aluminum (FCC) and Iron (BCC) at room temperature, Miller indices, Relation between 'ρ' and 'a'.

Nuclear Physics: Introduction to mass defect, Q value of nuclear reaction, properties of α, β and γ rays, GM Counter.

UNIT-5: Physics of Advanced Materials

Magnetic Materials: Types of magnetic materials, magnetic domain and hysteresis curve,

Semiconductors: Conductivity of semiconductors, Hall Effect (derivation & Applications)

Superconductors: Definition, critical temperature, critical magnetic field, Meissner effect, type I & II superconductors, Introduction to BCS theory.

Nanomaterials: Introduction, top-down and bottom-up approach, Introduction to XRD, FESEM, VSM and CNT, Applications of nano-materials.

Text / Reference Books:

2. Introduction to Electrodynamics –David R. Griffiths.
3. Concept of Modern Physics – Arthur Beizer. Tata McGraw-Hill Publishing CompanyLimited.
4. Optics –Ajoy Ghatak. MacGraw Hill Education (India) Pvt. Ltd.
5. Science of Engineering Materials- C.M. Srivastava and C. Srinivasan. New Age International Pvt. Ltd.
6. Solid State Physics – A.J. Dekker. McMillan India –Limited.
7. The Feynman Lectures on Physics Vol I, II, III.
8. Introduction to Solid State Physics – Charles Kittel. John Willey and Sons
9. Engineering Physics – M.N. Avadhanulu and P.G. Kshirsagar.S.Chand and CompanyLTD.
10. Engineering Physics - R.K. Gaur andS. L. Gupta. Dhanpat Rai Publications Pvt. Ltd.-New Delhi.
11. Fundamental of Physics - Halliday and Resnik. Willey Eastern Limited.
12. Nanotechnology: An Introduction To Synthesis, Properties And Applications of Nanomaterials **–** Thomas Varghese, K. M. Balakrishna

First Year (Semester –II)
Engineering Physics Lab

BTECE202L	Engineering Physics Lab	BSC	0L- 0T - 2P	1 Credits

Teaching Scheme	Examination Scheme
Practical: 2 hr./week	Continuous Assessment: 60 Marks End Semester Exam: 40 Marks

Engineering Physics Lab

Minimum 8-10 experiments are to be performed based on contents from syllabus

Sample List of Experiments:

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 activematerial
4. Laser - Determination of wavelength of He-Ne laser light
5. G.M. Counter - Determination of operating voltage of G.M. tube
6. Crystal Plane – Study of planes with the help of models related Miller Indices
7. P N Junction Diode Characteristics
8. Hall Effect – Determination of Hall Coefficient
9. Four Probe Method - Determination of resistivity of semiconductor
10. Measurement of Band gas energy of semiconductors
11. Experiment on fibre optics
12. B-H Curve Experiment
13. Ultrasonic interferometer

First Year (Semester –II)
Digital Electronics

BTECE203	Digital Electronics	PCC	2L- 0T - 0P	2Credits

Teaching Scheme	Examination Scheme
Lecture: 2 hrs./week Tutorial: 0 hr./week	Continuous Assessment : 20 Marks Mid Semester Exam: 20 Marks End Semester Exam: 60 Marks

Course Objectives:

1. To study basic concepts of Boolean algebra, number systems, and codes.
2. To study the use of Karnaugh Maps for simplifying logic expressions and designing efficient combinational logic circuits up to 4 variables.
3. Gain proficiency in the design and application of flip-flops and registers, including understanding clocking methodologies and their impact on sequential logic circuits.
4. Understand the characteristics of different digital logic families (such as TTL, CMOS) and their comparison, aiding in selecting the appropriate family for specific design requirements.
5. Acquire a comprehensive understanding of semiconductor memories, including RAM, ROM, and EEPROM, along with their organization, operation, and characteristics.

Course Outcomes:

After completion of this course, students will be able to:

CO1. Apply Boolean algebra to solve logic functions, number systems and its conversion.

CO2. Demonstrate proficiency in standard representations of logic functions, including Simplification of logic expressions using K-Map, adders and subtractors using logic gates

CO3. Analyze sequential circuits, ensuring reliable operation through understanding clocking techniques.

CO4. Evaluate appropriate digital logic families (e.g., TTL, CMOS) based on their characteristics, enabling informed decisions in digital circuit design.

CO5. Explore knowledge of semiconductor memories, programmable logic devices in digital design.

Course Contents:

UNIT-I: Number Systems and Boolean algebra

Number systems and their conversions, BCD code, Octal Code, Hexadecimal code, Excess-3 code, Gray code, Arithmetic operations using Two's compliment. Boolean Algebra, Laws of Boolean Algebra, Logic gates, Standard form of logic functions-SOP, POS.

UNIT-II: Combinational Logic Design

K-Map up to 4 variables, Don't Care Condition and its effect, Simplification of logic expressions using K-Map & its realization. Half adder & Subtractor, Full adder, Look ahead carry adder.

UNIT-III: Sequential Circuits

1-bit memory cell, Types of flip flops: R-S, J-K, Master slave J-K, D-type, T-type. Clocked SR FF, Use of preset and clear terminals, Shift Registers: SISO, SIPO, PISO, PIPO. Clock:

Level & Edge Triggering, Counters: Asynchronous and Synchronous counter, up/down counter.

UNIT-IV: Characteristics of digital ICs

Speed of operation, power dissipation, figure of merit, fan in, fan out, current and voltage parameters, noise immunity, operating temperatures and power supply requirements.
Digital Logic Families: RTL, TTL, ECL, IIL, CMOS and their comparison table of Characteristic.

UNIT-V: **Semiconductor memories and Programmable Logic Devices**

Memory organization and operation, expanding memory size, characteristics of memories, RAM (SRAM, DRAM) and ROM (EEPROM). Introduction to PLDs: PLA, PAL, ROM, Basic concept of CPLD and FPGA.

Text Books:

1. M. Morris Mano and M .D. Ciletti, "Digital Design", Pearson Education.
2. R P Jain, "Modern Digital Electronics", TMH.
3. Fundamental of digital circuits by A. ANANDKUMAR, PHI Publication.

References:

1. Wakerly, "Digital Design: Principles and Practices", 3rdedition, Pearson Education, 2004.
2. Charles H. Roth, "Fundamentals of Logic Design", 4th Edition, Jaico Publication
3. Lee S.C, "Digital Circuits and Logic Design", PHI.
4. Digital Fundamentals by Morris and Mano, PHI Publication
5. Digital Fundamentals by FLOYD & JAIN, Pearson's Pub

First Year (Semester –II)
Digital Electronics Lab

BTECE203L	Digital Electronics Lab	ESC	0L- 0T - 2P	1 Credits

Teaching Scheme	Examination Scheme
Practical: 2 hr./week	Continuous Assessment: 60 Marks End Semester Exam: 40 Marks

Minimum 8-10 experiments are to be performed based on contents from syllabus

Sample List of Experiments:

1. Introduction to Digital Electronics lab- nomenclature of digital ICS, 1 specifications, study of the data sheet, concept of vcc and ground, verification of the truth tables of logic gates using TTL ICS.
2. Study of Basic logic gates and verification of truth table using ICs.
3. Implementation of the given Boolean function using logic gates in 2 both sop and pos forms.
4. To study and verify NAND as a universal gate.
5. Verification of state tables of RS flip-flop using NAND or NOR gates.
6. To design and verify operation of half adder and full adder.
7. To design and verify operation of half subtractor.
8. Implementation of 4-bit parallel adder using 7483 IC.
9. Design and verify the 4-bit synchronous counter.
10. Design and verify the 4-bit asynchronous counter.
11. Design and verify the register.

First Year (Semester –II)
Engineering Graphics

BTECE204	Engineering Graphics	BSC	2L- 0T - 0P	2 Credits

Teaching Scheme	Examination Scheme
Lecture: 2 hrs./week Tutorial: 0 hr./week	Continuous Assessment : 20 Marks Mid Semester Exam: 20 Marks End Semester Exam: 60 Marks

Course Objectives:
1. To prepare you to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.
2. To prepare you to communicate effectively
3. To prepare you to use the techniques, skills, and modern engineering tools necessary for engineering practice

Course Outcomes:
Students will be able to:
CO1: Introduce the engineering design and its place in society
CO2: Expose to the visual aspects of engineering design
CO3: Expose to engineering graphics standards
CO4: Expose to solid modelling
CO5: Expose to computer-aided geometric design
CO6: Expose to creating working drawings
CO7: Expose to engineering communication

Unit 1: Introduction to Engineering Drawing
Principles of Engineering Graphics and their significance, usage of Drawing instruments, lettering, Scales – Plain, Diagonal and Vernier Scales
Unit 2: Traditional Engineering Graphics:
Principles of Engineering Graphics; Orthographic Projection; Descriptive Geometry; Drawing Principles; Isometric Projection; Surface Development; Perspective; Reading a Drawing; Sectional Views; Dimensioning & Tolerances; True Length, Angle; intersection, Shortest Distance.
Unit 3: Computer Graphics
Engineering Graphics Software; -Spatial Transformations; Orthographic Projections; Model Viewing; Co-ordinate Systems; Multi-view Projection; Exploded Assembly; Model Viewing; Animation; Spatial Manipulation; Surface Modelling; Solid Modelling.
Unit 4: Projections
Orthographic Projections: Principles of Orthographic Projections-Conventions – Projections of Points and lines inclined to both planes; Projections of planes inclined Planes - Auxiliary Planes; Projections of Regular Solids: those inclined to both the Planes- Auxiliary Views; Draw simple annotation, dimensioning and scale.
Unit 5: Sectioning of Solids, Isometric Projections
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. Dhananjay A. Jolhe, Engineering Drawing with an Introduction to Autocad, Mc GrawHill Education, 2017.

First Year (Semester –II)
Engineering Graphics Lab

BTECE204L	Engineering Graphics Lab	BSC	0L- 0T - 2P	1 Credits

Teaching Scheme	Examination Scheme
Practical: 2 hr./week	Continuous Assessment: 60 Marks End Semester Exam: 40 Marks

Minimum 8-10 experiments are to be performed based on contents from syllabus

Sample List of Experiments:

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.

First Year (Semester –II)

Fundamentals of Python Programming

BTECE205	**Fundamentals of Python Programming**	**ESC**	**2L- 0T -0P**	**2 Credits**

Teaching Scheme	**Examination Scheme**
Lecture: 2 hrs./week	Continuous Assessment : 40 Marks End Semester Exam: 60 Marks (Duration 03 hrs.)

Pre-Requisites: Programming in C.

Course Objectives:

1	Providing a strong foundation of fundamental basics of programming using python
2	Demonstrating awareness and fundamental understanding of various data types in python
3	Demonstrating python programming for the networking and GUI applications
4	Testing of Python programs for given data.

Course Outcomes: After completion of the course, students will be able to

CO1	Demonstrate use of python tokens in various IDEs.
CO2	Develop python program to demonstrate use of operators.
CO3	Use control flow statements to solve given problem statement
CO4	Describe functions and packages in python programming.
CO5	Develop python program to demonstrate use of classes, objects and GUI tools.

Course Contents:

UNIT I. Introduction and Python Installation [6 Hours]

Introduction: History of Python, Need of Python, Features of Python, Comparison with C and Java, Python Building Blocks: Keywords, Identifiers, Variables, Comments, Docstring, Indentation, Input-Output.

Python Installation: Python Installation with 3.x version, Working with various IDE: Command Prompt, IDLE, Jupyter Notebook, Google Colab, Pycharm, VS Code, Spyder.

UNIT II. Data Types, Operators and Control Flow [6 Hours]

Python Data Types: Numbers, Strings, Sequences, Declaration and Initialization.

Operators in Python: Arithmetic, Relational, Assignment, Logical, Bitwise, Membership, Identity, Operator Precedence & Associativity.

UNIT III. Control Flow [8 Hours]

Sequential, Iterative and Selective statements

if, if-elif-else, nested if-else, Loops: for, while loop, Loops using break, continue, pass.

Python Data Structures: List, Tuple, Set, Dictionary, Slicing and Comprehension operations using sequences.

UNIT IV. Python Functions and Packages [8 Hours]

Python built-in functions, Math Function, Python user-defined functions, Arguments: Actual & Formal, Default Argument, Positional Argument, Variable Length Argument, Function returning value/s, Scope of variable: Global and Local. Python packages, Introduction to PIP, Installing & Uninstalling Packages via PIP.

UNIT V. OOPS and GUI [8 Hours]

Classes and Objects, Self-variable, Methods, Constructor Method, Encapsulation, Inheritance, Polymorphism, Abstraction, Data Hiding, Method Overloading and Overriding.

GUI Programming, Turtle Graphics, TKinter, Data Compression: Need, Types.

Text Books

1. "Core Python Programming" by Dr. R. Nageswara Rao, Dreamtech Press.
2. "Python Programming: A Modern Approach", Vamsi Kurama, Pearson.
3. "Let Us Python" Yashwant Kanetkar, 4th Edition, BPB Publications.

Reference Books

1. The Complete Reference: Python- Martin C. Brown, McGraw Hill Publication.

2. Python Essential Reference, Developer's Library, David M. Beazley, 4th Edition, Addidion-Wesely Professional, ISBN: 9780672329784

COURSE CURRICULUM MAPPING WITH MOOC PLATFORM NPTEL

Sr. No	Name of Subject as per Curriculum	Course Code	Semester	SWAYAM/ NPTEL Course And Web Link	Name of Institute offering course	Relevance %	Duration of Course
1.	Python	BTECE403	Fourth	The Joy of	IIT		12

	Programming			Computing using Python	Ropar		Weeks

First Year (Semester –II)

Fundamentals of Python Programming Lab

BTECE205L	Fundamentals of Python Programming Lab	ESC	0L- 0T - 2P	1 Credits

Teaching Scheme	Examination Scheme
Practical: 2 hr./week	Continuous Assessment: 60 Marks

	End Semester Exam: 40 Marks

(Minimum 08 to 10 experiments are to be performed based on contents in syllabus)

Sample List of Experiments:

1* To Study Python Installation in Windows operating system and Practice Execution of python statements in REPL (Shell) & IDLE.

2* To write & perform python program using operators

3 To perform Python program to demonstrate use of conditional statements.

4* To perform Python program to demonstrate use of looping statements.

5* Write Python program to perform various operations on Lists and Tuples.

6* Write Python program to perform various operations on Sets and Dictionaries

7 Develop user defined Python function for given problem.

8 Demonstrate use of PIP for installing and Uninstalling various packages.

9 Demonstration of Object Oriented concepts like class, objects, inheritances.

10 Demonstration of Object Oriented concepts like Inheritances.

11 Building your first Python GUI Application using TKinter

a. Displaying Text and Images With Label Widgets
b. Displaying Clickable Buttons With Button Widgets

12* Mini-Project

*Note: * indicates practical is mandatory*

First Year (Semester –II)
Design Thinking

BTECE207	**Design Thinking**	**VSEC**	**2L- 0T - 0P**	**2 Credits**

Teaching Scheme	**Examination Scheme**
Lecture: 2hrs/week Tutorial: 0 hr./week Practical: 0 hr./week	Continuous Assessment: 60 Marks End Semester Exam: 40 Marks

Course Objective:

The objective of this Course is to provide the new ways of creative thinking and Learn the innovation cycle of Design Thinking process for developing innovative products which useful for a student in preparing for an engineering career.

Course Outcomes (CO):

After completion of this course, students will be able to:

CO1. Compare and classify the various learning styles and memory techniques and apply them in their engineering education.

CO2. Analyze emotional experience and Inspect emotional expressions to better understand users while designing innovative products.

CO3. Develop new ways of creative thinking and learn the innovation cycle of Design Thinking process for developing innovative products.

CO4. Propose real-time innovative engineering product designs and Choose appropriate frameworks, strategies, techniques during prototype development.

CO5. Perceive individual differences and its impact on everyday decisions and further create a better customer experience.

COURSE CONTENTS:

UNIT-I: An Insight to Learning and Remembering:

Memory Understanding the Learning Process, Kolb‘s Learning Styles, Assessing and Interpreting, Understanding the Memory process, Problems in retention, Memory enhancement techniques

UNIT-II: Emotions and Basics of Design Thinking

Understanding Emotions: Experience & Expression, Assessing Empathy, Application with Peers, Definition of Design Thinking, Need for Design Thinking, Objective of Design Thinking, Concepts & Brainstorming, Stages of Design Thinking Process (explain with examples) –Empathize, Define, Ideate, Prototype, Test.

UNIT-III: Problem Fixing and Process of Product Design

Understanding Creative thinking process, Understanding Problem Solving, Testing Creative Problem Solving, Process of Engineering Product Design, Design Thinking Approach, Stages of Product Design, Examples of best product designs and functions, Assignment – Engineering Product Design.

UNIT-IV: Prototyping & Testing

What is Prototype? Why Prototype? Rapid Prototype Development process, Testing, Sample

Example, Test Group Marketing.

UNIT-V: Design Thinking & Customer Centricity

Practical Examples of Customer Challenges, Use of Design Thinking to Enhance Customer Experience, Parameters of Product experience, Alignment of Customer Expectations with Product Design.

Text books:

1. Karmic Design Thinking by Prof. Bala Ramadurai
2. Muhammad Mashhood Alam, Transforming an Idea into Business with Design Thinking, First Edition, Taylor and Francis Group, 2019.
3. S. Balarara, Thinking Design, Sage Publications, 2011.

Reference books:

1. Tim Brown, Change by Design. How Design Thinking Transforms Organizations end Inspires Innovation, HarperCollins e-books, 2009.
2. Michael Lewrick, Patrick Link, Larry Leifer, fire Design Thinking Toolbox, John Wiley & Sons, 2020.
3. Michael Lewrick, Patrick Link, Larry Leifer, The Design Thinking Playbook, John Wiley & Sons, 2018.
4. Kristin Fontichiaro, Design Thinking, Cherry Lake Publishing, USA, 2015.
5. Walter Brenner, Falk Uebemickel, Design Thinking for Innovation - Research and Practice, Springer Series, 2016.
6. Gavin Ambrose, Paul Hands, Design Thinking, AVA Publishing, 2010.

First Year (Semester –II)
Integrated Personality Development

BTECE208A	**Integrated Personality Development**	**CC**	**1L- 0T - 2P**	**2 Credits**

Teaching Scheme	**Examination Scheme**
Lecture: 1 hrs./week Tutorial: 0 hr./week Practical: 2 hrs./week	Continuous Assessment: 60 Marks End Semester Exam: 40 Marks

Course Introduction: The Need for Values
Students will learn about the need for values as part of their holistic development to become successful in their many roles - as ambitious students, reliable employees, caring family members, and considerate citizens.

Course Outcomes:
After completion of this course, students will be able to:

CO1. To provide students with soft skills that complement their hard skills, making them more marketable when entering the workforce.
CO2. To enhance awareness of India's glory and global values, and to create considerate citizens who strive for the betterment of their family, college, workforce, and nation.
CO3. To inspire students to strive for a higher sense of character by learning from role models who have lived principled, disciplined, and value-based lives.

Course Content:

Unit		**Description**
1	**Module**: Remaking Yourself **Subject** : Begin with the End in Mind	Students will learn to visualize there future goals and will structure their lives through smart goals to give themselves direction and ultimately take them to where they want to go.
	Module: Remaking Yourself **Subject** : Being Addiction: Free	Students will explore the detrimental effects of addictions on one's health, personal life, and family life. They will learn how to take control of their life by becoming addiction free
	Module: Selfless Service **Subject** : Case Study: Disaster Relief	Students will apply previous lessons of seva to analyze the case study of the Bhuj earthquake: relief work.
	Module: Soft Skills **Subject** : Teamwork & Harmony	Students will learn the six steps of teamwork and harmony that are essential for students': professional and daily life.
	Module: My India My Pride **Subject** : Present Scenario	To implement the transformation of India from a developing country into a developed country it is necessary to have a value-based citizen Students will see how the transformation to a Greater India relies on the vision and efforts of themselves as a youth.

	Module: Learning from Legends **Subject** : Leading Without Leading	Students will explore a new approach to Leadership through humility.
	Module: My India My Pride **Subject** : An ideal Citizen -1	Students will learn that to become value-based citizens, they must first develop good values in their lives They start by exploring the values of responsibility and integrity
	Module: My India My Pride **Subject** : An ideal Citizen -2	Students will learn that by developing the values of loyalty, sincerity, and punctuality, they became indispensable and can leave a strong impression, They will start developing these values by trying to keep perfection in every small task and by looking at the bigger picture.
2	**Module**: Facing Failures **Subject** : Timeless Wisdom for Daily Life	Students will learn the role wisdom plays in finding long-term stability. They will use ancient wisdom to solve their modern-day challenges.
	Module: From House to Home **Subject** : Forgive & Forget	Students will understand the importance and benefits that forgiveness plays in their personal and professional life. They will learn to apply this knowledge in realistic situations
	Module: Remaking Yourself **Subject** : Stress Management	Students will learn to cope with current and future causes of stress.
	Module: Remaking Yourself Subject : Better Health Setter Future	A healthy body prevents disease and stress: increases positivity, productivity, and brainpower. Students will learn to maintain good health through regular exercise, healthy eating habits, and regular and sufficient sleep.
	Module: Learning from Legends Subject : Words of Wisdom	A panel of learned and experienced mentors will personally answer practical questions that students face in them daily life.
	Module: Soft Skits Subject : Financial Planning	Students will develop a variety of practical financial skills that prepare them to become financially stable throughout their future careers.
	Module: Remaking Yourself Subject : Impact of Company	Students will understand that the type of company that we keep, has a crucial rale in determining who we are and who we will become. They will develop the ability to create a positive environment around them.
	Life After IPDC	This concluding lecture encourages students to keep practising these priceless lessons and prepares them for the next steps in their lives

COURSE MATERIAL / MAIN COURSE WORKBOOK –

There will be one workbook for each semester. Each workbook will be Presented and designed by BAPS IPDC Team. These official workbooks would be the course-material for study of IPDC. These workbooks will solve the purpose of study, submission and viva for students.

1. IPDC Workbook-2 (presented by B.A.P.S. Swaminarayan Sanstha)

First Year (Semester –II)
NSS-II

BTECE208B	**NSS-II**	**CC**	**1L- 0T - 2P**	**2 Credits**

Teaching Scheme	**Examination Scheme**
Lecture: 1 hrs./week Tutorial: 0 hr./week Practical: 2 hrs./week	Continuous Assessment: 60 Marks End Semester Exam: 40 Marks

Unit 1: Life Competencies and skill

Definition and importance of life competencies, Communication, Inter Personal, Problem solving and decision making, Positive thinking, Self-confidence and self-esteem, Life goals, Stress and time management

Unit 2: Social Harmony and National Integration

Indian history and culture, Role of youth in peace-building and conflict resolution, Role of youth in Nation building

Unit 3: Youth Development Programmes in India

National Youth Policy, Youth development programmes at the National Level, State Level and voluntary sector, Youth-focused and Youth-led organizations

First Year (Semester –II)
Health and Wellness

BTECE208C	**Health and wellness**	**CC**	**1L- 0T - 2P**	**2 Credits**

Teaching Scheme	**Examination Scheme**
Lecture: 1 hrs./week Tutorial: 0 hr./week Practical: 2 hrs./week	Continuous Assessment: 60 Marks End Semester Exam: 40 Marks

Course Objectives:

1. To systematically addresses the issues of health, adjustment and well-being.
2. To provide insights from the field of psychology to make your life more satisfying and meaningful.

Course Outcomes:

Students will be able to:

CO1: Learn how to deal with mental distress and disorders

CO2: Understand and enhance positive mental health and wellbeing particularly in the field of psychology.

CO3: Gain happiness and well-being theory and research to enrich the understanding of both negative and positive side of human behaviour.

Unit 1: Psychology of happiness

What is happiness? What makes us happy? Socio-economic factors and happiness; Positive emotions

Unit 2: Can we become happier?

Genetic set-point and hedonic adaptation; Sustainable happiness model and intentional activities

Unit 3: Happiness Activities 1

Expressing gratitude and positive thinking; Love and kindness; Avoiding overthinking and social comparison

Unit 4: Happiness Activities 2

Identifying signature strengths; Achieving happiness with “Flow”.

Unit 5: Is happiness sufficient?

The concept of eudaimonic well-being; Self-determination and motivation

Reference:

1. W. Weiten, and M. A. Lloyd, Psychology Applied to Modern Life: Adjustment in the 21st Century, Wadsworth Publishing, 2007
2. R. Harington, Stress, Health and well-being: Thriving in the 21st century, Wadsworth Publishing, 2013.
3. I. Boniwell, Positive psychology in a nutshell, McGraw-Hill Education, 2012.

4. S. Lyubomirsky, The how of happiness, Penguine Press, 2008.

Alternative NPTEL/SWAYAM Course:

S. No.	NPTEL Course Name	Instructor	Host Institute
1	Psychology of Stress, Health and Well-being	Prof. Dilwar Hussain	IIT Guwahati