SCHEME OF TEACHING AND EXAMINATION

VISVESVARAYA TECHNOLOGICAL UNIVERSITY, BELAGAVI
Scheme of Teaching and Examination 2018 – 19
Choice Based Credit System (CBCS)
(Effective from the academic year 2018 – 19)

I SEMESTER Bachelor of Engineering

Three week mandatory non- credit Induction Program

For the UG students entering the Institution, right at the start. Normal classes start only after the Induction program is completed.

Preamble

Engineering Institutions are set up to generate well trained manpower in engineering with a feeling of responsibility towards oneself, one's family, society and Nation. However, often, the aspirants 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.

Students, who enter an Institution, will have diversethoughts, backgrounds and perceptions. It is important to help them adjust to the 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, and inculcate in them the ethos of the institution with a sense of larger purpose.

The graduating student must have knowledge and skills in the area of his study. Character needs to be nurtured as an essential quality by which he/she would understand and fullfill his/her responsibility as an engineer, a citizen and a human being. Besides the above, several meta-skills and underlying values are needed.

Therefore, a Program is needed to

- Help the newly joined students feel comfortable
- Sensitize them towards exploring their academic interests and activities
- Train them to work for excellence
- Build relations between teachers and students
- Impart a broader view of life
- Build character
- Develop awareness and sensitivity to Human Values
- Create feeling of equality, compassion and oneness
- Develop attention to society and nature

An induction program for the UG students entering the institution, right at the start, serves the purpose. The program also makes them reflect on their relationship with their families and extended family environment 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 seek help.

The Induction Program can also be used to rectify some critical lacunas, for example, English background, for those students who have deficiency in it.

Activities of the induction program

Induction program includes

Physical Activity, Creative Arts, Universal Human Values, Literary, Proficiency Modules, Lectures by Eminent People, Visits to Local Area, Familiarization to Department/Branch and Innovations, etc.

For more details refer to "A Guide to Induction Program", Page – 31, Model Curriculum for Undergraduate Degree Courses in Engineering and Technology, January 2018, Volume I.

VISVESVARAYA TECHNOLOGICAL UNIVERSITY, BELAGAVI
Scheme of Teaching and Examination 2018 – 19
Choice Based Credit System (CBCS)
(Effective from the academic year 2018 – 19)

I SEMESTER B.E./B.Tech (PHYSICS GROUP)

Sl. No	Course and Course Code		Course Title	Teaching Department	Paper Setting Board	Teaching Hours /Week			Examination				Credits
						Theory Lecture	Tutorial	Practical/ Drawing	Duration in hours	SEE Marks	CIE Marks	Total Marks	
1	BS	18MAT11	Engineering Mathematics -I	Mathematics	Basic Science	3	1	--	03	60	40	100	4
2	BS	18PHY12	Engineering Physics	Physics	Basic Science	3	1	--	03	60	40	100	4
3	ES	18ELE13	Basic Electrical Engineering	E and E Engineering	E and E Engineering	2	1	--	03	60	40	100	3
4	ES	18CIV14	Civil Engineering and Mechanics	Civil Engineering	Civil Engineering	2	1	--	03	60	40	100	3
5	ES	18EGDL15	Engineering Graphics and Design	ME, Auto, IP, IEM, Mfg Engineering	Mechanical Engineering	1	--	3	03	60	40	100	2.5
6	BS	18PHYL16	Engineering Physics Laboratory	Physics	Basic Science	--	--	3	03	60	40	100	1.5
7	ES	18ELEL17	Basic Electrical Engineering Laboratory	E and E Engineering	E and E Engineering	--	--	2	03	60	40	100	1.0
					TOTAL	11	04	08	21	420	280	700	19

Note: BS: Basic Science, ES: Engineering Science.

II SEMESTER B.E./B.Tech (CHEMISTRY GROUP)

Sl. No	Course Code		Course Title	Teaching Department	Paper Setting Board	Teaching Hours /Week			Examination				Credits
						Theory Lecture	Tutorial	Practical/ Drawing	Duration in hours	SEE Marks	CIE Marks	Total Marks	
1	BS	18MAT21	Engineering Mathematics -II	Mathematics	Basic Science	3	1	--	03	60	40	100	4
2	BS	18CHE22	Engineering Chemistry	Chemistry	Basic Science	3	1	--	03	60	40	100	4
3	ES	18CPPS23	C Programming for Problem Solving	Computer Science and Engineering	Computer Science and Engineering	2	1	--	03	60	40	100	3
4	ES	18ELN24	Basic Electronics	ECE/E and I/ TC	E and C Engineering	2	1	--	03	60	40	100	3
5	BS	18CHEL25	Engineering Chemistry Laboratory	Chemistry	Basic Science	--	--	3	03	60	40	100	1.5
6	ES	18CPL26	Computer Programming Laboratory	Computer Science and Engineering	Computer Science and Engineering	--	--	2	03	60	40	100	1
7	ES	18WMPL27	Workshop /Manufacturing Practices	ME, Auto, IP, IEM, Mfg Engineering	Mechanical Engineering	1	--	3	03	60	40	100	2.5
8	Hu	18EGH28	English	Humanities	Humanities	1	--	2	02	60	40	100	2
					TOTAL	12	04	10	23	480	320	800	21

Note: BS: Basic Science, ES: Engineering Science, Hu: Humanity and Social Science.

VISVESVARAYA TECHNOLOGICAL UNIVERSITY, BELAGAVI
Scheme of Teaching and Examination 2018 – 19
Choice Based Credit System (CBCS)
(Effective from the academic year 2018 – 19)

I SEMESTER B.E./B.Tech (CHEMISTRY GROUP)

Sl. No	Course Code		Course Title	Teaching Department	Paper Setting Board	Teaching Hours /Week			Examination				Credits
						Theory Lecture	Tutorial	Practical/ Drawing	Duration in hours	SEE Marks	CIE Marks	Total Marks	
1	BS	18MAT11	Engineering Mathematics -I	Mathematics	Basic Science	3	1	--	03	60	40	100	4
2	BS	18CHE12	Engineering Chemistry	Chemistry	Basic Science	3	1	--	03	60	40	100	4
3	ES	18CPPS13	C Programming for Problem Solving	Computer Science and Engineering	Computer Science and Engineering	2	1	--	03	60	40	100	3
4	ES	18ELN14	Basic Electronics	ECE/E and I/ TC	E and C Engineering	2	1	--	03	60	40	100	3
5	BS	18CHEL15	Engineering Chemistry Laboratory	Chemistry	Basic Science	--	--	3	03	60	40	100	1.5
6	ES	18ECPL16	Computer Programming Laboratory	Computer Science and Engineering	Computer Science and Engineering	--	--	2	03	60	40	100	1
7	ES	18WMPL17	Workshop/ Manufacturing Practices	ME, Auto, IP, IEM, Mfg Engineering	Mechanical Engineering	1		3	03	60	40	100	2.5
					TOTAL	11	04	08	21	420	280	700	19

Note: BS: Basic Science, ES: Engineering Science.

II SEMESTER B.E./B.Tech (PHYSICS GROUP)

Sl. No	Course Code		Course Title	Teaching Department	Paper Setting Board	Teaching Hours /Week			Examination				Credits
						Theory Lecture	Tutorial	Practical/ Drawing	Duration in hours	SEE Marks	CIE Marks	Total Marks	
1	BS	18MAT21	Engineering Mathematics -II	Mathematics	Basic Science	3	1	--	03	60	40	100	4
2	BS	18PHY22	Engineering Physics	Physics	Basic Science	3	1	--	03	60	40	100	4
3	ES	18ELE23	Basic Electrical Engineering	E and E Engineering	E and E Engineering	2	1	--	03	60	40	100	3
4	ES	18CIV24	Civil Engineering and Mechanics	Civil Engineering	Civil Engineering	2	1	--	03	60	40	100	3
5	ES	18EGDL25	Engineering Graphics and Design	ME, Auto, IP, IEM, Mfg Engineering	Mechanical Engineering	1	--	3	03	60	40	100	2.5
6	BS	18PHYL26	Engineering Physics Laboratory	Physics	Basic Science	--	--	3	03	60	40	100	1.5
7	ES	18ELEL27	Basic Electrical Engineering Laboratory	E and E Engineering	E and E Engineering	--		2	03	60	40	100	1.0
8	Hu	18EGH28	English	Humanities	Humanities	1		2	02	60	40	100	2
					TOTAL	12	04	10	23	480	320	800	21

Note: BS: Basic Science, ES: Engineering Science, Hu: Humanity and Social Science.

VISVESVARAYA TECHNOLOGICAL UNIVERSITY, BELAGAVI

SCHEME OF TEACHING AND EXAMINATION - 2018-19

B.E./B.Tech Name of the programme

CHOICE BASED CREDIT SYSTEM (CBCS)

III SEMESTER

Sl. No	Course (Subject) code	Course (Subject)	Course Title	Teaching Department	Teaching Hours /Week			Examination				Credits
					Theory	Tutorial	Practical/ Drawing	Duration in hours	CIE Marks	SEE Theory/ Practical Marks	Total Marks	
1	18MAT31	BS	Mathematics (Title as per the decision of BoS Basic Sciences)	Mathematics	2	1	--	03	40	60	100	3
2	18XX32	PC	Professional Core-1		3	1	--	03	40	60	100	4
3	18XX33	PC	Professional Core-2		3	0	--	03	40	60	100	3
4	18XX34	PC	Professional Core-3		3	0	--	03	40	60	100	3
5	18XX35	PC	Professional Core-4		3	0	--	03	40	60	100	3
6	18XX36	PC	Professional Core-5		3	0	--	03	40	60	100	3
7	18XXL37	PC	Laboratory		--	1	2	03	40	60	100	2
8	18XXL38	PC	Laboratory		--	1	2	03	40	60	100	2
9	18XX39	Hu	Kannada/CIPH	Hum	1	--	--	02	40	60	100	1
				TOTAL	**18**	**04**	**04**	**26**	**360**	**540**	**900**	**24**
Course prescribed to lateral entry Diploma holders admitted to III semester of Engineering programs												
10	18XX	NCMC	Advance Mathematics - I	Mathematics	03	--		03	40	60	100	0

(a)The mandatory non – credit courses Advance Mathematics- I and II prescribed at III and IV semesters respectively, to lateral entry Diploma holders admitted to III semester of BE/B.Tech programs shall compulsorily be registered during respective semesters to complete all the formalities of the course and appear for University examination.

(b)The mandatory non – credit courses Advance Mathematics I and II, prescribed to lateral entrant Diploma holders admitted to III semester of BE/B.Tech programs, are to be completed to secure eligibility to VII semester. However, they are not considered for vertical progression from II year to III year of the programme.

Note: BS: Basic Science, PC: Professional core. Hu: Humanities, NCMC: Non-credit mandatory course.

VISVESVARAYA TECHNOLOGICAL UNIVERSITY, BELAGAVI

SCHEME OF TEACHING AND EXAMINATION - 2018-19

B.E./B.Tech Name of the programme

CHOICE BASED CREDIT SYSTEM (CBCS)

IVSEMESTER

Sl. No	Course (Subject) code	Course (Subject)	Course Title	Teaching Department	Teaching Hours /Week			Examination				Credits
					Theory	Tutorial	Practical/ Drawing	Duration in hours	CIE Marks	SEE Theory/ Practical Marks	Total Marks	
1	18MAT41	BS	Mathematics (Title as per the decision of BoS Basic Sciences)	Mathematics	2	1	--	03	40	60	100	3
2	18XX42	PC	Professional Core-1		3	1	--	03	40	60	100	4
3	18XX43	PC	Professional Core-2		3	0	--	03	40	60	100	3
4	18XX44	PC	Professional Core-3		3	0	--	03	40	60	100	3
5	18XX45	PC	Professional Core-4		3	0	--	03	40	60	100	3
6	18XX46	PC	Professional Core-5		3	0	--	03	40	60	100	3
7	18XXL47	PC	Laboratory		--	1	2	03	40	60	100	2
8	18XXL48	PC	Laboratory		--	1	2	03	40	60	100	2
9	18XX49	HU	Kannada/CIPH	Hum	1	--	--	02	40	60	100	1
				TOTAL	**18**	**04**	**04**	**26**	**360**	**540**	**900**	**24**
Course prescribed to lateral entry Diploma holders admitted to III semester of Engineering programs												
10	18XX	NCMC	Advance Mathematics - II	Mathematics	03	--		03	40	60	100	0

(a) The mandatory non – credit courses Advance Mathematics-I and II prescribed at III and IV semesters respectively, to lateral entrant Diploma holders admitted to III semester of BE/B.Tech programs shall compulsorily be registered during respective semesters to complete all the formalities of the course and appear for University examination.

(b)The mandatory non – credit courses Advance Mathematics I and II, prescribed to lateral entrant Diploma holders admitted to III semester of BE/B.Tech programs, are to be completed to secure eligibility to VII semester. However, they are not considered for vertical progression from II year to III year of the programme.

Note: BS: Basic Science, PC: Professional core. Hu: Humanities, NCMC: Non-credit mandatory course.

VISVESVARAYA TECHNOLOGICAL UNIVERSITY, BELAGAVI

SCHEME OF TEACHING AND EXAMINATION - 2018-19

B.E./B.Tech Name of the programme

CHOICE BASED CREDIT SYSTEM (CBCS)

V SEMESTER

Sl. No	Course (Subject) code	Course (Subject)	Course Title	Teaching Department	Teaching Hours /Week			Examination				Credits
					Theory	Tutorial	Practical/ Drawing	Duration in hours	CIE Marks	SEE Theory/ Practical Marks	Total Marks	
1	18XX51	Hu	Management and Entrepreneurship (title as per BOS decision)	Hu	2	1	--	03	40	60	100	3
2	18XX52	PC	Professional Core-1		3	1	--	03	40	60	100	4
3	18XX53	PC	Professional Core-2		3	1	--	03	40	60	100	4
4	18XX54	PC	Professional Core-3		3	1	--	03	40	60	100	4
5	18XX55	PC	Professional Core-4		3	--	--	03	40	60	100	3
6	18XX56	PC	Professional Core-5		3	--	--	03	40	60	100	3
7	18XXL57	PC	Laboratory		--	1	2	03	40	60	100	2
8	18XXL58	PC	Laboratory		--	1	2	03	40	60	100	2
9	18XX59	NCMC	CIV	Hu	2	--	--	--	--	--	--	0
				TOTAL	**19**	**5**	**4**	**24**	**320**	**480**	**800**	**25**

Mini-project: To be carried out during the intervening vacations of V and VI semesters. The University examination will be conducted during VI semester. The credit prescribed for mini – project is added to VI semester credits. The mini-project is considered as a head of passing and is considered for the award of degree. Those, who do not take-up/complete the mini-project will be declared as failed and have to complete during subsequent University examination after satisfy the internship requirements. Also, mini-project is considered for eligibility to VII semester.

Note: Hu: Humanities, PC: Professional core, NCMC: Non-credit mandatory course.

VISVESVARAYA TECHNOLOGICAL UNIVERSITY, BELAGAVI

SCHEME OF TEACHING AND EXAMINATION - 2018-19

B.E./B.Tech Name of the programme

CHOICE BASED CREDIT SYSTEM (CBCS)

VI SEMESTER

Sl. No	Course (Subject) code	Course (Subject)	Course Title	Teaching Department	Teaching Hours /Week			Examination				Credits
					Theory	Tutorial	Practical/ Drawing	Duration in hours	CIE Marks	SEE Theory/ Practical Marks	Total Marks	
1	18XX61	PC	Professional Core-1	Hum	3	1	--	03	40	60	100	4
2	18XX62	PC	Professional Core-2		3	1	--	03	40	60	100	4
3	18XX63X	PE	Elective -1		2	1	--	03	40	60	100	3
4	18XX64X	PE	Elective -2		3	--	--	03	40	60	100	3
5	18XX65X	OE	Elective -A		3	--	--	03	40	60	100	3
6	18XXL66	PC	Laboratory		--	1	2	03	40	60	100	2
7	18XXL67	PC	Laboratory		--	1	2	03	40	60	100	2
8	18XXMP68	MP	Mini-project	(Completed during the intervening vacations of V and VI semesters)				03	40	60	100	3
9	18XXMI69	INT	Internship	(To be carried out during the intervening vacations of VI and VII semesters)				--	--	--	--	--
				TOTAL	**14**	**5**	**4**	**24**	**320**	**480**	**800**	**24**

Note: PC: Professional core, PE: Professional Elective, OE: Open Elective, MP: Mini-project, INT: Internship.

Internship: All the students admitted to III year of BE/B.Tech have to undergo mandatory internship of 4 weeks during the vacations of VI and VII semesters and /or VII and VIII semesters. A University examination will be conducted during VIII semester and prescribed credit are added to VIII semester. Internship is considered as a head of passing and is considered for the award of degree. Those, who do not take-up/complete the internship will be declared as failed and have to complete during subsequent University examination after satisfy the internship requirements.

Electives

Course code	Professional Electives - 1
18XX631	
18XX632	
18XX633	

Course code	Professional Electives -2
18XX641	
18XX642	
18XX643	

Open Elective -A

Students can select any one of the open electives (Please refer to consolidated list of VTU for open electives)offered by any Department.

Candidate may be offered with an open elective,

- If the candidate has not studied the same course during the earlier courses of the program.
- The syllabus content of open elective is not similar to that of Departmental core courses or professional electives.
- A similar course, under any category, is not prescribed in the higher semesters of the programme.

Registration to electives shall be documented under the guidance of Programme Coordinator/ Adviser/Mentor.

VISVESVARAYA TECHNOLOGICAL UNIVERSITY, BELAGAVI

SCHEME OF TEACHING AND EXAMINATION - 2018-19

B.E./B.Tech Name of the programme

CHOICE BASED CREDIT SYSTEM (CBCS)

VII SEMESTER

Sl. No	Course (Subject) code	Course (Subject)	Course Title	Teaching Department	Teaching Hours /Week			Examination				Credits
					Theory	Tutorial	Practical/ Drawing	Duration in hours	CIE Marks	SEE Theory/ Practical Marks	Total Marks	
1	18XX71	PC	Professional Core-1	Hum	4	--	--	03	40	60	100	4
2	18XX72X	PE	Elective -3		3	--	--	03	40	60	100	3
3	18XX73X	PE	Elective -4		3	--	--	03	40	60	100	3
4	18XX74X	OE	Elective -B		3	--	--	03	40	60	100	3
5	18XXL75	PC	Laboratory			--	2	03	40	60	100	1
6	18XXP76	Project	Project Work Phase - 1		--	--	2	03	40	60	100	2
7	18XXI77	INT	Internship	(If not completed after VI semester examinations, it has to be carried out during the intervening vacations of VII and VIII semesters)				--	--	--	--	--
			TOTAL		**13**	**--**	**4**	**24**	**240**	**360**	**600**	**16**

Note: PC: Professional core, PE: Professional Elective, OE: Open Elective, INT: Internship.

Internship: All the students admitted to III year of BE/B.Tech have to undergo mandatory internship of 4 weeks during the vacations of VI and VII semesters and /or VII and VIII semesters. A University examination will be conducted during VIII semester and prescribed credit are added to VIII semester. Internship is considered as a head of passing and is considered for the award of degree. Those, who do not take-up/complete the internship will be declared as failed and have to complete during subsequent University examination after satisfy the internship requirements.

Electives

Course code	Professional Electives - 3
18XX721	
18XX722	
18XX723	

Course code	Professional Electives - 4
18XX731	
18XX732	
18XX733	

Open Elective -B

Students can select any one of the open electives (Please refer to consolidated list of VTU for open electives)offered by any Department.

Candidate may be offered with an open elective,

- If the candidate has not studied the same course during the earlier courses of the program.
- The syllabus content of open elective is not similar to that of Departmental core courses or professional electives.
- A similar course, under any category, is not prescribed in the higher semesters of the programme.

Registration to electives shall be documented under the guidance of Programme Coordinator/ Adviser/Mentor.

VISVESVARAYA TECHNOLOGICAL UNIVERSITY, BELAGAVI

SCHEME OF TEACHING AND EXAMINATION - 2018-19

B.E./B.Tech Name of the programme

CHOICE BASED CREDIT SYSTEM (CBCS)

VIII SEMESTER

Sl. No	Course (Subject) code	Course (Subject)	Course Title	Teaching Department	Teaching Hours /Week			Examination				Credits
					Theory	Tutorial	Practical/ Drawing	Duration in hours	CIE Marks	SEE Theory/ Practical Marks	Total Marks	
1	18XX81	PC	Professional Core-1		4	--	--	03	40	60	100	4
2	18XX82X	PE	Elective -5		3	--	--	03	40	60	100	3
3	18XX83X	OE	Elective -C		3	--	--	03	40	60	100	3
4	18XXP84	Project	Project Work Phase - 2		--	--	2	03	40	60	100	8
5	18XXS85	Seminar	Technical Seminar		--	--	2	03	40	60	100	1
6	18XXl86	INT	Internship	(Completed during the intervening vacations of VI and VII semesters and /or VII and VIII semesters.)				03	40	60	100	3
			TOTAL		**10**	**--**	**4**	**18**	**240**	**360**	**600**	**22**

Note: PC: Professional core, PE: Professional Elective, OE: Open Elective, INT: Internship.

Electives

Course code	Professional Electives - 5
18XX821	
18XX822	
18XX823	

Open Elective -C

Students can select any one of the open electives (Please refer to consolidated list of VTU for open electives)offered by any Department. Candidate may be offered with an open elective,

- The candidate has not studied the same course during Ito VIIsemesters of the programme.
- The syllabus content of open elective is not similar to that of Departmental core courses or professional electives.

Registration to electives shall be documented under the guidance of Programme Coordinator/ Adviser/Mentor.

VISVESVARAYA TECHNOLOGICAL UNIVERSITY, BELAGAVI

PROPOSED UG SYLLABUS FOR 2018-2022

ENGINEERING MATHEMATICS-I

(Common to all branches)
[As per Choice Based Credit System (CBCS) scheme]
(Effective from the academic year 2018-19)

Course Code : 18MAT11	**CIE Marks : 40**
Contact Hours/Week : 04(3L+1T)	**SEE Marks: 60**
Total Hours:50 (8L+2T per module)	**Exam Hours : 03**
Semester : I	**Credits: 04**

Course Learning Objectives: This course (**18MAT11**) will enable students to master the basic tools of differential & integral calculus, differential equations and elementary linear algebra and become skilled for solving problems in science and engineering.

MODULE-I

Differential Calculus-1:-
Review of elementary calculus, Polar curves - angle between the radius vector and tangent, angle between two curves, pedal equation. Curvature and radius of curvature- Cartesian and polar forms (without proof). Centre and circle of curvature (formulae only) –applications to evolutes and involutes.(**RBT Levels: L1 & L2)**

MODULE-II

Differential Calculus-2:-
Taylor's and Maclaurin's series expansions for one variable (statements only), indeterminate forms - L'Hospital's rule. Partial differentiation; Total derivatives-differentiation of composite functions. Maxima and minima for a function of two variables; Method of Lagrange multipliers with one subsidiary condition. Applications of maxima and minima with illustrative examples. Jacobians-Simple problems.(**RBT Levels: L1 & L2)**

MODULE-III

Integral Calculus:-
Multiple integrals: Evaluation of double and triple integrals. Evaluation of double integrals-change of order of integration and changing into polar co-ordinates. Applications to find area, volume and centre of gravity.
Beta and Gamma functions: definitions, Relation between beta and gamma functions and simple problems.(**RBT Levels: L1 & L2)**

MODULE-IV

Ordinary differential equations(ODE's)of first order:-
Exact and reducible to exact differential equations. Bernoulli's equation. Applications of ODE's-orthogonal trajectories, Newton's law of cooling and L-R circuits.
Nonlinear differential equations: Introduction to general and singular solutions; Solvable for p only; Clairaut's and reducible to Clairaut's equation only.(**RBT Levels: L1 & L2)**

MODULE-V

Elementary Linear Algebra: Rank of a matrix-echelon form. Solution of system of linear equations – consistency. Gauss-elimination method, Gauss –Jordan method and Gauss-Seidel method. Eigen values and eigen vectors- Rayleigh's power method. Diagonalization of a square matrix of order two. (**RBT Levels: L1 & L2)**

Course Outcomes: On completion of this course, students are able to:

CO1: Apply the knowledge of calculus to solve problems related to polar curves and its applications in determining the bentness of a curve.

CO2: Learn the notion of partial differentiation to calculate rates of change of multivariate functions and solve problems related to composite functions and Jacobians.

CO3: Apply the concept of change of order of integration and variables to evaluate multiple integrals and their usage in computing the area and volumes.

CO4 : Illustrate the applications of multivariate calculus to understand the solenoidal and irrotational vectors and also to exhibit the interdependence of line, surface and volume integrals.

CO5 : Make use of matrix theory for solving system of linear equations and compute eigen values and eigen vectors required for matrix diagonalization process.

Question paper pattern:

Note:- The SEE question paper will be set for 100 marks and the marks scored by the student will be proportionately reduced to 60.

- The question paper will have **ten** full questions carrying equal marks.
- Each full question carries **20** marks.
- There will be **two** full questions (with a **maximum** of **four** sub questions) from each module.
- Each full question will have sub question covering all the topics under a module.
- The students will have to answer **five** full questions, selecting **one** full question from each module.

Text Books:

1. B.S. Grewal: Higher Engineering Mathematics, Khanna Publishers, 43rd Ed., 2015.
2. E. Kreyszig: Advanced Engineering Mathematics, John Wiley & Sons, 10th Ed.(Reprint), 2016.

Reference books:

1. C.Ray Wylie, Louis C.Barrett : "Advanced Engineering Mathematics", 6th Edition, McGraw-Hill Book Co., New York, 1995.
2. N.P.Bali and Manish Goyal: A Text Book of Engineering Mathematics, Laxmi Publishers, 7th Ed., 2010.
3. B.V.Ramana: "Higher Engineering Mathematics" 11th Edition, Tata McGraw-Hill, 2010.
4. Veerarajan T.," Engineering Mathematics for First year", Tata McGraw-Hill, 2008.
5. Thomas G.B. and Finney R.L."Calculus and Analytical Geometry"9th Edition, Pearson, 2012.

Web links and Video Lectures:

1. http://nptel.ac.in/courses.php?disciplineID=111
2. http://www.class-central.com/subject/math(MOOCs)
3. http://academicearth.org/

Annexure-IV

VISVESVARAYA TECHNOLOGICAL UNIVERSITY, BELAGAVI

PROPOSED UG SYLLABUS FOR 2018-2022

ENGINEERING CHEMISTRY

(Common to all branches)
[As per Choice Based Credit System (CBCS) scheme]
(Effective from the academic year 2018-19)

Course Code: 18CHE12/22	**CIE Marks: 40**
Contact Hours/Week: 04 (3L+1T)	**SEE Marks: 60**
Total Hours: 50 (8L+2T per module)	**Exams. Hours: 03**
Semester: I/II	**Credits: 04**

Course Learning Objectives: This course (**18CHE12/22**) will enable students to master the basic knowledge of engineering chemistry for building technical competence in industries, research and development in the fields of use of free energy in chemical equilibrium, electrochemistry & water chemistry, corrosion & metal finishing, energy systems, environmental pollution, waste management and nanomaterials.

MODULES

MODULE- I: Use of free energy in chemical equilibria, Electrochemical energy systems and Corrosion

Use of free energy in chemical equilibria: Thermodynamic functions: energy, entropy and free energy. Estimations of entropy and free energies. Free energy and emf. Cell potential, the Nernst equation and applications.

Electrochemical energy systems: Reference electrodes: Introduction, construction, working and applications of calomel and Ag / AgCl electrodes. Ion selective electrode: Introduction; Construction and working of glass electrode, determination of pH using glass electrode. Concentration cells: Electrolyte concentration cells, numerical problems.

Corrosion: Introduction, electrochemical theory of corrosion, Factors affecting the rate of corrosion: ratio of anodic to cathodic areas, nature of metal, nature of corrosion product, nature of medium – pH, conductivity and temperature. Types of corrosion- Differential metal and differential aeration (Pitting and water line). Corrosion control: Metal coatings-Galvanization and Tinning.

(RBT Levels: L1 & L2)

MODULE-II: Metal finishing and Water chemistry

Metal finishing: Introduction, Technological importance. Electroplating: Introduction, principles governing metal finishing-Polarization, decomposition potential and overvoltage. Electroplating of chromium and gold. Electroless plating: Introduction, distinction between electroplating and electro less plating, electroless plating of nickel & copper.

Water Chemistry: Introduction**,** sources and impurities of water; boiler feed water, boiler troubles with disadvantages -scale and sludge formation, Boiler corrosion (due to dissolved O_2, CO_2 and $MgCl_2$). Chemical analysis of water: Chlorides, Sulphates, Fluorides and Lead. Sewage treatment: Primary and secondary (activated sludge method) methods, Softening of water by ion exchange process. Desalination of sea water by reverse osmosis.

Introduction to heavy water.

(RBT Levels: L1 & L2)

MODULE-III : Energy Systems

Chemical Fuels: Introduction, classification, determination of calorific value of solid/liquid fuel using bomb calorimeter, numerical problems. Power alcohol, unleaded petrol and biodiesel.

Energy storage systems: Introduction, classification - primary, secondary and reserve batteries. Construction, working and applications of Ni-MH and Li-ion batteries.

Fuel Cells: Introduction, differences between conventional cell and fuel cell, limitations & advantages. Construction, working & applications of methanol-oxygen fuel cell with H_2SO_4 electrolyte, Solid oxide fuel cells (SOFCs).

Solar Energy: Introduction, utilization and conversion, photovoltaic cells- construction and working. Design of PV cells: modules, panels & arrays. Advantages & disadvantages of PV cells.

(RBT Levels: L1 & L2)

MODULE IV: Environmental Pollution and Waste management

Environmental Pollution: Introduction, The atmosphere, Air pollutants: Sources, effects and control of primary air pollutants: Oxides of sulphur, Oxides of nitrogen and hydrocarbons, Particulate matter, Carbon monoxide, Mercury and Lead. Secondary air Pollutant: Ozone, Ozone depletion, The greenhouse effect, Global warming, Sources of water pollution, Sewage, Introduction to Biological oxygen demand (BOD) and Chemical Oxygen Demand (COD), Numerical problems on BOD and COD.

Waste and management: Solid Waste Management, E - Waste Management & Biomedical Waste Management -Sources, Characteristics & Disposal methods.

(RBT Levels: L1 & L2)

MODULE-V: Instrumental methods of analysis and Nanomaterials

Instrumental methods of analysis: Theory, Instrumentation and applications of Colorimetry, Potentiometry, Conductometry (Strong acid with a strong base, weak acid with a strong base, strong acid with a weak base, weak acid with a weak base, mixture of a strong acid and a weak acid vs. a strong base or a weak base, displacement or replacement titrations, precipitation titration and complex formation titration), Flame photometry, Atomic absorption spectroscopy.

Nanomaterials: Introduction, size dependent properties (Surface area, Electrical, Optical, Catalytic and Thermal properties), Synthesis of nanomaterials: Top down and bottom up approaches, Synthesis by bottom up approach: Sol-gel, precipitation and hydrothermal methods, Nano scale materials: Fullerenes and Carbon nanotubes.

(RBT Levels: L1 & L2)

Course Outcomes: On completion of this course, students will have knowledge in:

1. Use of free energy in equilibria, rationalize bulk properties and processes using thermodynamic considerations, electrochemical energy systems and causes & effects of corrosion of metals and control of corrosion.
2. Modification of surface properties of metals to develop resistance to corrosion, wear, tear, impact etc. by electroplating and electro less plating and water chemistry.
3. Production & consumption of energy for industrialization of country and living standards of people. Electrochemical and concentration cells. Classical, modern batteries and fuel cells. Utilization of solar energy for different useful forms of energy.
4. Environmental pollution and waste management.
5. Different techniques of instrumental methods of analysis.
6. Fundamental principles of nanomaterials.

Question paper pattern:

Note:- The SEE question paper will be set for 100 marks and the marks scored by the student will be proportionately reduced to 60.

- The question paper will have **ten** full questions carrying equal marks.
- Each full question consisting of **20** marks.
- There will be **two** full questions (with a **maximum** of **three** sub questions) from each module.
- Each full question will have sub question covering all the topics under each module.
- The students will have to answer **five** full questions, selecting **one** full question from each module.

Text Books:

1. P.C. Jain & Monica Jain. **"Engineering Chemistry"**, Dhanpat Rai Publications, New Delhi (Latest edition-2015).
2. B.S. Jai Prakash, R. Venugopal, Sivakumaraiah & Pushpa Iyengar, **"Chemistry for Engineering Students"**, Subhash Publications, Bengaluru (Latest edition-2015).
3. P. W. Atkins **, "Physical Chemistry"**, Oxford Publications (Eighth edition-2006).

Reference books:

1. O.G. Palanna,**"Engineering Chemistry"**, Tata McGraw Hill Education Pvt. Ltd. New Delhi, Fourth Reprint (Latest edition-2015).
2. R.V. Gadag & A. Nityananda Shetty., **"Engineering Chemistry"**, I K International Publishing House Private Ltd. New Delhi (Latest edition-2015).
3. **"Wiley Engineering Chemistry"**, Wiley India Pvt. Ltd. New Delhi. Second Edition-2013.
4. M.G. Fontana., **"Corrosion Engineering"**, Tata McGraw Hill Publishing Pvt. Ltd. New Delhi (2006).
5. Chemistry: Principles and Applications, by M. J. Sienko and R. A. Plane (1980).

Web Links and Video Lectures:

1. http://bcs.whfreeman.com/vollhardtschore5e/default.asp.
2. https://www.youtube.com/watch?v=FnJ0V7B7nKo
3. https://www.youtube.com/watch?v=6_mBFpyruNQ
4. https://www.ttu.ee/public/m/Mehaanikateaduskond/Instituudid/Materjalitehnika_instituut/MTX9100/Lecture11_Synthesis.pdf.
5. http://nptel.ac.in/courses/113108051/module1/lecture1.pdf

PROGRAMMING FOR PROBLEM SOLVING
[As Per Choice Based Credit System (CBCS) System]
(Effective from the academic year 2018 -2019)
SEMESTER – I/II

Subject Code	18PPS13/23	**CIE Marks**	40
Number of Lecture Hours/Week	4	**SEE Marks**	60
Total Number of Lecture Hours	40	**Exam Hours**	3 Hrs

CREDITS – 4

Course Objectives :

- To familiarize with writing of algorithms, fundamentals of C and philosophy of problem solving.
- To implement different programming constructs and decomposition of problems into functions.
- To use and implement data structures like arrays and structures to obtain solutions.
- To define and use of pointers with simple applications.

Module 1	**Teaching Hours**
Introduction to Programming: Introduction to components of a computer system (disks, memory, processor, where a program is stored and executed, operating system, compilers etc.). **Idea of Algorithm:** steps to solve logical and numerical problems. Representation of Algorithm: Flowchart/Pseudocode with examples. From algorithms to programs; source code, variables (with data types) variables and memory locations, Syntax and Logical Errors in compilation, object and executable code **Arithmetic expressions and precedence** **Conditional Branching and Loops:** Writing and evaluation of conditionals and consequent branching. Iteration and loops	08
Module 2	
Arrays: Arrays (1-D, 2-D), Character arrays and Strings **Basic Algorithms**: Searching, Basic Sorting Algorithms (Bubble, Insertion and Selection), Finding roots of equations, notion of order of complexity through example programs (no formal definition required)	08
Module 3	
Function: Functions (including using built in libraries), Parameter passing in functions, call by value, Passing arrays to functions: idea of call by reference	08
Module 4	
Recursion: Recursion, as a different way of solving problems. Example programs, such as Finding Factorial, Fibonacci series, Ackerman function etc. Quick sort or Merge sort.	08
Module 5	
Structure: Structures, Defining structures and Array of Structures **Pointers**: Idea of pointers, Defining pointers, Use of Pointers in self-referential structures, notion of linked list (no implementation)	08

Course Outcomes: The student will be able to :

- Write agorithms to simple problems involving logic.
- Code the simple algorithms from the different domains such as mathematics, physics, etc.
- Correct syntax and logical errors and execute the programs.
- Demonstrate problem solving skills.

Question Paper Pattern:

- The question paper will have ten questions.
- Each full Question consisting of 20 marks
- There will be 2 full questions(with a maximum of four sub questions) from each module.
- Each full question will have sub questions covering all the topics under a module.
- The students will have to answer 5 full questions, selecting one full question from each module.

Textbooks:

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India.
2. E. Balaguruswamy, Programming in ANSI C, Tata McGraw-Hill

Reference Books:

1. Vikas Gupta: Computer Concepts and C Programming, Dreamtech Press 2013.
2. R S Bichkar, Programming with C, University Press, 2012.
3. V Rajaraman: Computer Programming in C, PHI, 2013.
4. Basavaraj S. Anami, Shanmukhappa A Angadi, Sunilkumar S. Manvi, Computer Concepts and C Programming: A Holistic Approach to Learning C, Seond edition, PHI India, 2010.

BASIC ELECTRONICS

[As per Choice Based Credit System (CBCS) scheme]

SEMESTER – I/II

Course Code	**18ELN14/24**	**CIA Marks**	**40**
Number of Lecture Hours/Week	**03 (02 + 01 Tutorial)**	**SEE Marks**	**60**
Total Number of Lecture Hours	**40 (08 Hours per Module)**	**Exam Hours**	**03**

Credits – 03

Module-1

Semiconductor Diodes and Applications:

p-n junction diode, Equivalent circuit of diode, Zener Diode, Zener diode as a voltage regulator, Rectification-Half wave rectifier, Full wave rectifier, Bridge rectifier, Capacitor and Choke filter circuit (only qualitative approach). Refer 2.2, 2.3, 2.4 of Text.

Photo diode, LED, Photocoupler. Refer 2.7.4, 2.7.5, 2.7.6 of Text.

78XX based Fixed IC voltage regulator. Refer 8.4.4 and 8.4.5 of Text.

Module-2

BJT and Applications:

BJT as an amplifier, BJT as a switch, Transistor switch circuit to switch ON/OFF an LED and a lamp in a power circuit using a relay (refer 4.4 and 4.5 of Ref. Book 1)

Feedback Amplifiers – Principle, Properties and advantages of Negative Feedback, Voltage series feedback, Large Signal amplifiers-Class-B amplifier, Class AB amplifier. Refer 7.1-7.6.

Oscillators – Barkhausen's criteria for oscillation, RC Phase Shift oscillator, Wien Bridge oscillator. Refer 7.7-7.9 of Text.

Module-3

FET and other Components:

Field Effect Transistor (FET) – Construction, Operation, Transfer Characteristics, p-channel FET-construction, operation and drain characteristics, Depletion and Enhancement type Metal Oxide Semiconductor (MOSFET), Complementary Metal Oxide Semiconductor (CMOS).

Refer 4.2 (except 4.2.8), 4.3 and 4.5.

Silicon Controlled Rectifier (SCR) – Two-transistor model, switching action, Characteristics, Phase control application. Refer 3.4 upto 3.4.5 of Text.

Module-4
Operational Amplifiers and Applications: Introduction to Op-Amp, Differential Amplifier Configurations, Ideal Characteristics, Op-Amp parameters-CMRR, PSRR, Slew Rate, Input offset voltage, Bias current, frequency response, Pin Configuration of 741 Op-Amp, Applications-Inverting amplifier, Adder, Voltage follower, Integrator, Differentiator, Comparator. Refer 6.1, 6.2 of Text. Oscillator using IC 555. Refer 17.3 of Text.
Module-5
Digital Electronics Fundamentals: Difference between analog and digital signals, Number System-Binary, Hexadecimal, Conversion- Decimal to binary, Hexadecimal to decimal and vice-versa, Boolean algebra, Basic and Universal Gates, Full adder, Multiplexer, Decoder, SR and JK flip-flops, Shift register, Counters. Refer 10.1-10.7 of Text. Principle of operations of Mobile phone – Refer 18.18 of Text.
Text Book: D.P.Kothari, I.J.Nagarath, "Basic Electronics", 2nd edn, Mc Graw Hill, 2018.
Reference Books: 1. Thomas L. Floyd ," Electronic Devices", Pearson Education, 9th edition, 2012. 2. D.P.Kothari, I.J.Nagarath, "Basic Electronics", 1st edn, Mc Graw Hill, 2014. 3. David A. Bell, "Electronic Devices and Circuits", Oxford University Press, 5th Edition, 2008. 4. Muhammad H. Rashid, "Electronics Devices and Circuits", Cengage Learning, 2014.

ENGINEERING CHEMISTRY LABORATORY **[Annexure-IV(a)]**

[As per Choice Based Credit System (CBCS) scheme]

(Effective from the academic year 2018 -2019)

SEMESTER - I/II

Laboratory Code	18CHEL15/25	CIE Marks	40
Number of hours/week	3	SEE Marks	60
Total Number of Hours	42	Exam Hours	03

CREDITS – 1.5

Course objectives:

- To provide students with practical knowledge of quantitative analysis of materials by classical and instrumental methods for developing experimental skills in building technical competence.

Part A: Instrumental Experiments

1. Potentiometric estimation of FAS using standard $K_2Cr_2O_7$ solution.
2. Conductometric estimation of acid mixture.
3. Determination of Viscosity co-efficient of the given liquid using Ostwald's viscometer.
4. Colorimetric estimation of Copper.
5. Determination of pKa of the given weak acid using pH meter.
6. Flame photometric estimation of sodium and potassium.

Part B: Volumetric Experiments

1. Estimation of Total hardness of water by EDTA complexometric method.
2. Estimation of CaO in cement solution by rapid EDTA method.
3. Determination of percentage of Copper in brass using standard sodium thiosulphate solution.
4. Determination of COD of waste water.
5. Estimation of Iron in haematite ore solution using standard $K_2Cr_2O_7$ solution by external indicator method.
6. Determination of chloride content of water (Iodometric method)

Course outcomes:

On completion of this course, students will have the knowledge in,

- Handling different types of instruments for analysis of materials using small quantities of materials involved for quick and accurate results, and
- Carrying out different types of titrations for estimation of concerned in materials using comparatively more quantities of materials involved for good results

Conduction of Practical Examination:

1. Examination shall be conducted for 100 marks, later reduced to 60 marks.
2. All experiments are to be included for practical examination.
3. One instrumental and another volumetric experiment shall be set.
4. Different experiments shall be set under instrumental and a common experiment under volumetric.

Reference Books:

1. G.H. Jeffery, J. Bassett, J. Mendham and R.C. Denney, **"Vogel's Text Book of Quantitative Chemical Analysis"**
2. O.P. Vermani & Narula, **"Theory and Practice in Applied Chemistry"**, New Age International Publishers.
3. Gary D. Christian, **"Analytical chemistry**", 6th Edition, Wiley India.

COMPUTER PROGRAMMING LABORATORY
[As Per Choice Based Credit System (CBCS) System]
(Effective from the academic year 2018 -2019)
SEMESTER – I/II

Subject Code	18CPL16/26	**CIE Marks**	40
Number of Lecture Hours/Week	2	**SEE Marks**	60
Total Number of Lab Hours	32	**Exam Hours**	3 Hrs

Credits – 1

Course Objectives :

- To practice writing flowcharts, algorithms and programs.
- To implement basics of C programming language.
- To provide provide solutions to the laboratory programs.
- To familiarize the processes of debugging and execution.

Descriptions (if any):

- The laboratory should be preceded or followed by a tutorial to explain the approach or algorithm to be implemented / implemented for the problems given. Ensure that no built-in functions are used.

Laboratory Programs:

1.	Familiarization with programming environment, concept of naming the program files, storing, compilation, execution and debugging. Taking any simple C- code.
2.	Simple computational problems using arithmetic expressions and use of each operator leading to implementation of a Commercial calculator.
3.	Problems involving if-then-else structures. Implement different ways of finding the largest of given three positive integers.
4.	Compute the roots of a quadratic equation by accepting the coefficients.
5.	Introduce Iterative problem solving and implement Taylor series approximation to compute Sin(x).
6.	Introduce 1D/2D Array manipulation and implement bubble sort technique.
7.	Implement Matrix multiplication and ensure the rules of multiplication are checked.
8.	Use functions to check whether the given string is a Palindrome. Convince the parameter passing techniques.
9.	Implement Newton-Raphson method to find the squre root of a given positive integer. Also Cross check with implementation of long-division method.
10.	Implement structures to read, write, compute average- marks and the students scoring above and below the average marks for a class of 60 students.
11.	Implement addition of array elements using Pointers.
12.	Implement Recursive functions, namely, GCD and Binary to Decimal Conversion.

Laboratory Outcomes: The student should be able to:

- Write algorithms, flowcharts and program for simple problems.
- Correct syntax and logical errors to execute a program.
- Write iterative and wherever possible recursive programs
- Demonstrate use of functions, arrays, strings and structures in problem solving.
- Appreciate pointers and their advantages.

Conduct of Practical Examination:

- All laboratory experiments,excluding the first, are to be included for practical examination.
- Students are allowed to pick one experiment from the lot and provide equal opportunity.
- Strictly follow the instructions as printed on the cover page of answer script for breakup of marks
- Change of experiment is allowed only once and 15% Marks is deducted from the procedure part.

WORKSHOP/MANUFACTURING PRACTICES
[As per Choice Based Credit System (CBCS) scheme]
SEMESTER – I/II

Course Code	**18WMPL17/18WMPL27**	**CIA Marks**	**40**
Number of Lecture Hours/Week	**4 (1L + 3P)**	**SEE Marks**	**60**
Total Number of Lecture Hours	**56**	**Exam Hours**	**03**

CREDITS – 2.5

Course objectives:

- **To impart knowledge and skill to use tools, machines, equipment, and measuring instruments.**
- **Expose the students to the concept of fitting, welding soldering, and development of sheet metal components.**
- **Expose them to recent developments in power tools.**

Module-1

1. Use of Hand Tools: V-block, Marking Gauge, Files, Hack Saw, Drills, Taps; minimum 3 models involving triangular, square and semicircular joint.
2. Welding: Study of electric arc welding tools &equipments, Models: Butt Joint, Lap Joint, T joint & L-joint.
3. Sheet Metal & Soldering Work: Development & Soldering of the models: frustum of cone,prism (Hexagon & Pentagon), and funnel.

Module-2

1. Study & Demonstration of power tools like power drill, power hacksaw, portable hand grinding, cordless screw drivers, production air tools, wood cutter, etc., used in Mechanical Engineering (Demonstration purpose only).

Course outcomes:

At the end of the course, the student will be able to:

- **Demonstrate and produce different types of fitting models and appreciate the importance of fitting in mechanical engineering.**
- **Gain knowledge of development of sheet metal models and understand its applications.**
- **Perform soldering ofsheet metal and welding of plates.**
- **Understand the Basics of Workshop practices.**
- **Understand the recent advances in power tools.**

Scheme of Examination:

Fitting Model / Sheet Metal Work: **50 Marks**

(50% of the batch to be given Fitting and remaining 50% to be given Sheet metal work including Soldering)

Welding: 30 Marks

Viva voce: 20 Marks

Total:100 Marks

Ref Book:

1. Elements of Workshop Technology:Vol. I:Manufacturing Processes, S. K. HajraChoudhury, A. K. HajraChoudhury,15th Edition Reprinted 2013,Media Promoters &Publishers Pvt Ltd., Mumbai.

Note: No mini drafters and drawing boards required. Drawings (Developments) can be done on sketch sheets using scale, pencil and Geometrical Instruments.

VISVESVARAYA TECHNOLOGICAL UNIVERSITY, BELAGAVI

PROPOSED UG SYLLABUS FOR 2018-2022

ENGINEERING MATHEMATICS-II

(Common to all branches)
[As per Choice Based Credit System (CBCS) scheme]
(Effective from the academic year 2018-19)

Course Code : 18MAT21	**CIE Marks : 40**
Contact Hours/Week : 04(3L+1T)	**SEE Marks: 60**
Total Hours:50 (8L+2T per module)	**Exam Hours : 03**
Semester : II	**Credits: 04**

Course Learning Objectives: The purpose of the course **18MAT21** is to facilitate the students with concrete foundation of vector calculus, ordinary and partial differential equations, infinite series and numerical methods enabling them to acquire the knowledge of these mathematical tools.

MODULE-I

Vector Calculus:-
Vector Differentiation: Scalar and vector fields**.** Gradient, directional derivative; curl and divergence-physical interpretation; solenoidal and irrotational vector fields- Illustrative problems.
Vector Integration: Line integrals, Theorems of Green, Gauss and Stokes (without proof). Applications to work done by a force and flux.(**RBT Levels: L1 & L2)**

MODULE-II

Differential Equations of higher order:-
Second order linear ODE's with constant coefficients-Inverse differential operators, method of variation of parameters; Cauchy's and Legendre homogeneous equations. Applications to oscillations of a spring and L-C-R circuits.(**RBT Levels: L1 & L2)**

MODULE-III

Partial Differential Equations(PDE's):-
Formation of PDE's by elimination of arbitrary constants / functions. Solution of non-homogeneous PDE by direct integration. Homogeneous PDEs involving derivative with respect to one independent variable only. Solution of Lagrange's linear PDE. Derivation of one dimensional heat and wave equations and solutions by the method of separation of variables.(**RBT Levels: L1 & L2)**

MODULE-IV

Infinite Series: Convergence and divergence of infinite series- Cauchy's root test and D'Alembert's ratio test(without proof)- Illustrative examples.
Power series solutions-Series solution of Bessel's differential equation leading to $J_n(x)$- Bessel's function of first kind-orthogonality. Series solution of Legendre's differential equation leading to $P_n(x)$-Legendre polynomials. Rodrigue's formula (without proof), problems. (**RBT Levels: L1 & L2)**

MODULE V

Elementary Numerical Methods:
Finite differences. Interpolation/extrapolation using Newton's forward and backward difference formulae, Newton's divided difference and Lagrange's formulae (All formulae without proof). Solution of polynomial and transcendental equations – Newton-Raphson and Regula-Falsi methods(only formulae)- Illustrative examples.
Numerical integration: Simpson's $(1/3)^{th}$ and $(3/8)^{th}$ rules, Weddle's rule (without proof) – Problems. (**RBT Levels: L1 & L2)**

Course Outcomes: On completion of this course, students are able to:

CO1: Solve first order linear/nonlinear differential equations analytically using standard methods.

CO2: Explain various physical models through higher order differential equations and solve such linear ordinary differential equations.

CO3: Understand a variety of partial differential equations and solution by exact methods/method of separation of variables.

CO4: Describe the applications of infinite series and obtain series solution of ordinary differential equations.

CO5: Apply the knowledge of numerical methods in the models of various physical and engineering phenomena.

Question paper pattern:

Note:- The SEE question paper will be set for 100 marks and the marks scored by the student will be finally reduced to 60.

- The question paper will have **ten** full questions carrying equal marks.
- Each full question consisting of **20** marks.
- There will be **two** full questions (with a **maximum** of **four** sub questions) from each module.
- Each full question will have sub question covering all the topics under a module.
- The students will have to answer **five** full questions, selecting **one** full question from each module.

Text Books:

1. B.S. Grewal: Higher Engineering Mathematics, Khanna Publishers, 43rd Ed., 2015.
2. E. Kreyszig: Advanced Engineering Mathematics, John Wiley & Sons, 10th Ed.(Reprint), 2016.

Reference books:

1. C.Ray Wylie, Louis C.Barrett : "Advanced Engineering Mathematics", 6th Edition, McGraw-Hill Book Co., New York, 1995.
2. N.P.Bali and Manish Goyal: A Text Book of Engineering Mathematics, Laxmi Publishers, 7th Ed., 2010.
3. B.V.Ramana: "Higher Engineering Mathematics" 11th Edition, Tata McGraw-Hill, 2010.
4. Veerarajan T.," Engineering Mathematics for First year", Tata McGraw-Hill, 2008.
5. Thomas G.B. and Finney R.L."Calculus and Analytical Geometry"9th Edition, Pearson, 2012.

Web links and Video Lectures:

1. http://nptel.ac.in/courses.php?disciplineID=111
2. http://www.class-central.com/subject/math(MOOCs)
3. http://academicearth.org/

Annexure-II

VISVESVARAYA TECHNOLOGICAL UNIVERSITY, BELAGAVI

PROPOSED SYLLABUS FOR 2018-2022

ENGINEERING PHYSICS

(Common to all branches)
[As per Choice Based Credit System (CBCS) scheme]
(Effective from the academic year 2018-19)

Course Code : 18PHY12/22	**CIE Marks : 40**
Contact Hours/Week : 04(3L+1T)	**SEE Marks: 60**
Total Hours:50 (8L+2T per module)	**Exams. Hours: 03**
Semester: I/II	**Credits: 04**

Course Learning Objectives: This course (**18PHY12/22**) will enable students to learn the basic concepts in Physics which are very much essential in understanding and solving engineering related challenges.

MODULES

MODULE-I :

Oscillations and Waves

Simple harmonic motion: Definition of SHM, derivation of equation for SHM, Mechanical and electrical simple harmonic oscillators (mass suspended to spring oscillator, LC and LCR oscillations), complex notation and phasor representation of simple harmonic motion.

Free, damped and forced oscillations: Equation of motion for free oscillations, Natural frequency of oscillations. Theory of damped oscillations: overdamping, critical & under damping, quality factor. Theory of forced oscillations and resonance, Sharpness of resonance. One example each for mechanical and electrical resonance.

Shock waves: Mach number, Properties of Shock waves, control volume. Laws of conservation of mass, energy and momentum. Mention of Rankine-Hugoniot equations. Construction and working of Reddy shock tube, applications of shock waves.

Numerical problems

(RBT Levels L1, L2, L3)

MODULE-II:

Elastic properties of materials:

Elasticity: Concept of stress, strain, tensile stress, shear stress, compressive stress, concept of elasticity, plasticity, strain hardening and strain softening, failure (fracture/fatigue), Hooke's law, different elastic moduli: Poisson's ratio, Expression for Young's modulus (Y), Bulk modulus (K) and Rigidity modulus (n) in terms of α and β. Relation between Y, n and K, Limits of Poisson's ratio.

Bending of beams: Neutral surface and neutral plane, expression for bending moment of a beam with circular and rectangular cross section(Derivation). Single cantilever (derivation).

Torsion of cylinder: Expression for couple per unit twist of a solid cylinder (Derivation), Torsional pendulum-Expression for period of oscillation.Numerical problems

(RBT Levels L1, L2, L3)

MODULE- III:

Maxwell's equations, EM waves and Optical fibers

Maxwell's equations: Review of vector calculus. Divergence and curl of electric field and magnetic field (static), Gauss' divergence theorem and Stokes' theorem. Review of laws of electrostatics, magnetism and Faraday's laws of EMI. Current density & equation of Continuity; displacement current (with derivation) Maxwell's equations in vacuum

EM Waves: The wave equation in differential form in free space (Derivation of the equation using Maxwell's equations), Plane electromagnetic waves in vacuum, their transverse nature, polarization of EM waves(Qualitative)

Optical fibers: Propagation mechanism, angle of acceptance. Numerical aperture. Modes of propagation and Types of optical fibers. Attenuation: Causes of attenuation and Derivation of expression for attenuation coefficient, applications of optical fibers. Discussion of block diagram of point to point communication
Numerical problems
(RBT Levels L1, L2)

MODULE IV:

Quantum Mechanics and Lasers

Quantum mechanics: Introduction to Quantum mechanics, Wave nature of particles, Heisenberg's uncertainty principle and applications (non confinement of electron in the nucleus), Schrodinger time independent wave equation, Significance of Wave function, Normalization, Particle in a box, Energy eigen values of a particle in a box, Free particle, and square well potential.
Lasers: Review of spontaneous and stimulated processes, Einstein's coefficients (expression for energy density). Requisites of a Laser system. Conditions for laser action. Principle, Construction and working of Nd-YAG, CO2 and semiconductor Lasers. Application of Lasers in Defense (Laser range finder), Engineering (Data storage) and medicine (LASIK). `
Numerical problems
(RBT Levels L1, L2, L3)

MODULE-V:

Material science

Quantum Free electron theory of metals: Review of classical free electron theory, mention of assumption and failures. Assumptions of Quantum Free electron theory, Derivation of Expression for density of states, Fermi-Dirac statistics (qualitative), Fermi level, Derivation of the expression for Fermi energy, Success of QFET. Comparison between conductors and superconductors, mention of applications of superconductors
Physics of Semiconductor: Fermi level in intrinsic and extrinsic semiconductors, Expression for concentration of electrons in conduction band (Derivation), Hole concentration in valance band (Mention the expression), Intrinsic carrier concentration Conductivity of semiconductors, Hall effect, Expression for Hall coefficient(derivation)
Dielectric materials: polar and non-polar dielectrics, internal fields in a solid, Clausius-Mossotti equation, mention of solid, liquid and gaseous dielectrics with one example each. Application of dielectrics in transformers.
Numerical problems
(RBT Levels L1, L2, L3)

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

1. Understand various types of oscillations and their implications, the role of Shock waves in various fields
2. Recognize the elastic properties of materials for engineering applications
3. Realize the interrelation between time varying electric field and magnetic field, the transverse nature of the EM waves and their role in optical fiber communication.
4. Compute Eigen values, Eigen functions, momentum of Atomic and subatomic particles using Time independent 1-D Schrodinger's wave equation
5. Apprehend theoretical background of laser, construction and working of different types of laser and its applications in different fields
6. Understand various electrical and thermal properties of materials like conductors, semiconductors and dielectrics using different theoretical models.

Question paper pattern:

Note:- The SEE question paper will be set for 100 marks and the marks scored by the student will be proportionately reduced to 60.

- The question paper will have **ten** full questions carrying equal marks.
- Each full question consisting of **20** marks.
- There will be **two** full questions (with a **maximum** of **four** sub questions) from each module.
- Each full question will have sub question covering all the topics under a module.
- The students will have to answer **five** full questions, selecting **one** full question from each module.

Text Books:

1. Oscillations and waves in physics- Ian G. Main: 3rd Ed, Cambridge University Press-1993(online publication 2012)
2. Engineering Mechanics- MK Harbola: , 2nd Ed. Cengage publications, New Delhi, 2009
3. Lasers and Non Linear Optics – BB laud, 3rd Ed, New Age International Publishers 2011
4. Engineering Physics-Gaur and Gupta-Dhanpat rai Publications-2017

Reference books:

1. Introduction to Mechanics — MK Verma: 2nd Ed, University Press(India) Pvt Ltd, Hyderabad 2009
2. O. Svelto, "Principles of Lasers", Springer Science & Business Media, 2010.
3. B.G. Streetman, "Solid State Electronic Devices", Prentice Hall of India, 1995.
4. Concepts of Modern Physics-Arthur Beiser: 6th Ed;Tata McGraw Hill Edu Pvt Ltd- New Delhi 2006
5. Shock waves made simple- Chintoo S Kumar, K Takayama and KPJ Reddy: Willey India Pvt. Ltd. New Delhi2014
6. Introduction to Electrodynamics- David Griffiths: 4th Ed, Cambridge University Press 2017

BASIC ELECTRICAL ENGINEERING [As per Choice Based Credit System (CBCS) scheme] SEMESTER – I/II			
Course Code	**18ELE13/18ELE23**	**CIA Marks**	**40**
Number of Lecture Hours/Week	**2L +1T**	**SEE Marks**	**60**
Total Number of Lecture Hours	**40 (08 Hours per Module)**	**Exam Hours**	**03**
Credits – 03			
Each module is designed for about 6 hours. Around 10 hours is earmarked for tutorial. (Total Hours for each module: 8)			
Module-1			
D.C.Circuits: Ohm's Law and Kirchhoff's Laws, analysis of series, parallel and series- parallel circuits excited by independent voltage sources. Power and Energy. Illustrative Examples. **A.C. Fundamentals:** Generation of sinusoidal voltage, frequency of generated voltage, definition and numerical values of average value, root mean square value, form factor and peak factor of sinusoidally varying voltage and current, phasor representation of alternating quantities.			
Module-2			
A.C.Circuits: Analysis with phasor diagram, of circuits with R, L, C, R-L, RC, R-L-C for series and parallel configurations. Real power, reactive power, apparent power and power factor. Illustrative Examples. Three-phase balanced circuits, voltage and current relations in star and delta connections. Measurement of three phase power using two wattmeter method.			
Module-3			
Single Phase Transformers: Faradays Laws, self and mutually induced emfs and coefficient of coupling, Necessity of transformer, Principle of operation, Basic parts of transformers. Emf equation, losses, variation in losses with respect to load, efficiency, Condition for maximum efficiency,Illustrative problems on Emf equation and efficiency.			
Module-4			
D.C. Machines: Dynamically induced Emf, Fleming's right hand rule. Force on current carrying conductor placed in a magnetic field, Fleming's left hand rule. Basic parts of d.c. machines. DC Generators: Principle of operation, Expression for induced Emf. DC motors: Principle of operation, Back Emf ,Torque equation, Types of dc motors, Characteristic of dc motors (shunt and series motors only) and Applications. **Three Phase Synchronous Generators:** Basic parts, Principle of operation, Synchronous speed, Frequency of generated voltage, Emf equation. Concept of			

winding factor (excluding the derivation of distribution and pitch factors). Illustrative examples on Emf equation.

Module-5

Three Phase Induction Motors: Generation of rotating magnetic field, Construction and working of a three-phase induction motor, Slip and its significance. Necessity of a starter, starting of motor using stars-delta starter. Illustrative examples on slip calculation.

Domestic Wiring: Service mains, meter board and distribution board. Brief discussion on concealed conduit wiring. Two-way and three-way control. Elementary discussion on Circuit protective devices: fuse and Miniature Circuit Breaker (MCB's). Electric shock, precautions against shock. Earthing: Pipe and Plate earthing.

Course Outcomes

- To understand and analyse D.C and A.C electric circuits.
- To understand the concepts of electromagnetic induction.
- To study the construction and working principle of transformers.
- To study the construction and working principle of d.c.machines.
- To study the construction and working principle of induction motors.
- To introduce the concepts of electrical wiring.

Question paper pattern:

- 1. The question paper will have ten questions. Each question is set for 20 marks.
- 2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub questions), should have a mix of topics under that module.
- 3. The students have to answer 5 full questions, selecting one full question from each module.

Text Books:

- 1. Basic Electrical Engineering, D C Kulshreshtha, Tata McGraw Hill, Revised First Edition.
- 2. Electrical Technology, E. Hughes International Students 9th Edition, Pearson, 2005.
- 3. Principles of Electrical Engineering & Electronics,V.K. Mehta,Rohit Mehta,S.Chand , Publications

Reference Books:

1. Fundamentals of Electrical Engineering and Electronic, B. L. Theraja, S. Chand & Company
Ltd, Reprint Edition 2013.
2. Electrical Engineering Fundamentals, Vincent Del Toro, Pearson, 2nd Edition, 2015
3. Basic Electrical Engineering, D. P. Kothari and I. J. Nagrath, Tata McGraw Hill, 2010.
4. Fundamentals of Electrical Engineering, L. S. Bobrow, Oxford University Press, 2011.

VISVESVARAYA TECHNOLOGICAL UNIVERSITY, BELGAUM
CHOICE BASED CREDIT SYSTEM (CBCS)
CIVIL ENGINEERING BOARD
BE-CBCS SYLLABUS 2018-19 Scheme

TITLE OF THE COURSE: ENGINEERING MECHANICS
B.E., I Semester
[As per Choice Based Credit System (CBCS) scheme]

Course Code	**18 CIV14/24**	**CIE Marks**	**40**
Number of Lecture Hours/Week	**03(2hrs Lectures+1hr Tutorial)**	**SEE Marks**	**60**
Total Number of Lecture Hours	**40 (8 Hours per Module)**	**Exam Hours**	**03**

Credits – 03

Course Objectives: This course will enable students;
The objectives of this course is to make students to learn basics of Civil Engineering concepts and infrastructure development solve problems involving Forces, loads and Moments and know their applications in allied subjects. It is a pre-requisite for several courses involving Forces, Moments, Centroids, Moment of inertia and Kinematics.

Module-1

Introduction to civil engineering: Scope of different fields of Civil Engineering-Surveying, Building Materials, Construction Technology, Geotechnical Engineering, Structural Engineering, Hydraulics, Water Resources and Irrigation Engineering, Transportation Engineering, Environmental Engineering. Effect of the infrastructural facilities on socio-economic development of a country.

Introduction to Engineering Mechanics: Force Systems Basic concepts, Particle equilibrium in 2-D & 3-D; Rigid Body equilibrium; System of Forces, Coplanar Concurrent Forces, Components in Space – Resultant- Moment of Forces and its Application; Couples and Resultant of Force System.

L1, L2

Module-2

Equilibrium of Forces: Free body diagrams, Equations of Equilibrium of Coplanar Systems and Spatial Systems; Static Indeterminancy

Support Reactions: Support Reaction in beams Types of Loads and Supports, statically determinate beams, Numerical problems on support reactions for statically determinate beams with Point load (Normal and inclined) and uniformly distributed and uniformly varying loads and Moments.

L2,L3

Module-3

Friction: Types of friction, Limiting friction, Laws of Friction, Static and Dynamic Friction; Motion of Bodies, wedge friction, ladder friction, screw jack & differential screw jack

L2,L3

Module-4

Centre of Gravity and moment of inertia: Centroid of simple figures from first principle, centroid of composite/built-up sections; Centre of Gravity and its implications; Area moment of inertia- Definition, Moment of inertia of plane sections from first principles, Theorems of moment of inertia, Moment of inertia of standard sections and composite sections; Mass moment inertia of circular plate, Cylinder, Cone, Sphere, Hook.

L2 ,L3

Module-5

Kinematics and Kinetics: Definitions, Displacement, Average velocity, Instantaneous velocity, Speed, Acceleration, Average acceleration ,Variable acceleration, Acceleration due to gravity, Newton's Laws of Motion. Rectilinear Motion–Numerical problems. Curvilinear Motion – Super elevation, Projectile Motion, Relative motion, Numerical problems. Motion under gravity, Numerical problems, D'Alembert's principle and its applications in plane motion and connected bodies

Course outcomes: After a successful completion of the course, the student will be able to:

1. Know basics of Civil Engineering, its scope of study,
2. Comprehend the action of Forces, Moments and other loads on systems of rigid bodies;
3. Compute the reactive forces and the effects that develop as a result of the external loads;
4. Locate the Centroid and compute the Moment of Inertia of regular and built-up sections.
5. Express the relationship between the motion of bodies and
6. Equipped to pursue studies in allied courses in Mechanics.

Text Books:

1. Irving H. Shames, Engineering Mechanics, Prentice Hall
2. F. P. Beer and E. R. Johnston , Vector Mechanics for Engineers, Vol I - Statics, Vol II, – Dynamics, Tata McGraw Hill

Reference Books:

1. R. C. Hibbler, Engineering Mechanics: Principles of Statics and Dynamics, Pearson Press.
2. Andy Ruina and Rudra Pratap , Introduction to Statics and Dynamics, Oxford University Press
3. Shanes and Rao, Engineering Mechanics, Pearson Education,
4. Hibler and Gupta,Engineering Mechanics (Statics, Dynamics) by Pearson Education
5. Reddy Vijaykumar K. and K. Suresh Kumar, Singer's Engineering Mechanics
6. Bansal R.K., A Text Book of Engineering Mechanics, Laxmi Publications
7. Tayal A.K. , Engineering Mechanics, Umesh Publications

Engineering Graphics and Design [As per Choice Based Credit System (CBCS) scheme] SEMESTER – I/II			
Course Code	**18EGDL15/18EGDL25**	**CIA Marks**	**40**
Number of Lecture Hours/Week	**4 (1L + 3P)**	**SEE Marks**	**60**
Total Number of Lecture Hours	**56**	**Exam Hours**	**03**
CREDITS – 2.5			

Course Objectives:

- **To expose the students to standards and conventions followed in preparation of engineering drawings.**
- **To make them understand the concepts of orthographic and isometric projections.**
- **Develop the ability of conveying the engineering information through drawings.**
- **To make them understand the relevance of engineering drawings to different engineering domains.**
- **To expose them to Computer aided drafting packages and generation of computer assisted drawings.**

Module-1	Teaching Hours
Introduction to Computer Aided Sketching Introduction, Drawing Instruments and their uses, BIS conventions, Lettering, Dimensioning and free hand practicing. Computer screen, layout of the software, standard tool bar/menus and description of most commonly used tool bars, navigational tools. Co-ordinate system and reference planes HP, VP, RPP & LPP of 2D/3D environment. Selection of drawing size and scale. Commands and creation of Lines, Co-ordinate points, axes, poly-lines, square, rectangle, polygons, splines, circles, ellipse, text, move, copy, off-set, mirror, rotate, trim, extend, break, chamfer, fillet, curves, constraints viz. tangency, parallelism, inclination and perpendicularity. Dimensioning, line conventions, material conventions and lettering.	**04**

Module-2	Teaching Hours
Orthographic Projections of points, straight lines and planes. Introduction, Definitions - Planes of projection, reference line and conventions employed, Projections of points in all the four quadrants. Projections of straight lines (located in First quadrant/first angle only), True and apparent lengths, True and apparent inclinations to reference planes (No application problems and midpoint problems). Orthographic Projections of Plane Surfaces (First Angle Projection Only): Introduction, Definitions–projections of regular plane surfaces–triangle, square, rectangle, pentagon, hexagon and circle-in simple positions inclined to both the planes; planes in different positions by change of position method only. (No problems on punched plates and composite plates).	**12**
Module-3	**Teaching Hours**
Projections of solids Introduction, Definitions – Projections of right regular tetrahedron, hexahedron (cube), prisms, pyramids, and cones with axis inclined to both the planes. (No problems on octahedrons, and freely suspended solids).	**16**
Module-4	**Teaching Hours**
Development of Lateral Surfaces of Solids Introduction, introduction to section planes and sectional views, Development of lateral surfaces of right regular prisms, cylinders,pyramids,cones and their frustums resting with base on HP only. (No problems on lateral surfaces of trays, tetrahedrons, spheres and transition pieces).	**12**
Module-5	**Teaching Hours**
Isometric Projection (Using Isometric Scale Only) Introduction, Isometric scale, Isometric projection of simple plane figures, Isometric projection of hexahedron(cube), right regular prisms, pyramids, cylinders, cones, spheres. Isometric view of combination of two simple solids. Conversion of given isometric/ pictorial views to orthographic views of simple objects.	**12**

Course outcomes: After studying this course, students will be able to:

- **Produce computer generated drawings using CAD software.**
- **Prepare drawings as per BIS following the conventions mentioned in the relevant codes.**
- **Apply the knowledge of orthographic projections to represent engineering information/concepts and preset the same in the form of drawings.**
- **Read and evaluate engineering drawings.**
- **Create isometric drawings of simple objects reading the orthographic projections of those objects.**

Question paper pattern:

- Module -1 is only for practice and Internal Assessment and not for examination.
- Question paper for each batch of students will be sent online by VTU and has to be downloaded before the commencement of Examination of each batch. The answer sheets will have to be jointly evaluated by the Internal & External examiners.
- A maximum of THREE questions will be set as per the following pattern (No mixing of questions from different Modules).

From Chapters	Marks Allotted
Module 2[Choice between (Points +Lines or Planes)]	**25**
Module 3	**45**
Module 4 or Module 5	**30**
Total	**100**

Scheme of evaluation:

Q.No.	Solutions and Sketching in the sketchbook	Computer Display and Printout	Total Marks
1	**10**	**15**	**25**
2	**15**	**30**	**45**
3	**15**	**15**	**30**
Total Marks	**40**	**60**	**100**

- Students have to submit the computer printouts and the sketches at the end of the examination. Both Internal & External examiners have to jointly evaluate the solutions (sketches) and computer display & printouts of each student for 100 marks (40 marks for solutions & sketches + 60 marks for computer display and printouts) and submit the marks list along with the solution (sketches) on graph sheets & computer printouts in separate covers.
- Each batch must consist of a minimum of 10 students and a maximum of 12 students.
- Examination can be conducted in parallel batches, if necessary.

Text Books:

- **Engineering Drawing** – N.D. Bhatt & V.M. Panchal, 48th edition, 2005- Charotar Publishing House, Gujarat.
- Engineering Graphics – K.R. Gopalakrishna, 32nd edition, 2005- Subash Publishers Bangalore.

Reference Books:

- Computer Aided Engineering Drawing – S. Trymbaka Murthy, – I.K. International Publishing House Pvt. Ltd., New Delhi, 3rd revised edition-2006.
- Computer Aided Engineering Drawing- by Dr. M H Annaiah, Dr C N Chandrappa and

Dr. B SudheerPremkumar, Fifth edition, New Age International Publishers.

- Fundamentals of Engineering Drawing with an Introduction to Interactive Computer Graphics for Design and Production- Luzadder Warren J., Duff John M., Eastern Economy Edition, 2005- Prentice-Hall of India Pvt. Ltd., New Delhi.
- A Primer on Computer Aided Engineering Drawing-2006, Published by VTU, Belgaum.

Suggested Experiments in Engg. Physics Lab

(Common to all Branches)

(Effective from the academic year 2018-19)

Course Code : 18PHYL16/26 **CIE Marks : 40**
Contact Hours/Week : 03 **SEE Marks: 60**
Total Hours: 42 **Exams. Hours: 03**
Semester: I/II **Credits: 1.5**

Course Learning Objectives: This course (**18PHY16/26**) will enable students
To realize experimentally, the mechanical, electrical and thermal properties of materials, concept of waves and oscillations
Design simple circuits and hence study the characteristics of semiconductor devices

Sl. No	Title of the Experiment	To which Module it belongs
1	**Determination of spring constants in Series and Parallel combination**	**I**
2	**Young's modulus by Uniform bending experiment**	**II**
3	**n & I by Torsional pendulum**	**II**
4	**Single Cantilever experiment**	**II**
5	**Radius of curvature of plano convex lens using Newton's rings**	**III**
6	**LCR Resonance (Series and Parallel)**	**I/III**
7	**Acceptance angle and Numerical aperture of an optical fiber**	**III**
8	**Wavelength of semiconductor laser using Laser diffraction**	**IV**
9	**Estimation of Fermi Energy of Copper**	**V**
10	**Study of Transistor characteristics**	**V**
11	**Study of Photodiode characteristics**	**V**
12	**Calculation of Dielectric constant by RC charging and Discharging**	**V**

Note:-

1. In addition to above experiments, Reddy shock tube must be introduced as compulsory demo experiment
2. All 12 experiments are mandatory. Student has to perform 2 experiments in the semester end examination

Conduction of Practical Examination:

1. Examination shall be conducted for **100 marks**, later reduced to **60 marks.**
2. All experiments are to be included for practical examination.

Course Outcomes:

Upon completion of this course, students will be able to

1. Recall the concepts of interference of light, diffraction of light, Fermi energy
2. Understand the principles of operations of optical fibers and semiconductor devices such as photodiode, and NPN transistor using simple circuits
3. Determine elastic moduli and moment of inertia of given materials with the help of suggested procedures
4. Recognize the resonance concept and its practical applications
5. Understand the importance of measurement procedure, honest recording and representing the data, reproduction of final results

Basic Electrical Engineering Laboratory [As per Choice Based Credit System (CBCS) scheme] SEMESTER – I/II			
Course Code	**18ELEL17/18ELEL27**	**CIA Marks**	**40**
Number of Lecture Hours/Week	**2P**	**SEE Marks**	**60**
Total Number of Lecture Hours	**32**	**Exam Hours**	**03**
Credits – 01			

Orientation class for an exposure to:

- Resistors, capacitors and inductors, types of wires, measuring instruments – voltmeter, ammeter, wattmeter, multi-meter, oscilloscope, transformer, dc motor, synchronous generator, three phase induction motor etc.
- Basic safety precautions while dealing with electricity.

List of experiments:

1. Verification of KVL and KCL for DC circuits.
2. Measurement of current, power and power factor of incandescent lamp, fluorescent lamp, CFL and LED lamp.
3. Impedance calculation and verification for R-L and R-C circuits- using decade boxes.
4. Load test on a single phase transformer.
5. Voltage and Current relationships of three phase star/delta circuits.
6. Measurement of three phase power using two wattmeter method.
7. Speed load characteristic of a 3 phase induction motor.
8. Two way and three way Control of lamp and formation of truth table.

Demonstration Experiments (for CIE only):

1. Demonstration of fuse, MCB by creating a fault.
2. Demonstration of cut-out sections of electrical machines (DC machines, Induction machines and synchronous machines)

Laboratory Outcomes

- Get an exposure to common electrical components.
- Make electrical connections by wires of appropriate ratings.
- Understand the usage of common electrical measuring instruments.
- Understand the basic functioning of electrical machines.
- Understand two way and three way control of lamp.

Annexure-VIII

VISVESVARAYA TECHNOLOGICAL UNIVERSITY, BELAGAVI

Subject: Functional English for Engineers

[As per Choice Based Credit System (CBCS) scheme]

(Effective from the academic year 2018-19)

Course Code: 18EGH18/28	**CIE Marks: 40**
Contact Hours/Week: 03 hr/week (1hr L+ 2hr lab)	**SEE Marks: 60**
Total Hours: 40 (14 hr lecture + 26 hr lab)	**Exam: 03 hr**
Semester: I/II	**Credits: 02**

Course Learning Objectives: This course (18EGH18/28) will enable the students to assimilate and get familiarized with English vocabulary, to improve both speaking and writing skills, and to identify the common errors in spoken and writing English, to provide information on standard technical report writing and involving students in language lab for hands on experience and to enhance oral communication skills through group activities.

MODULE- I

Basic Writing Skills: Basic English Grammar and Remedial Grammar (Parts of Speech, Noun & Pronoun, Number, Gender, Verbs, Preposition, Articles, Conjunctions, Voices and other aspects).

The Kinds of Sentences & Sentence Structures, The functions of Tenses, Use of idioms and phrases, and clauses in Sentences.

Importance of proper punctuation, Creating coherence.

(05 Hours) **(RBT Levels: L1 & L2)**

MODULE- II

Vocabulary Building: The concept of Word Formation, Root words from foreign languages and their use in English, Acquaintance with prefixes and suffixes from foreign languages in English to form derivatives.

Vocabulary Test, Synonyms and antonyms, Paronyms and Homonyms, Spelling Test (Spelling Error), Cloze Test , Standard abbreviations & Contractions, Sentence Improvement , Sentence Arrangements and Theme Detection. **(05 Hours)** (**RBT Levels: L3 & L5)**

MODULE-III (Language Lab)

Reading and Writing Practices

This Module has to be covered in language laboratory. Activity based teaching with examples (Observation and Lab Notes Compulsory). In 2 hours lab session, first 30 minutes explanation by the Faculty member and then Topic/Activity execution by the Student interacting with the faculty.

- Reading Techniques, Technical Writing and Technical Proposals
- Letters, Memos, E-mail, Reports, Writing introduction and Conclusion
- The Art of Condensation (Precise, writing), Organizing principles of paragraphs in documents, Comprehensions, Paragraphs & Essays

- Workplace Communication
  i) Business Letters: Types, Layouts, Structure
  ii) Reports: Purpose, Types, Structure.
- Research Paper, Dissertation, and Thesis: Types, Layouts, Structure, Referencing and Styling
- Employment Communication: Resume & Cover Letter

(07 sessions Lab of 2 hour duration each) **(RBT Levels: L3 & L4, L6)**

MODULE- 4

Spoken / Oral English Communication Skills

GRE, IELTS, TOFEL, CIEFL- Hyderabad, Web links Videos and other exam activities with audio and videos may be used for the following topics.

- Communication Skills: Formal and Informal
- Listening Skills &Comprehensions
- Pronunciation, Intonation, Stress and Rhythm
- Speaking: Self-introduction, introducing one self, one's family, one's friends And relatives, one's country etc. Welcome Address, Vote of thanks, Extempore Speeches, Short speech on simple topics on simpler themes for about one minute
- Reading: Reading aloud – by students individually, reading rhymes, Proverbs, passages on various topics of interest, Newspaper Reading, Reading humorous passages, Anecdotes, Stories, tricky sounds(conditioners), Reading manuals, Reading individual sentences with articulation, pronunciation and Tones
- Common Everyday Situations: Conversations and Dialogues, Presentation skills & Formal Presentations by Students
- Inter-personal Communication skills and Group Discussion, Employment Interviews **(07 sessions Lab of 2 hour duration each)** **(RBT Levels: L3 & L4, L5)**

MODULE- V

How to Write Correct English

(Identifying Common Errors in writing & speaking)

Subject-verb agreement, Noun-pronoun agreement, Misplaced modifiers, Spotting errors exercises.

Common Errors:Due to the Confusion of words, in the use of Idioms & Phrases, in the use of Noun & Pronouns, Proverbs and Gender, Singular & Plural, in the Sequence of Tense, Articles. Common Errors due to Indianism, Redundancies& Clichés.

(04 Hours) **(RBT Levels: L4 & L5)**

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

- Improve the functional effectiveness through better workplace communication skills
- Acquire basic proficiency in English reading and listening, comprehensions, writing and speaking skills
- Write campus recruitment exams, engineering competitive exams and all other general competitive exams
- Improve business and technical communication skills and technical writing skills

Question paper pattern:-

- Examination will be Conducted for **100 marks**, and later reduced to **60 marks**
- The question paper comprises of **Ten** full questions carrying equal marks
- Each full question carries **20** marks.(**Descriptive-15 marks** & **Objective type-5 marks**)
- Each module will have **two** full questions (with a **maximum** of **four** sub questions)
- The students will have to answer **five** full questions, selecting **one** full question from each module.

Text Books:-

1) Technical Communication – Principles and Practice, Third Edition, Meenakshi Raman and Sangeetha Sharma, Oxford University Press, 2015.
2) High School English Grammar & Composition, Wren & Martin (Upgraded Format), Revised by N D V Prasad, S Chand & Company Ltd, 2015.
3) English for Technical Communication, N. P. Sudharshana and C. Savitha, Cambridge University Press, India Pvt Ltd, 2017.
4) Communication Skills, Sanjay Kumar and Pushpa Lata, Oxford University Press, 2011.
5) Exercises in Spoken English, Parts I-III, CIEFL, Hyderabad, Oxford University Press, 2015.

Reference Books:-

1) Soft Skills and Employability Skills, Sabina Pillai and Agna Fernandez, Cambridge University Press, India Pvt Ltd, 2017.
2) Soft skills for everyone, Jeff Butterfield, Cengage learning India Pvt Ltd, 2017.
3) Business Communication (Connecting at Work), Hory Sankar Mukerjee, Oxford University Press, 2017.
4) Remedial English Grammar, F. T. Wood., Macmillan, 2007.
5) Books relating to GRE, TOFEL, GATE, SSC/CDS/SSB, IBPS, IES and other state and National level Exams (UPSC & KPSC).

Web Links and Video Lectures

www.unacademy.com/lesson/future-perfect-tense/YQ9NSNQZ

https://goo.gl/mne8XW

banking adda English - https://t.me/adda247youtube For All the

www.india.oup.com/orcs/9780199457496

https://goo.gl/LLAkQE

www.india.oup.com/orcs/9780199457069

https://www.youtube.com/channel/UCzGB...

https://www.youtube.com/watch?v=dSeLyms1YVM

https://www.ets.org/toefl

Videos & Lectures relating to IELTS, GRE, TOFEL and other exams