GONDWANA UNIVERSITY, GADCHIROLI

DIRECTION NO. 4 OF 2020

EXAMINATIONS LEADING TO THE DEGREE OF BACHELOR OF ENGINEERING (B.E) (EIGHT SEMESTER DEGREE COURSE) BASED ON AICTE PRESCRIBED MODEL CURRICULUM INCORPORATING CHOICE BASED CREDIT SYSTEM (CBCS) IN THE FACULTY OF SCIENCE AND TECHNOLOGY DIRECTION, 2020.

(Issued under Provision of Section 12(8) of the Maharashtra Public Universities Act, 2016)

Whereas, The Maharashtra Public Universities Act, 2016 has come into force with effect from 1 st March 2017. (Maharashtra Act No. VI of 2017);

AND

Whereas, the above mentioned Act is applicable to the Gondwana University, Gadchiroli from 1 st March, 2017;

AND

Whereas, the chairman, U.G.C. New Delhi has directed the Vice-Chancellor of the university to initiate steps for successful implementation of the choice based credit system(CBCS) from the Academic Session 2015-16 vide letter D.O.No.F-1-1/2015(CM) dated 8/01/2015 ;

AND

Whereas, the U.G.C. has formulated and issued guidelines on adoption of choice based credit system in all the universities;

AND

Whereas, the Vice-chancellor has directed, on the basis of the resolution of the authorities of the university, to formulate and introduce choice based credit system at U.G. and P.G. level programme in all the faculties in the univesity;

AND

Whereas, the choice based credit system was introduced at the Bachelor of Engineering Degree level in the faculty of Science and Technology from the Academic year 2017-18 vide Direction No. 17 of 2017;

AND

Whereas, the choice based credit system was introduced at the Bachelor of Engineering Degree level in the faculty of Science and Technology from the Academic year 2017-18 vide Ordinance No. 17 of 2017;

AND

Whereas, the apex governing council for professional engineering education has formulated and issued guidelines on adoption of Model Curriculum for Undergraduate Degree Courses [BACHELOR OF ENGINEERING (B.E)] in Engineering & Technology in January 2018;

AND

Whereas, the Faculty of science and Technology in its meeting held on 31.07.2019 has resolved to adapt AICTE prescribed Model Curriculum for Undergraduate Degree Courses [BACHELOR OF ENGINEERING (B.E)] in Engineering & Technology;

AND

Whereas, Hon'ble Vice-chancellor on behalf of the Academic Council on dated 3.08.2019 under the provision of section 12(7) of the Act has approved to adapt AICTE prescribed Model Curriculum for Undergraduate Degree Courses [BACHELOR OF ENGINEERING (B.E)] in Engineering & Technology, considering the exingency of the matter to be regulated;

AND

Whereas, the Faculty of science and Technology in its meeting held on 8.11.2019 has resolved norms and guidelines in respect of number of credits, examination and promotion scheme, estimation of SGPA and CGPA, Grade Tables, Scope for improvement and criteria for the final award of the degree to be incorporated as part of the adapted AICTE prescribed Model Curriculum for Undergraduate Degree Courses [BACHELOR OF ENGINEERING (B.E)] in Engineering & Technology;

AND

Whereas, Hon'ble Vice-chancellor on behalf of the Academic Council on dated 3.11.2019 under the provision of section 12(7) of the Act has approved above mentioned norms and guidelines to be adapted as part of the AICTE prescribed Model Curriculum for Undergraduate Degree Courses [BACHELOR OF ENGINEERING (B.E)] in Engineering & Technology, considering the exingency of the matter to be regulated;

AND

Whereas, no Ordinance is in existence in the University for introducing AICTE prescribed Model Curriculum incorporating choice based credit system in the Faculty of Science and Technology;

AND

Whereas, making of an Ordinance for introducing AICTE prescribed Model Curriculum incorporating Choice Based Credit System in the Faculty of Science and Technology is a time consuming process;

AND

Now, therefore, I, Dr. N.V. Kalyankar, Vice-chancellor, Gondwana University, Gadchiroli in exercise of the powers vested in me under provision of section 12(8) of the Maharashtra Public Universities Act,2016 do hereby issue following Directions :-

This Direction shall be called **"EXAMINATIONS LEADING TO THE DEGREE OF BACHELOR OF ENGINEERING (B.E) (EIGHT SEMESTER DEGREE COURSE) BASED ON AICTE PRESCRIBED MODEL CURRICULUM INCORPORATING**

CHOICE BASED CREDIT SYSTEM (CBCS) IN THE FACULTY OF SCIENCE AND TECHNOLOGY DIRECTION, 2020".

1. This Direction shall come into force with effect from the Academic year 2019-20 for I st and II nd semester of the Bachelor of Engineering (B.E.) Degree course on progressive basis.
2. **In this direction, unless the context otherwise requires:-**
   1) **Academic Year:** Two consecutive (one odd + one even) semesters constitute one academic year.
   2) **Choice Based Credit System (CBCS):** The CBCS provides choice for students to select from the prescribed courses (core, elective or minor or soft skill courses).
   3) **Course:** Usually referred to, as 'papers' is a component of a program. All courses need not carry the same weight. The courses should define learning objectives and learning outcomes. A course may be designed to comprise lectures/tutorials/laboratory work/field work/outreach activities/project work/vocational training /viva /seminars /term papers/assignments/ presentations/self-study etc. or a combination of some of these.
   4) **Credit Based Semester System (CBCS):** Under the CBSS, the requirement for awarding a degree or diploma or certificate is prescribed in terms of number of credits to be completed by the students.
   5) **Credit Point:** It is the product of grade point and number of credits for a course.
   6) **Credit:** A unit by which the course work is measured. It determines the number of hours of instructions required per week. One credit is equivalent to one hour of teaching (lecture or tutorial) or two hours of practical work/field work per week, as far as possible
   7) **Cumulative Grade Point Average (CGPA):** It is a measure of overall cumulative performance of a student over all semesters. The SGPA is the ratio of total credit points secured by a student in various courses in all semesters and the sum of the total credits of all courses in all the semesters. It is expressed up to two decimal places.
   8) **Grade Point:** It is numerical weight allotted to each letter grade on a 10 point scale.
   9) **Letter Grade:** It is an index of the performance of students in a said course. Grades are denoted by letters A+, A, B+,B, C+, C,D, F and Z.
   10) **Program:** An educational program leading to award of a Degree, diploma or certificate.
   11) **Semester Grade Point Average (SGPA)**: It is a measure of performance of work done in a semester. It is ratio of total credit points secured by a student in various courses registered in a

semester and the total course credits taken during that semester. It shall be expressed up to two decimal places.

12) **Semester**: Each semester will consist of 15-18 weeks of academic work equivalent to 90 actual teaching days. The odd semester may be scheduled from July to December and even semester from January to June.

13) **Transcript or Grade Card or Certificate**: Based on the grades earned, a grade certificate shall be issued to all the registered students after every semester. The grade certificate will display the course details (code, title, number of credits, grade secured) along with SGPA of that semester and CGPA earned till that semester.

3. ABBREVIATION

L	**Lecture**	**MC**	**Mandatory courses**
T	**Tutorial**	**PROJ**	**Project**
P	**Practical**	**MSE**	**Mid Semester Examination**
BSC	**Basic Science Courses**	**IE**	**Internal Evaluation**
ESC	**Engineering Science Course**	**ESE**	**End Semester Examination**
HSMC	**Humanities and Social Sciences including Management courses**	**TW**	**Term work**
PCC	**Professional core courses**	**POE**	**Performance & Oral Examination**
PEC	**Professional Elective courses**	**BoS**	**Board of Studies (Board)**
OEC	**Open Elective courses**		

4. ELIGIBILITY FOR ADMISSION TO PROGRAM AT FIRST YEAR LEVEL

The candidate shall be eligible for admission to the First Year B.E., subject to the conditions prescribed by the Government of Maharashtra from time to time. AND s/he shall have passed 12th (HSC) Standard Examination of the Maharashtra State Board of Secondary Education or its equivalent, with the subjects:

i) English (Higher or Lower)
ii) Modern Indian Language (Higher or Lower)
iii) Mathematics and Statistics
iv) Chemistry
v) Physics
vi) And/or any other condition prescribed and revised by the Director, Technical Education, Government of Maharashtra from time to time.

5. ELIGIBILITY FOR ADMISSION TO PROGRAM AT SECOND YEAR LEVEL

Admission of a Candidate directly to the Third Semester B.E. Level shall be termed as Lateral Entry. The Eligibility conditions for lateral entry directly to the 3rd semester B.E. shall be governed by the rules prescribed and updated from time to time by the Director of Technical Education, Government of Maharashtra. However, the general eligibility conditions shall be as mentioned below:

(i) That the Candidate should have passed Three Years Diploma Program with at least 50% marks in appropriate branch of Engineering/Technology from within the State of Maharashtra or its equivalent,

OR

(ii) That the Candidate should have passed Three Years B.Sc(Bachelor of Science) examination of this University or any other University recognized by the UGC/MHRD with Mathematics, as a compulsory subject, with minimum 50 % marks(CGPA = 5.75), after passed XII(HSC) standard with mathematics as a subject.

However, candidates admitted under such category shall be required to clear Courses of Engineering Graphics/Engineering Drawing, Electrical Engineering and Engineering Mechanical of the I and II Semester B.E. Program, along with the III semester B.E. Courses. The eligibility for admission into V Semester B.E. shall remain same, as usual.

(iii) The candidate should have passed four years B.E. degree program of this University or its equivalent from any other University, recognized by the UGC/MHRD. However, s/he will be eligible for admission to the discipline/Branch othe than one in which s/he has already acquired his B.E. or its equivalent degree.

6. VARIOUS DISCIPLINES/BRANCHES UNDER FOUR YEARS B.E. DEGREE PROGRAM

The Degree of Bachelor of Engineering (B.E.), as per AICTE prescribed model Curriculum incorporating Choice Based Credit System (CBCS) shall be awarded to the examinee who in accordance with the provisions of this Direction and shall qualify for the award in any of the following Disciplines/Branches:

Sr. No.	Title of the Discipline/Branch	CODE
1	Civil Engineering	CE
2	Electrical Engineering	EE
3	Electronics & Telecommunication Engineering	ET

4	Mechanical Engineering	ML
5	Computer Science & Engineering	CS
6	Instrumentation Engineering	IE

The Disciplines/Branches of Engineering may be appended from time to time, if granted to start, by the concerned Governing Bodies to the affiliated colleges in the University.

7. DEFINITION OF CREDIT

1 Hr. Lecture (L) per week - 1 credit
1 Hr. Tutorial (T) per week - 1 credit
2 Hours Practical (Lab)/week - 1 credit

8. NUMBER OF CREDITS FOR THE PROGRAM

A sum of 160 credits is required to be earned by a given student to be eligible to get award of the Under-Graduate degree of Bachelor of Engineering (B.E.).

9. STRUCTURE, EXAMINATION SCHEME AND SYLLABUS OF UNDER-GRADUATE ENGINEERING PROGRAM

Sr. No.	Abbreviations	Particulars of Category	Suggested Breakup of Credits (Total 160)
1	HSMC	Humanities and Social Sciences including Management courses	12*
2	BSC	Basic Science courses	25*
3	ESC	Engineering Science courses including workshop, drawing, basics of electrical/mechanical/computer etc.	24*
4	PCC	Professional core courses	48*
5	PEC	Professional Elective courses relevant to chosen specialization/branch	18*
6	OEC	Open subjects – Electives from other technical and /or emerging subjects	18*
7	PROJ	Project work, seminar and internship in industry or elsewhere	15*
8	MC	Mandatory Courses [Environmental Sciences, Induction Program, Indian Constitution, Essence of Indian Knowledge Tradition]	(non-credit)
Total			160*

***Minor variation is allowed as per need of the respective disciplines of engineering offered.**

Semester wise course structure and syllabus is affixed with **Appendix-I** whereas examination scheme is affixed with **Appendix-IV.**

10. INTERNAL & END SEMESTER EXAMINATIONS

(i) There shall be eight semester examinations leading to the Degree of B.E. Examinations shall be common for all the branches.

(ii) The period of Academic Session shall be such as may be notified by the University through its Academic Calendar.

(iii)The End Semester Examination (ESE) of first, third, fifth and seventh semester shall be held by the University in winter & supplementary examination in summer every year. Further end semester examination is summer every year. Further end semester examination of second, fourth, sixth & eighth semester will be held in summer & the supplementary examination in winter every year.

(iv)The internal and external assessment of student performance shall be as mentioned in details in Teaching and Examination Scheme of the respective Branches of Engineering program.

(v) The Mid semester Examination (MSE) marks shall be based on Student's performance in the Internal Theory examination(s) conducted by the respective Colleges However, the Internal Evaluation (IE) part shall be based on student's performance in Assignments/quizzes/GDs/Seminar/Viva voce/Response Classes.

(vi)The Term Work (TW) shall be Internal Assessment marks based on assessment of student in Practical/timely submission of completed Journal/Internal vica etc. However, the performance & Oral Examination (POE) shall be an external practical examination to be conducted at College only, on the dates announced by the University. The mark shall be on the basic of students performance in conduct of Practical and/or Oral (on the related topics) tobe conducted in the presence of External Examiner, as per rules of the University. Wherever possible, the practical performance must be conducted, before Oral Examination.

(vii)The pattern of End Semester Examination(ESE) to be conducted by the University shall be as mentioned below:

(a) The prescribed syllabi for each of the theory courses have been divided into FIVE units for a Three Hours Paper and FOUR Units for a Two Hours Paper.

(b) Syllabus has been divided into units equal to the number of question to be answered /attempted in ESE.

(c) There will be question on each unit.

(d) Number of question/s will be in accordance with the unit/s prescribed in the syllabus, i.e. there will be a full question on every unit.

(e) For every question, there will be internal choice from the same Unit.

(f) The question will be either long answer type or short answer type containing number of sub questions with no internal choice.

(viii) The Scope of Every course shall be as mentioned it its respective syllabus. The Medium of Instruction shall be English and all the internal and external examinations (including ESE) shall be conducted only in English.

(ix) Provisions of Ordinance to provide grace marks for passing in a particular Course head and improvement of Division (Higher Class) and getting Distinction in the subject and Condonation of Deficiency of Marks in a course shall be as per relevant Direction/Ordinance of the University.

(x) An examinee who does not pass, or who fails to present himself/herself for the examination shall be eligible for "Readmission" to the same examination, on payment of a fresh fee and such other fees as may be prescribed from time to time.

(xi) An unsuccessful examinee, at any of the above examination, shall carry, by defalt, his/her SESSIONAL marks for theory examination to his/her SESSIONAL marks in a Course or Course (Theory only) of his choice, iin which case he/she shall be examined for marks obtained in ESE examination only and proportional marks shall be supplemented as SESSIONAL Mark, at his/her successive attempts at the examination(s). Such an option may be availed by the examinee by including the same in his/her "Application Form for Examination" and the option once exercised, it shall be "Final and Binding" on the concerned examinee, in all further attempted examinations in that course.

(xii) As soon as possible after the examinations, the Board of Examinations & Evaluation shall publish a list of successful examinees. The result of all the examinations shall be classified on the basis of Semester Grade Point Score 'SGPS' evaluated as specified in the adopted model choice based credit grade system and shall be notified in accordance with the provisions of governing Ordinance/Direction.

12. MARKS TO LETTER GRADE & GRADE POINT CONVERSION

The marks scored by the examinees in their courses of the program shall be converted in to Letter Grade and Grade Point as per Table mentioned below:

% SCORE (x) in Theory	% SCORE (x) in Practical	Letter Grade	Grade Point (G) (on 10 point scale)
80 ≤x ≤100	85 ≤x ≤100	A+	10
70 ≤x ≤79	80≤x ≤ 84	A	9
60 ≤x ≤ 69	75≤x ≤79	B+	8
55 ≤x ≤59	70≤x ≤ 74	B	7
50 ≤x ≤54	65 ≤x ≤ 69	C+	6
45 ≤x ≤49	60 ≤x ≤ 64	C	5
40 ≤x ≤44	50≤x ≤ 59	D	4
00≤x ≤ 39	00≤x ≤ 49	F	0
Absent in Examination	Absent in Examination	Z	-

As such, the lowest passing Grade in any Theory/Practical Examination shall be 'D'.

13. RULES FOR PROMOTION TO THE HIGHER SEMESTERS

The students shall be required to acquire minimum CREDITS to move into the higher semester. The students admitted to the UG Program in CBCS pattern shall be entitled for promotion to the higher semester, based on the conditions mentioned below.

ADMISSION TO SEMESTER	CONDITION TO BE FULFILLED BY THE STUDENT
I	Should have passed XII or its minimum prescribed marks and is eligible as per rule prescribed and revised from time to time by the Director, Technical Education, Government of Maharashtra.
II	Should have appeared at least one ESE of the I –Semester Course (Theory)
III	Should have passed minimum 40% of the total Credits of I and II Semester taken together with Theory and Practical as combined passing head. **OR** Should have joined in Lateral Entry by passing Three Years Diploma Program and fulfilling other conditions as prescribed by the Director, Technical Education, Government of Maharashtra.
IV	Should have appeared in at least one ESE of the III semester Course(Theory)
	Should have acquired ALL the prescribed Credits of I & II Semesters **AND**

V	Should have passed minimum 40% of the total Credits of III and IV Semester taken together with Theory and Practical as combined passing head.
VI	Should have appeared in at least one ESE of the V semester Course(Theory)
VII	Should have acquired ALL the prescribed Credits of III & IV Semesters **AND** Should have passed minimum 40% of the total Credits of V and VI Semester taken together with Theory and Practical as combined passing head.
VIII	Should have appeared in at least one ESE of the VII Semester Course(Theory)

If in any case credits to be considered (in right side column of above Table) for promotion of a student to higher semester is found to be in fraction, it shall be considered as an Integer on lower side and accordingly, the promotion decision shall be taken.

11. CALCULATION OF SGPA AND CGPA

The semester Grade Point Average (SGPA) shall be calculated for every Semester of the program and shall be evaluated as mentioned below:

SGPA (Si) = (Ci x Gi)/ Ci]

Where ci is the number of credits of the ith course and Gi is the grade point scored by the student in the ith course.

However, the Cumulative Grade Point Average (CGPA) shall be calculated for the Program and shall be evaluated as mentioned below:

CGPA= (C7 x S7 + C8 x S8)/(C7 + C8)

Where, S_7 is the SGPA of the 7^{th} Semester, S_8 is the SGPA of 8^{th} Semester; C_7 is the total credits of 7^{th} Semester and C_8 is the total credits in 8^{th} Semester.

12. DIVISION OF PASSING

The students who pass in all the minimum prescribed Courses of any Program shall be eligible for the Degree of Bachelor of Engineering of this University in the Branch, in which the study has been undertaken. The CGPA calculation for the award of Degree shall be based on the student's performance in the VII and VIII Semesters examinations, taken together.

The Division of Passing shall be based on CGPA secured by an Examinee as shown in the Table below:

TABLE

RANGE OF CGPA	DIVISION OF PASSING
CGPA 8.25	First with Distinction
6.75 CGPA 8.24	First
6.00 CGPA 6.74	Second
CGPA 5.90	Pass

CGPA, if any between the boundary conditions shall be treated on higher side and higher passing class shall be granted to the Examinee.

15. IMPROVEMENT CHANCE TO THE STUDENTS

Improvement upto 2% of the total credits prescribed for the given degree is permitted (in both Theory & Practical heads of passing) for securing Higher Division.

16. AUDIT HEADS

The students shall be required to qualify in minimum 10 (TEN) Audit Heads from the available list. The Students shall be at the liberty to acquire assigned FIVE (05) non-academic Credits by the time s/he appears for the first ESE of VI semester of the Program. The Colleges shall send list of Ten Audit Heads qualified (Q) by the student and their single composite Grade Point (G) by that time. The Audit Heads shall be considered only if undertaken during the tenure of this program, during its first three years. For qualifying, the student has to secure minimum Grade Point of '5' in TEN different Audit Heads.

Note: *The Audit Course Credits shall not be counted for calculation of SGPA.*

The Audit Heads Grade Point shall be shown in the Grade Sheet of VI semester B.E. in all the programs. If the composite Grade Points (G) is not sent from the college side till the above prescribed time, then such student shall be shown 'F'(Fail) in the Grade Sheet of VI semester. The College shall send consolidated list of all the students in the Program and their 'Composite Grade Point' in respect of Audit Heads qualified by them in the prescribed format 'Form-AHCI', appended with this direction as Appendix–II.

The following Audit Heads shall be available to the students:

A	National Social Service(NSS)	**H**	National Cadet Corps (NCC)	**O**	Blood Donation
B	Paper Presentation	**I**	Quiz Competition	**P**	Debate Competition
C	Computer/Software/ Campus Recruitment courses (3-5 days)	**J**	Office Bearer in Departmental or higher Students Body/Professional Society (College level)	**Q**	Soft skills Development Course (3-5 days)
D	Hardware/Software Competition participation	**K**	Volunteer in minimum inter collegiate activities	**R**	Sports Team Participation
E	YOGA/Meditation Training Certificate (Minimum Three Days)	**L**	Cultural Activity Competition, National , State, District level Essay Competition.	**S**	Certificate of Noteworthy participation in National event like SWACHCHHA BHARAT ABHIYAAN, TREE PLANTATION
F	Certificate of service to the Home for the Aged/Orphans/Differentl y enabled (1-3 days)	**M**	Membership of any registered Non-Government Organization(NGO)	**T**	Plant/Industrial Visit
G	Certificate of Appreciation by local Civic/District /State/ National level Government Authority/Organizations	**N**	Certificate of Noteworthy participation in Environment Day/AKSHAY URJA Day or such other programs of national importance/Environ mental day, Science day, Engineers Day, Teachers day etc.	**U**	Participation in 3 to 5 days youth Seminars on Social, Environmental, Wellbeing, Consciousness Programs.

Note: The Audit Heads may be appended/revised/changed from time to time and shall be notified by the University.

17. INCENTIVE MARKS

The grant of incentive marks shall be in accordance with the provisions of Direction No. 179 of 2015 or any other Direction/ Ordinance that may repeal the existing Direction and/ or issued from time to time.

18. EXAMINATION FEES

The Examination fee shall be as prescribed/ revised and notified from time to time by the University.

19. MANDATORY INDUCTION PROGRAM

The mandatory Induction Program for admitted students is to be offered at the beginning of the First Year of the course of the study. Refer **Appendix-III** for detailed guidelines.

Duration of the program - 3 weeks
It shall consist of; • Physical activity • Creative Arts • Universal Human Values • Literary • Proficiency Modules • Lectures by Eminent Person/s • Visits to local Areas • Familiarization to Department/Branch & Innovations

20. AWARD OF THE DEGREE

The Examinee who secures minimum prescribed registered credits (160) from 1st to 8th semester, if admitted under provisions of paragraph (5) of this Direction and the Examinee who secures minimum prescribed registered credits (122 and additionally assigned credits of first year courses, if applicable) from 3rd to 8th Semester, if admitted under provisions of paragraph (6) of this Direction, shall be eligible for the award of the Degree of Bachelor of Engineering in the given discipline/branch, in the Faculty of Science and Technology of this University.

Place: Gadchiroli
Date: 30/01/2020

(Dr. N. V. Kalyankar) 30/01/2020
Vice-Chancellor

Appendix-I

Course Structure

Semester I (First year) **GROUP-A***

GROUP-A: Common to all branches of Bachelor of Engineering (B.E.) Course

Sr. No.	Category	Course Code	Course Title	Hours per week			Credits
				L	T	P	
1	Basic Science course	BSC101	Physics	3	1	2	5
2	Basic Science course	BSC103	Mathematics –I	3	1	0	4
3	Engineering Science Courses	ESC101	Basic Electrical Engineering	3	1	2	5
4	Engineering Science Courses	ESC102	Engineering Graphics & Design	1	0	4	3
5	Humanities and Social Sciences including Management courses	HSMC102	Soft Skill	2	0	0	2
						Total credits	19

Semester I (First year) **GROUP-B***

GROUP-B: Common to all branches of Bachelor of Engineering (B.E.) Course

Sr. No.	Category	Course Code	Course Title	Hours per week			Credits
				L	T	P	
1	Basic Science course	BSC102	Chemistry-I	3	1	2	5
2	Basic Science course	BSC103	Mathematics –I	3	1	0	4
3	Engineering Science Courses	ESC103	Programming for Problem Solving	3	0	2	4
4	Engineering Science Courses	ESC104	Workshop/ Manufacturing Practices	1	0	4	3
5	Humanities and Social Sciences including Management courses	HSMC101	English	2	0	2	3
						Total credits	19

Semester II (First year) **GROUP-A***

GROUP-A: Common to all branches of Bachelor of Engineering (B.E.) Course

S. No.	Category	Course Code	Course Title	Hours per week			Credits
				L	T	P	
1	Basic Science course	BSC102	Chemistry-I	3	1	2	5
2	Basic Science course	BSC104	Mathematics – II	3	1	0	4
3	Engineering Science Courses	ESC103	Programming for Problem Solving	3	0	2	4
4	Engineering Science Courses	ESC104	Workshop/ Manufacturing Practices	1	0	4	3
5	Humanities and Social Sciences including Management courses	HSMC101	English	2	0	2	3
						Total credits	19

Semester II (First year) **GROUP-B***

GROUP-B: Common to all branches of Bachelor of Engineering (B.E.) Course

S. No.	Category	Course Code	Course Title	Hours per week			Credits
				L	T	P	
1	Basic Science course	BSC101	Physics	3	1	2	5
2	Basic Science course	BSC104	Mathematics –II	3	1	0	4
3	Engineering Science Courses	ESC101	Basic Electrical Engineering	3	1	2	5
4	Engineering Science Courses	ESC102	Engineering Graphics & Design	1	0	4	3
5	Humanities and Social Sciences including Management courses	HSMC102	Soft Skill	2	0	0	2
						Total credits	19

Note: For Example;

GROUP – A* Electrical Engg., Mechanical Engg. and Instrumentation Engg.

GROUP – B* Civil Engg., Computer Science & Engg. and Electroncs & Telecommunication Engg.

1) GROUP – B Subject Applied Mechanics will be in 3rd SEM.
2) GROUP – A subject Applied Mechanics will be in 4th SEM.

Syllabus for I/II Semester B.E. (Common for all branches)

Course Code : BSC101

Title of the Course : Physics

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
3	1	2	4+2	5	3	10	10	80	100

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

1. Apply engineering physics concepts, which form the basis of modern engineering.
2. Elaborate the general nature of concepts learnt and possibility of their cross-disciplinary application.

3. Gain fundamental knowledge in areas like quantum mechanics, semiconductors, dielectrics, and optics.
4. Solve numerical problems on areas covered.
5. Implement concepts of elementary physics in understanding of engineering applications.

Units	Contents	Hours
1	**Quantum Physics** Dual nature of matter, De-Broglie's concept of matter waves , Davisson-Germer experiment, wave packet concept, wave function interpretation, Heisenberg's uncertainty principle and its experimental illustrations, Schrodinger's wave equations, applications : Motion of free particle, particle in infinite potential well, linear harmonic oscillator.	08
2	**Semiconductor Physics** Formation of energy bands in solids, Classification of solids based on band theory, Energy band diagram of germanium & silicon, Probability distribution function Fermi energy-its dependence on temp and doping concentration, conductivity of semiconductors, energy band structure of p-n junction diode and transistors, junction voltage equation.	08
3	**Dielectrics** Introduction, Dielectric constant, energy stored in a capacitor, polarization, field vectors, induced dipoles, permanent dipoles, nonpolar and polar dielectrics, types of polarization, internal field, ferroelectric and piezoelectric materials, applications of dielectrics.	08
4	**Wave optics & Electron ballistics** Interference due to thin films of uniform and non-uniform thickness, Newton's ring, Antireflection coating applications, Motion of electron in uniform electric and magnetic fields, Concept of crossed fields. Electron refraction, electric and magnetic focusing devices - CRT, CRO and its applications, Bainbridge Mass spectrograph.	08
5	**Lasers and fibre optics** Interaction of radiation with matter, population inversion and pumping, Spatial and temporal coherence of light waves, optical resonator, types of laser; Gas laser (He-Ne), solid state laser (Ruby) and semiconductor laser, characteristics and applications. Introduction to optical fibre structure, principle, modes of propagation, acceptance angle, Numerical aperture, fractional refractive index, types and classifications of optical fibre, V – number, attenuation & its different mechanisms, distortion, applications as sensors and detectors. advantages of optical fibre in communication	08
		40

Text Book:

1. Avadhanulu & Kshirsagar, *Engineering Physics,* S. Chand Prakashan.

Reference Books:

1. A. Beiser, *Concept of modern Physics*, TMH Edition
2. S. L. Gupta & S. Gupta, *Concept of modern Physics*,

3. David Halliday, Robert Resnik And Jerle Walker, *Fundamentals of Physics*, John Wiley & Sons
4. Ajay Ghatak, Optics, Mc Grow Hill Publication
5. B. B. Laud, *Lasers and Non Linear Optics*, New Age Publications
6. John Allison, *Electronic Engineering Material & Devices*, TMH Edition
7. K. C. Nandi, *Applied Physics*, Tech. Max. Pune

Title of the Course : Physics Laboratory

Course Outcome: After completion of the course, the student will be able to:

1) Understand and analyse the theoretical concepts in physics through experimentation
2) Learn and use the proper methods while gathering experimental data.
3) Get familiar with the proper use of basic instruments in physics laboratories.

Minimum eight (8) experiments are to be performed from the list given below.

List of Experiments:

1. Determination of resistivity of a semiconductor by four probe method.
2. A study of transistor characteristics in common base configuration.
3. Determination of the radius of curvature of a plano-convex lens using Newton's rings.
4. Determination of thickness of a thin foil using air wedge.
5. A study of the static characteristics of germanium and silicon diodes.
6. A study of the static characteristics of Zener Diode.
7. A study of transistor characteristics in common emitter configuration.
8. Determination of activation energy of a thermister.
9. Determination of wavelength of Laser light using plane transmission grating.
10. To measure the divergence of laser beam.
11. Determination of numerical aperture and acceptance angle, attenuation in optical fibre.
12. Determination of refractive index of glass prism.
13. Determination of refractive index of quartz/calcite prism

I/II Semester B.E. (Common for all branches)

Course Code : BSC102

Title of the Course : Chemistry-I

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
3	1	2	4+2	5	3	10	10	80	100

Unit	Contents	Hours
1	**Water Conditioning :** Impurities in water, Hardness of water, units of hardness, ill effect of hard water in boilers, Boiler corrosion, caustic embrittlement, Priming and foaming, Scale and sludge formation Boiler beed water treatment : 1) Internal treatment - Calgon, Colloidal and phosphate conditioning, 2) External treatment : a) Lime – Soda process (only reaction), b) Zeolite process, c) ion exchange method, Numerical based on Lime – soda and zeolite process Desalination of brackish water/Purification of water by reverse osmosis and Electrodialysis	10
2	**Corrosion and Battery Science :** Cause and Consequences of corrosion, chemical and electro – Chemical Corrosion, Mechanisms of electro chemical corrosion, Pilling Bedworth rule, Differential aeration theory of corrosion, Types corrosion – Pitting, Intergranular, stress. Waterline Corrosion, corrosion prevention : a) Dlsign and material selection, b) cathodic and anodic protection. Battery :Secondory – Nickel – cadmium, Fuel cells- Alkaline fuel cell, Phosphoric, acid fuel cell, polymer electrolyte membrane fuel cell construction, applications, advantages and limitations.	10
3	**Fuels and Combustion :** Definition, Calorific values, HCV and LCV, Determination – Bomb Colorimeter, Boy's Calorimeter, Numericals, Solid fuel- significance of proximate and Ultimate analysis, Numerical (Dulong's Formula) Liquid fuels – Petroleum – composition and bubble tower fractional distillation of crude oil, Knocking in IC and compression engine, octane number of petrol, Cetane Number of Diesel, Poer alcohol, Biodiesel, Doping agent (Antiknodcing , Antioxidants, enticing), fisher – tropsch process for manufacture of synthetic gasoline, Gaseous fuel - composition, properties and applications of CNG, LPG Combustion: Chemical reactions, Calculations for air required, Numericals.	10
4	**Green Chemistry :** Defimition, goals of green chemistry, efficiency parameters need of green chemistry, Major uses traditional and green pathways of synthesis of adipic acid, polycarbonate, indigo dye, principles, concept of carbon credits.	5
5	**Synthetic Organic Polymer :** Introduction functionality of monomer, Polymerisation – fre radical	10

	mechanism and step growth polymerization concept and significance of – Average molecular Weight Crystalinity in Polymers, Tm and Tg, Thermoplastic and thermosetting polymers, compounding of plastics, Techniques of Polymerisation, Preparation, properties and engineering application of Polyethylene (LDPE and HDPE) and epoxy resin, Elastomers – Natural rubber – processing and Vulcanization by sulphur, Synthetic rubbers – SBR, Specialty polymer : Engineering thermoplastics – Polycarbonate, biodegradable polymers – Poly (Hydroxyburate, Hydroxyvalanate) Conducting polymers – Polyacetylene, Polyaniline, Electroluminscent polymers – polyphenylenevinylene, Liquid crystaline polymers – Kevlar, Polymer Composites – fiber reinforced plastic (FRP)	

List of book to be referred: Text Books

1. Text Book of Engineering Chemistry, S.S.Dara, S. Chandand Company Ltd., NewDelhi.
2. Text book of Engineering Chemistry, P.C.Jain and Monica Jain, Dhanpat Rai and Sons, NewDelhi.
3. Text book of Engineering Chemistry, S.N.Narkhede, R.T.Jadhav, A.B.Bhake, A.U.Zadgaonkar, Das Ganu Prakashan, Nagpur.
4. Applied Chemistry,A.V.Bharati and Walekar, TechMax Publications, Pune.
5. Engineering Chemistry, Arty Dixit, Dr.Kirtiwardhan Dixit, Harivansh Prakashan, Chandrapur.

Reference Books:

1. A Textbook of Engineering Chemistry, Shashi Chawla, Dhanpat Rai & Sons, New Delhi.
2. Applied Chemistry by N. Krishnamurthy, P.Vallinavagam., K.Jeysubramanian, TMH.
3. Applied Chemistry for Engineers, T. S. Gyngell.
4. Chemistry in Engineering, Lloyda. Munro, Prentice-hall
5. Chemistry of Advanced Materials:CNR Rao, Rsc Publication.
6. Chemistry of Cement, J.D.Lee, Mcgraw Hill Publishing Company, NewDelhi.
7. Chemistry of Engineering Materials: Robert B Leighou, McGraw Hill Book Company, New York.
8. Chemistry, Raymond Chang, Tata McGraw Hill.
9. CorrosionEngineeringbyMarsG.FontanaandNorbertD.GreenMcGrawHillBookCo. Tokyo
10. Electrochemistry, Philip H. Rieger (Chapmanand Hail)
11. EngineeringChemistry(Vol.IandII)byRajaramandKuriakose.
12. EngineeringChemistryB.K.SharmaKrishnaPrakashanmediaprivateLTD.
13. EngineeringChemistrybyGyngell,McGrawHillPublishingCompany,NewDelhi.
14. EngineeringchemistrybyR.gopalan,andothers,Vikaspublications
15. Engineering Chemistry by R.V.Gadag, A.NityanandaShetty ; I K International Publishing House, NewDelhi
16. EngineeringChemistry(Vol.1&2)byRajaramandKuriakose
17. EngineeringChemistry,B.S.Sivasankar,TataMcgrawHillPublishingCompany,NewDelhi.
18. EngineeringChemistry,O.G.Palan,TataMcgrawHillPublishingCompany,NewDelhi.
19. EngineeringChemistry,R.Shivakumar,TataMcgrawHillPublishingCompany,NewDelhi.
20. EngineeringChemistry,SaraswatandThakur,VikasPublication,NewDelhi.
21. EngineeringMaterials:KennethGBudinski(Prentice–HallofIndia)

22. FuelsandCombustionbyAmirCircar,OrientLongmans
23. FundamentalsofCorrosion:MichaelHenthorne,ChemicalEngineering.
24. Fundamentals of Engineering Chemistry (Theory and Practice) :S. K. Singh (NewAge Materials
25. Materialsscienceandengineeringanintroduction,WilliamD.Callister,(Jr.,Wiley.publisher)
26. Textbookofengineeringchemistry,R.N.GoyalandHarrmendraGoel,(AnebooksIndia).
27. WaterTreatment:F.I.Bilane,Mirpublisher
28. WatertreatmentforindustrialandotherusebyEskelNordell,ReinholdPublishing Corporation,NewYork

Title of the Course : Chemistry-I Laboratory

Minimum 6 - 8 experiments are to be performed from the list given below.

List of Experiments:

1. Determination of temporary and permanent hardness of water by complexometry method.
2. To estimate the amount of Ni+2 ions in a given solution by complexometric method.
3. Estimation of free chlorine in the water by iodometry.
4. Type and extent of alkalinity by Warder's method.
5. Estimation of dissolved oxygen in a water sample.
6. Determination of capacity of anion exchange resin.
7. Determination of capacity of cation exchange resin.
8. Determination of copper by lodometry.
9. To estimate the amount of ferrous and ferric ions present in the given solution or from ore.
10. Determination of hardness of water due to calcium and magnesium ions separately.
11. Determination of moisture content/volatile matter/ash content of coal.
12. Determination of molecular weight of a polymer by viscosity measurements.
13. Determination on rate of corrosion by weight loss by corrossometer.
14. Preparation of Biodiesel and its characterization.
15. Study of charging of lead acetate battery by measuring density of sulphuric acid electrolyte.
16. Determination of pH of waste water.
17. Determination of conductivity and potential difference.
18. Determination of COD in waste water.
19. Determination of calorific value of a solid fuel using bomb Calorimeter.
20. Laboratory Manual :
21. Applied Chemistry theory and practical O.P. Virmani and A. K. Narular (New Age International)
22. Laboratory Manual on Engineering Chemistry by Dr. Subdharani (Dhanpat Rai Publishing)

23. A Textbook on experiment and calculation in engineering chemistry by S. S. Dara S. Chand
24. Inorganic quantitative analysis, Vogel. (Prentice Hall)

I Semester B.E. (Common for all branches)

Course Code : BSC103

Title of the Course : Engineering Mathematics-I

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
3	1	0	4	4	3	10	10	80	100

Course Outcomes:

The objective of this course is to familiarize the prospective engineers with techniques in differential & Integral calculus & statistics.
It aims to equip the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling more advanced level of mathematics and applications that they would find useful in their disciplines.

The students will learn:

1. To apply knowledge of mathematics in formulating and solving problems analytically.
2. To deal with function of several variables that are essential in most branches of Engineering.
3. To use the knowledge of Gamma and Beta function to evaluate some definite integrals arising in various branches of engineering.
4. To use various statistical techniques to applied engineering problem.

Detailed contents:

Unit	Contents	Hours
1	**Module 1: Diffential Calculus: (8 lectures)** Successive differentiation, Leibnitz's theorem on the n th derivative of a product, Expansion of a function by using Taylor's and Maclaurian's theorem, Indetermine forms	06
2	**Module 2: Partial Differentation : (8 lectures)** Partial Derivatives, Euler's theorem on homogeneous functions, Transformation of independent variables (Chain rule)	06
3	**Module 3: Application of Partial Differntation: (10 lectures)** Jacobians, properties of Jocobians, Taylor's and Maclaurin's series for function of two variable, Maxima and Minima of functions of two variables, Lagrange's method of undermined multipliers.	10
4	**Module 4: Integral Calculus : (8 lectures)** Gamma and Beta functions, properties of gamma, beta functions, Differentiations of definite integrals under integral sign, (Leibnitz's Rule), Mean and R.M.S. value.	08
5	**Module 5: Statistics & Finite Differences: (8 lectures)** Fitting of straight line, second degree parabola & exponential curves, Coefficient of Correlation, Regression lines, Rank coefficient of correlation	10

	Finite Differences : Operator E & Delta, Fractional polynomial. Lagrange's, interpolation formula for unequal intervals of arguments.	

Reference Books:

1. A Text book of Engineering Mathematics, Volume I and II by D. T. Deshmukh.
2. A Text book of Applied Mathematics Volume I and II by J. N. Wartikar and P. N. Wartikar.
3. N. P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi publication, Reprint, 2008.
4. Higher Engineering Mathematics by B. S. Grewal Khanna Publishers.
5. Advanced Engineering Mathematics by H. K. Dass
6. Advanced Engineering Mathematics by Erwins Kreyszig

II Semester B.E. (Common for all branches)

Course Code : BSC104

Title of the Course : Engineering Mathematics-II

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
3	1	0	4	4	3	10	10	80	100

Course Outcomes:

The objective of this course is to familiarize the prospective engineers with techniques in differential & integral calculus & Statistics.

It aims to equip the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling more advanced level of mathematics and applications that they would find useful in their disciplines.

The students will learn:

1. To apply knowledge of mathematics in formulating and solving problems analytically.
2. To develop mathematical models for various engineering system and their solution using Differential equation .
3. Use of multiple integration for calculation of area, mass, volume, centre of gravity.
4. To calculate gradient and directional derivatives of scalar point function.
5. To use Green's theorem to evaluate line integrals along simple close contours on the plane, Stoke's theorem to give physical interpretation of the curl of a vector field and the Divergence throrem to give physical interpretation of the divergence of a vector field.

Detailed contents:

Unit	Contents	Hours
1	**Module 1: Ordinary differential equation I : (8 lectures)** Solution of first order and first degree differential equations, (Exact, Linear and reducible to Linear Bernoulli's equation) & Higher order linear differential equations with constant coefficients.	10

2	**Module 2: Ordinary differential equation II: (8 lectures)** Method of variation of parameters, Cauchy's and Legendre;s differential equaltions, Differntial equation of the form, Application of differential equation to electrical circuits, Kinematics and Vibrations (Upto second order)	06
3	**Module 3: Multiple Integrals and their Applications: (8 lectures)** Elementary double integral, change of order of integration (Cartesian), Elementary Tripple Integral, Applications to Area, Volume, Mass and Centre of gravity.	08
4	**Module 4: Vector Calculus: (8 lectures)** Vector differentiation, Velocity and Acceleration, Tangential and Normal acceleration, Vector operator Del, Gradient, Directional Derivative of scalar point function.	08
5	**Module 5: Vector Calculus - II: (8 lectures)** Vector point functions, Divergence and Curl, Solenoidal and Irrotational vector fields. Scalar potential, work done and conservative vector field, Line, Surface and volume integrals. Statements without proof of Gauss Divergence theorem, Greens theorem, Stoke's theorem.	08

Reference Books:

1. A text book of Engineering Mathematics, Volume I and II by D. T. Deshmukh.
2. A text book of Applied Mathematics Volume I and II by J. N. Wartikar and P. N. Wartikar
3. Higher Engineering Mathematics by Dr. B. S. Grewal
4. Advanced Engineering Mathematics by H. K. Dass.
5. Advance Engineering Mathematics by Erwins kreyszig

I/II Semester B.E. (Common for all branches)

Course Code : ESC101

Title of the Course : Basic Electrical Engineering

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
3	1	2	4+2	5	3	10	10	80	100

Course Outcomes:

At the end of this course, students will demonstrate the ability

1. To understand and analyse basic electric and magnetic circuits.
2. To study the working principles of electrical machines and power converters.
3. To introduce the components of low-voltage electrical installations.

Unit	Contents	Hours
1	**Module 1 : DC Circuits** Electrical circuit elements (R, L and C), voltage and current sources, Kirchoff current and voltage laws, analysis of simple circuits with dc	08

	excitation.Superposition, Thevenin and Norton Theorems.Time-domain analysis of first-order RL and RC circuits.	
2	**Module 2: AC Circuits** Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor. Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel), resonance. Three phase balanced circuits, voltage and current relations in star and delta connections.	08
3	**Module 3: Transformers** Magnetic materials, BH characteristics, ideal and practical transformer, equivalent circuit, losses in transformers, regulation and efficiency.Auto-transformer and three-phase transformer connections.	06
4	**Module 4: Electrical Machines** Generation of rotating magnetic fields, Construction and working of a three-phase induction motor, Significance of torque-slip characteristic. Loss components and efficiency, starting and speed control of induction motor. Single-phase induction motor. Construction, working, torque-speed characteristic and speed control of separately excited dc motor. Construction and working of synchronous generators.	08
5	**Module 5: Semiconductor Diode** Construction, working and characteristics. Application of Diode as Rectifier **Module 6: Electrical Installations** Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthing. Types of Batteries, Important Characteristics for Batteries.Elementary calculations for energy consumption, and battery backup.	08

Text Books:

1. D. P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 2010.
2. D. C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, 2009.

Reference Books:

1. L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press, 2011.
2. E. Hughes, "Electrical and Electronics Technology", Pearson, 2010.
3. V. D. Toro, "Electrical Engineering Fundamentals", Prentice Hall India, 1989.

Title of the Course : Basic Electrical Engineering Laboratory

Laboratory Outcomes: The students are expected to

1. Get an exposure to common electrical components and their ratings.
2. Make electrical connections by wires of appropriate ratings.
3. Understand the usage of common electrical measuring instruments.
4. Understand the basic characteristics of transformers and electrical machines.
5. Get an exposure to the working of power electronic converters.

Minimum 6 - 8 experiments are to be performed from the list given below.

List of Experiments:

1. Basic safety precautions. Introduction and use of measuring instruments – voltmeter, ammeter, multi-meter, oscilloscope. Real-life resistors, capacitors and inductors.
2. Measuring the steady-state and transient time-response of R-L, R-C, and R-L-C circuits to a step change in voltage (transient may be observed on a storage oscilloscope). Sinusoidal steady state response of R-L, and R-C circuits – impedance calculation and verification. Observation of phase differences between current and voltage. Resonance in R-L-C circuits.
3. Transformers: Observation of the no-load current waveform on an oscilloscope (nonsinusoidal
4. wave-shape due to B-H curve nonlinearity should be shown along with a discussion about harmonics). Loading of a transformer: measurement of primary and secondary voltages and currents, and power.
5. Three-phase transformers: Star and Delta connections. Voltage and Current relationships (line-line voltage, phase-to-neutral voltage, line and phase currents). Phase-shifts between the primary and secondary side. Cumulative three-phase power in balanced three-phase circuits.
6. Demonstration of cut-out sections of machines: dc machine (commutator-brush arrangement), induction machine (squirrel cage rotor), synchronous machine (field winging - slip ring arrangement) and single-phase induction machine.
7. Torque Speed Characteristic of separately excited dc motor.
8. Synchronous speed of two and four-pole, three-phase induction motors. Direction reversal by change of phase-sequence of connections. Torque-Slip Characteristic of an induction motor. Generator operation of an induction machine driven at supersynchronous speed.
9. Synchronous Machine operating as a generator: stand-alone operation with a load. Control of voltage through field excitation.
10. (a)Demonstration of Single Phase Rectifier (half wave and full wave) and (b) Components of LT switchgear.

I/II Semester B.E. (Common for all branches)

Course Code : ESC102

Title of the Course : Engineering Graphics & Design

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
1	0	4	1+4	3	4	10	10	80	100

Course Outcomes:

1. Introduction to engineering design and its place in society
2. Exposure to the visual aspects of engineering design
3. Exposure to engineering graphics standards
4. Exposure to computer-aided geometric design
5. Exposure to creating working drawings
6. Exposure to engineering communication

(Except the basic essential concepts, most of the teaching part can happenconcurrently in the laboratory)

Units	Contents	Hours
1	Principles of Engineering Graphics and their significance, usage of Drawing instruments,lettering, Different types of lines used in drawing practices, dimensioning, Introduction to scale i.e. full size, Reducing scale and enlarging scale. Conic sections (No focus and directrix method) including the Rectangular Hyperbola;Cycloid, and Involute; Principles of Orthographic Projections, concepts of four quadrants, difference between first and third angle projection, firstangle projections, and conventions used to represent methods of orthographic projection. Projections of Points and lines inclinedto both planes(Lines in First QuadrantOnly, excluding applications of straight lines.);	
2	Projections of Planes: Projection of planes when it is parallel to one & perpendicular to other reference plane, lyingin reference plane, inclined to one & perpendicular to other reference plane, inclined to bothreference planes. Auxiliary planes - Auxiliary Inclined Plane (AIP) and Auxiliary Vertical Plane (AVP), Use ofAuxiliary Plane method for solving the problems. Projections of Solids: cube, tetrahedron, prism, pyramid, cylinder and cone, projections of above solids whenaxis perpendicular to one of the reference planes, axis inclined to one & parallel to otherreference plane, axis inclined to both the reference planes.Draw simple annotation, dimensioningand scale. Floor plans that include: windows, doors, and fixtures such as WC, bath, sink, shower, etc.	
3	Sections and Sectional Views of Right Angular Solids: Section planes, sectional views, Draw the sectional orthographic viewsof geometrical solidslike Cube, Tetrahedron, Prism, Cylinder, Pyramid, Conecut by differentsection planes (when solid is in simple position, when axis is parallel to one & inclined toother reference plane).and to draw Sectional views of objects from industry and dwellings (foundation to slab only) Development of surfaces of Regular Solids –Cube, Tetrahedron, Prism, Pyramid, Cylinder and Cone; (No reverse development)	
4	Isometric Projections: Principles of Isometric projection – Isometric Scale, Isometric Views, Conventions;Isometric Views of Planes, Simple and compound Solids; Conversion of IsometricViews to Orthographic Views and Vice-versa, Conventions;	
5	Overview of Computer Graphics: listing the computer technologies that impact on graphical communication, Demonstratingknowledge of the theory of CAD software [such as: The Menu System, Toolbars (Standard,Object Properties, Draw, Modify and Dimension), Drawing Area (Background, Crosshairs,Coordinate System), Dialog boxes and	

	windows, Shortcut menus (Button Bars), TheCommand Line (where applicable), The Status Bar, Different methods of zoom as used inCAD, Select and erase objects.; Isometric Views of lines, Planes, Simple and compound Solids]; consisting of set up of the drawing page and the printer, including scale settings, Setting upof units and drawing limits; ISO and ANSI standards for coordinate dimensioning andtolerance; Orthographic constraints, Snap to objects manually and automatically;Producing drawings by using various coordinate input entry methods to draw straight lines,Applying various ways of drawing circles; applying dimensions to objects, applying annotations to drawings; Setting up and use ofLayers, layers to create drawings, Create, edit and use customized layers; Changing linelengths through modifying existing lines (extend/lengthen); Printing documents to paperusing the print command; orthographic projection techniques; Drawing sectional views ofcomposite right regular geometric solids and project the true shape of the sectioned surface;Drawing annotation	

In Practical minimum 8 half imperial (A2-594 mm X 420mm) sheets based on above Syllabus are to be drawn. In each sheet minimum 4 problems are to be drawn.

Drawings of Isometric views to Orthographic views and vice-versa are to be drawn using CAD software.

Note: During external practical examination of 25 marks, Students are expected to solve One/ Two Problems on drawing sheet (or using the software on the system) OR Objective type Questions. + Oral (15+ 10 =25 marks).

Text Book:

1. Bhatt N.D., Panchal V.M. & Ingle P.R., (2014), Engineering Drawing, CharotarPublishing House
2. Shah, M.B. &Rana B.C. (2008), Engineering Drawing and Computer Graphics, PearsonEducation
3. D.N. Johle, Engineering Drawing, Tata Megraw-hill publishing Co. Ltd
4. Narayana, K.L. & P Kannaiah (2008), Text book on Engineering Drawing, Scitech Publishers
5. (Corresponding set of) CAD Software Theory and User Manuals

I/II Semester B.E. (Common for all branches)

Course Code : ESC103

Title of the Course: Computer Programming in C

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
03	0	2	03	04	03	10	10	80	100

Unit	Contents	Hours
I	Process of programming: Editing, Compiling, Error Checking, executing, testing and debugging of programs. Using TDM GCC compliler for C Program development, Flowcharts, Algorithms.	11
II	Types, Operators and Expressions: Variable names, Data types, sizes, constants, declarations, arithmetic operators, relational and logical operators, type conversions, increment and decrement operators, bitwise operators, assignment operators and expressions, conditional expressions precedence and order of evaluation.	08
III	Control Flow: Statements and Blocks. If-else, else-if switch Loops while and for, do-while break and continue go to and Labels. Functions and Program Structure: Basic of functions, functions returning non integers external variables scope rules.	08
IV	Arrays in C: Initializing arrays, Initializing character arrays, multidimensional arrays.	09
V	Structures C: Basics of structures, structures and functions arrays of structures, Pointer in C. Pointers to integers, characters, floats, arrays, structures.	09
	Total	45

Reference/Text Book/s:

1. Brain W. Kernighan & Dennis Ritchie, The C Programming Language, Prentice Hall, 2nd Edition, 1988.
2. Herbert Schildit, C the Complete Reference, McGraw-Hill Publication, 2000.
3. Balguruswamy, Programming in C, PHI.
4. YashwantKanitkar, Let Us C, PHI

Course Outcomes:

The student will learn

CO1 To formulate simple algorithms for arithmetic and logical problems.

CO2 To translate the algorithms to programs (in C language).

CO3 To test and execute the programs and correct syntax and logical errors.

CO4 To implement conditional branching, iteration and recursion.

CO5 To decompose a problem into functions and synthesize a complete program using divide andconquer approach.

CO6 To use arrays, pointers and structures to formulate algorithms and programs.

CO7 To apply programming to solve matrix addition and multiplication problems and searchingand sorting problems.
CO8 To apply programming to solve simple numerical method problems, namely rot finding offunction, differentiation of function and simple integration.

Laboratory - Programming for Problem Solving [L : 0; T:0 ; P : 4 (2credits)] [The laboratory should be preceded or followed by a tutorial to explain the approach or algorithm to be implemented for the problem given.]
Tutorial 1: Problem solving using computers:
Lab1: Familiarization with programming environment
Tutorial 2: Variable types and type conversions:
Lab 2: Simple computational problems using arithmetic expressions
Tutorial 3: Branching and logical expressions:
Lab 3: Problems involving if-then-else structures
Tutorial 4: Loops, while and for loops:
Lab 4: Iterative problems e.g., sum of series
Tutorial 5: 1D Arrays: searching, sorting:
Lab 5: 1D Array manipulation
Tutorial 6: 2D arrays and Strings
Lab 6: Matrix problems, String operations
Tutorial 7: Functions, call by value:
Lab 7: Simple functions
Tutorial 8 &9: Numerical methods (Root finding, numerical differentiation, numerical integration):
Lab 8 and 9: Programming for solving Numerical methods problems
Tutorial 10: Recursion, structure of recursive calls
Lab 10: Recursive functions
Tutorial 11: Pointers, structures and dynamic memory allocation
Lab 11: Pointers and structures
Tutorial 12: File handling:
Lab 12: File operations

Laboratory Outcomes
-To formulate the algorithms for simple problems
-To translate given algorithms to a working and correct program
-To be able to correct syntax errors as reported by the compilers
-To be able to identify and correct logical errors encountered at run time
-To be able to write iterative as well as recursive programs
-To be able to represent data in arrays, strings and structures and manipulate them through a program
-To be able to declare pointers of different types and use them in defining self-referential structures.
-To be able to create, read and write to and from simple text files

I/II Semester B.E. (Common for all branches)

Course Code : ESC104

Title of the Course : Workshop/ Manufacturing Process

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/week	Credits	Internal Assesment	MSE	IE	ESE	Total
1	0	4	1+4	3	50	0	0	0	50

Course Outcomes:

After completion of the course, the student 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.
4. The students will gain knowledge of the different manufacturing processes which are commonly employed in the industry, to fabricate components using different materials.

Units	Contents (Theory)	Hours
1	Manufacturing Methods- casting, forming, machining, joining, advanced manufacturing methods	3
2	Fitting operations & power tools and Carpentry	1
3	Plastic moulding, glass cutting	1
4	Metal casting	1
5	Welding (arc welding & gas welding), brazing	1
	Contents(Practicals)	
1	Introduction various shops with its tools and equipments.	2
2	One job on carpentry with minimum two types of joints (any two) with different operations like cutting, filing, planning etc.	8
3	One job on Fitting including filing, cutting, drilling etc.	10
4	One job on sheet metal with different operations like cutting, hammering, riveting/soldering etc.	8
5	One job on black smithy including heating, hammering, fullering, edging, bending, cutting, trimming etc.	8
6	Demonstrations on welding processes like arc welding, gas welding and resistance welding.	4
7	Introduction to various machine tools like lathe, drilling machine, milling machine, shaping, planning and grinding machine. Demonstrations of each machine.	4
8	Introduction to moulding practices and its tools, equipments and procedure	4
9	Introduction to Rolling, Forging and Extrusion processes.	4

Text Book:

1. HajraChoudhury S.K., HajraChoudhury 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.

Reference Books:

1. Kalpakjian S. And Steven S. Schmid, "Manufacturing Engineering and Technology", 4th edition, Pearson Education India Edition, 2002.
2. Rao P.N., "Manufacturing Technology", Vol. I and Vol. II, Tata McGrawHill House, 2017.

I/II Semester B.E. (Common for all branches)

Course Code : HSMC101

Title of the Course : English

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/week	Credits	Internal Assesment	MSE	IE	ESE	Total
2	0	2	2+2	3	50	0	0	0	50

Course Outcomes

The student will acquire basic proficiency in English including reading and listening comprehension, writing and speaking skills.

Units	Contents (Theory)	Hours
1	Vocabulary Building 1.1 The concept of Word Formation 1.2 Root words from foreign languages and their use in English 1.3 Acquaintance with prefixes and suffixes from foreign languages in English to form derivatives. 1.4 Synonyms, antonyms, and standard abbreviations.	6
2	2. Basic Writing Skills 2.1 Sentence Structures 2.2 Use of phrases and clauses in sentences 2.3 Importance of proper punctuation 2.4 Creating coherence 2.5 Organizing principles of paragraphs in documents 2.6 Techniques for writing precisely.	6
3	Identifying Common Errors in Writing 3.1 Subject-verb agreement 3.2 Noun-pronoun agreement 3.3 Misplaced modifiers 3.4 Articles 3.5 Prepositions 3.6 Redundancies 3.7 Clichés	6
	Nature and Style of sensible Writing 4.1 Describing	

4	4.2 Defining 4.3 Classifying 4.4 Providing examples or evidence 4.5 Writing introduction and conclusion Writing Practices 4.6 Comprehension 4.7 Précis Writing 4.8 Essay Writing	6
5	Oral Communication (This unit involves interactive practice sessions in Language Lab) 5.1 Listening Comprehension 5.2 Pronunciation, Intonation, Stress and Rhythm 5.3 Common Everyday Situations: Conversations and Dialogues 5.4 Communication at Workplace 5.5 Interviews 5.6 Formal Presentations	6

Suggested Readings:

(i) Practical English Usage. Michael Swan. OUP. 1995.
(ii) Remedial English Grammar. F.T. Wood. Macmillan.2007
(iii) On Writing Well. William Zinsser. Harper Resource Book. 2001
(iv) Study Writing. Liz Hamp-Lyons and Ben Heasly.Cambridge University Press. 2006.
(v) Communication Skills. Sanjay Kumar and PushpLata.Oxford University Press. 2011.
(vi) Exercises in Spoken English. Parts.I-III. CIEFL, Hyderabad. Oxford University Press

I/II Semester B.E. (Common for all branches)

Course Code : HSMC102

Title of the Course : Soft skill

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/week	Credits	Internal Assesment	MSE	IE	ESE	Total
2	0	0	2	2	50	0	0	0	50

Units	Contents (Theory)	Hours
1	**Team Building**: To know the nature of the team, To understand personal as well as professional goals of the members of the group, To work effectively in a team through building relation and interpersonal communication **Art of Negotiation:** To understand what is negotiation, Ways of negotiating and being successful in it, To understand the power of language and non-verbal communication	6
	Dress for Success: To learn selection of proper attire as per the situation, How to carry one's	

2	self, How to project one's self in the right frame and spirit. **Table Manners:** To learn the manners during professional meetings over lunch/dinner, Basics of the table manner.	6
3	**Organizing Meetings:** How to call the meeting, How to organize a meeting in the smooth manner, How to design the agenda and prepare minutes of the meeting. **Stress Management:** To learn kinds of stress, To identify the right reason/s of stress, How to handle the pressure and perform efficiently in such situations, Techniques to cope with the stressful situation at aworkplace	6
4	**Telephone etiquettes:** Students learn the telephonic etiquettes; tone and pitch of the voice, How to send a voice mail, Students are also exposed to the etiquettes **Time Management:** Goal setting, To make students understand the importance of time, How to prepare the time line and allocate time to complete different tasks, How to successfully follow the prepared time-schedule.	6
5	**Presentation Skills:** To learn the skill of presentation, How to prepare thepresentation, Knowing the audience and their requirements, Effective way to deliver the presentation, How to prepare the multimedia presentation **Organizational Skills:** To understand the nature of the organization, To understand the structure and communication channel of the organization **Group Discussion**: Understanding the nature of discussion, Difference between debate and discussion. **Personal Interviews** To learn the skills of appearing in an interview and being successful in it	6

Books Recommended

1. Peggy Klaus, The Hard Truth about Soft Skills.
2. Nitin Bhatnagar. Effective Communication and Soft Skills. Pearson Education India.
3. Eric Garner. Team Building.
4. Wendy Palmer and Janet Crawford. Leadership Embodiment.

APPENDIX-II
FORM – AHCI

GONDWANA UNIVERSITY, GADCHIROLI
FACULTY OF SCIENCE & TECHNOLOGY
COMPOSITE GRADE SHEET FOR AUDIT HEADS

NAME OF THE COLLEGE: _____

NAME OF THE STUDENT	PRN NUMBER	SEMESTER	BRANCH

AUDIT HEAD CODE	TITLE OF THE AUDIT HEAD	GRADE POINT SCORED (OUT OF 10)	COMPOSITE AUDIT GRADE POINT (CAGP) AVERAGE
A	National Social Service (NSS)		
B	Paper Presentation		
C	Computer/Software/ Campus Recruitment courses (3-5 days)		
D	Hardware / Software Competition participation		
E	YOGA/MEDITATION Training Certificate (Minimum 3 DAYS)		
F	Certificate of Service to the Home for the Aged / Orphans/Differently Enabled.		
G	Certificate of Appreciation by local Civic/ District/ State/ National level Government Authority / Organizations		
H	National Cadet Corps (NCC)		
I	Quiz Competition		
J	Office Bearer in Students Body / Professional Society (College level)		
K	Volunteer in minimum inter collegiate activities		
L	Cultural Activity Competition, National, State, District level **Essay Competition.**		
M	Membership of any registered Non-Government Organization (NGO)		
N	Certificate of Noteworthy participation in Environment Day/ AKSHAY URJA Day or such other programs of national importance/ Environmental day, Science day, Engineers Day, Teachers day etc.		
O	Blood Donation		
P	Debate Competition		
Q	Soft Skills Development Course (3-5 days)		
R	Sports Team Participation		
S	Certificate of Noteworthy participation in National Day event like SWACHCHHA BHARAT ABHIYAAN/TREE PLOANTATION		
T	Plant/ Industrial Visit		
U	Participation in 3 to 5 days youth Seminars/Conferences/Workshops on Social, Environmental, Wellbeing, Consciousness Programs.		

CODES (IN ALPHABETIC ORDER) OF AUDIT HEADS QUALIFIED BY THE STUDENT									

DIRECTOR,
PHYSICL EDUCATION/ **HEAD OF THE DEPARTMENT** **PRINCIPAL**

Appendix - III

A Guide to Induction Program

1. Introduction

(Induction Program was discussed and approved for all colleges by AICTE in March 2017. It was discussed and accepted by the Council of IITs for all IITs in August 2016. It was originally proposed by a Committee of IIT Directors and accepted at the meeting of all IIT Directors in March 2016.[1] *This guide has been prepared based on the Report of the Committee of IIT Directors and the experience gained through its pilot implementation in July 2016 as accepted by the Council of IITs. Purpose of this document is to help institutions in understanding the spirit of the accepted Induction Program and implementing it.)*

Engineering colleges were established to train graduates well in the branch/department of admission, have a holistic outlook, and have a desire to work for national needs and beyond.

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

There is a mad rush for engineering today, without the student determining for himself his interests and his goals. This is a major factor in the current state of demotivation towards studies that exists among UG students.

The success of gaining admission into a desired institution but failure in getting the desired branch, with peer pressure generating its own problems, leads to a peer environment that is demotivating and corrosive. Start of hostel life without close parental supervision at the same time, further worsens it with also a poor daily routine.

To come out of this situation, a multi-pronged approach is needed. One will have to work closely with the newly joined students in making them feel comfortable, allow them to explore their academic interests and activities, reduce competition and make them work for excellence, promote bonding within them, build relations between teachers and students, give a broader view of life, and build character.

---

[1] A Committee of IIT Directors was setup in the 152nd Meeting of IIT Directors on 6th September 2015 at IIT Patna, on how to motivate undergraduate students at IITs towards studies, and to develop verbal ability. The Committee submitted its report on 19th January 2016. It was considered at the 153rd Meeting of all IIT Directors at IIT Mandi on 26 March 2016, and the accepted report came out on 31 March 2016. The Induction Program was an important recommendation, and its pilot was implemented by three IITs,

namely, IIT(BHU), IIT Mandi and IIT Patna in July 2016. At the 50th meeting of the Council of IITs on 23 August 2016, recommendation on the Induction Program and the report of its pilot implementation were discussed and the program was accepted for all IITs.

2. Induction Program

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

We propose a 3-week long induction program for the UG students entering the institution, right at the start. Normal classes start only after the induction program is over. Its purpose is to make the students feel comfortable in their new environment, open them up, set a healthy daily routine, create bonding in the batch as well as between faculty and students, develop awarness, sensitivity and understanding of the self, people around them, society at large, and nature.[2]

The time during the Induction Program is also used to rectify some critical lacunas, for example, English background, for those students who have deficiency in it. The following are the activities under the induction program in which the student would be fully engaged throughout the day for the entire duration of the program.

Induction Program as described here borrows from three programs running earlier at different institutions: (1) Foundation Program running at IIT Gadhinagar since July 2011, (2) Human Values course running at IIIT Hyderabad since July 2005, and (3) Counselling Service or mentorship running at several IITs for many decades. Contribution of each one is described next.

(1) IIT Gandhinagar was the first IIT to recognize and implement a special 5-week Foundation Program
for the incoming 1st year UG students. It took a bold step that the normal classes would start only after the five week period. It involved activities such as games, art, etc., and also science and other creative workshops and lectures by resource persons from outside.

(2) IIIT Hyderabad was the first one to implement a compulsary course on Human Values. Under it, classes were held by faculty through discussions in small groups of students, rather than in lecture mode. Moreover, faculty from all departments got involved in conducting the group discussions under the course. The content is non-sectarian, and the mode is dialogical rather than sermonising or lecturing. Faculty were trained beforehand, to conduct these discussions and to guide students on issues of life.

(3) Counselling at some of the IITs involves setting up mentor-mentee network under which 1st year students would be divided into small groups, each assigned a senior student as a student guide, and a faculty member as a mentor. Thus, a new student gets connected to a faculty member as well as a senior student, to whom he/she could go to in case of any difficulty whether psychological, financial, academic, or otherwise.

The Induction Program defined here amalgamates all the three into an integrated whole, which leads to its high effectiveness in terms of building physical activity, creativity, bonding, and character. It develops sensitivity towards self and one's relationships, builds awareness about others and society beyond the individual, and also in bonding with their own batch-mates and a senior student besides a faculty member.

Scaling up the above amalgamation to an intake batch of 1000 plus students was done at IIT(BHU), Varanasi starting from July 2016.

2.1 Physical Activity

This would involve a daily routine of physical activity with games and sports. It would start with all students coming to the field at 6 am for light physical exercise or yoga. There would also be games in the evening or at other suitable times according to the local climate. These would help develop team work. Each student should pick one game and learn it for three weeks. There could also be gardening or other suitably designed activity where labour yields fruits from nature.

2.2 Creative Arts

Every student would choose one skill related to the arts whether visual arts or performing arts. Examples are painting, sculpture, pottery, music, dance etc. The student would pursue it every day for the duration of the program.

These would allow for creative expression. It would develop a sense of aesthetics and also enhance their creativity which would, hopefully, flow into engineering design later.

2.3 Universal Human Values

It gets the student to explore oneself and allows one to experience the joy of learning, stand up to peer pressure, take decisions with courage, be aware of relationships with colleagues and supporting staff in the hostel and department, be sensitive to others, etc. Need for character building has been underlined earlier. A module in Universal Human Values provides the base.

Methodology of teaching this content is extremely important. It must not be through do's and dont's, but get students to explore and think by engaging them in a dialogue. It is best taught through group discussions and real life activities rather than lecturing. The role of group discussions, however, with clarity of thought of the teachers cannot be over emphasized. It is essential for giving exposure, guiding thoughts, and realizing values.

The teachers must come from all the departments rather than only one department like HSS or from outside of the Institute. Experiments in this direction at IIT(BHU) are noteworthy and one can learn from them.[3]

Discussions would be conducted in small groups of about 20 students with a faculty mentor each. It is to open thinking towards the self. Universal Human Values discussions could even continue for rest of the semester as a normal course, and not stop with the induction program.

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

---

[3]The Universal Human Values Course is a result of a long series of experiments at educational institutes starting from IIT-Delhi and IIT Kanpur in the 1980s and 1990s as an elective course, NIT Raipur in late 1990s as a compulsory one-week off campus program. The courses at IIT(BHU) which started from July 2014, are taken and developed from two compulsory courses at IIIT Hyderabad first introduced in July 2005.

2.4 Literary

Literary activity would encompass reading, writing and possibly, debating, enacting a play etc.

2.5 Proficiency Modules

This period can be used to overcome some critical lacunas that students might have, for example, English, computer familiarity etc. These should run like crash courses, so that when normal courses start after the induction program, the student has overcome the lacunas substantially. We hope that problems arising due to lack of English skills, wherein students start lagging behind or failing in several subjects, for no fault of theirs, would, hopefully, become a thing of the past.

2.6 Lectures by Eminent People

This period can be utilized for lectures by eminent people, say, once a week. It would give the students exposure to people who are socially active or in public life.

2.7 Visits to Local Area

A couple of visits to the landmarks of the city, or a hospital or orphanage could be organized. This would familiarize them with the area as well as expose them to the under privileged.

2.8 Familiarization to Dept./Branch & Innovations

The students should be told about different method of study compared to coaching that is needed at IITs. They should be told about what getting into a branch or department means what role it plays in society, through its technology. They should also be shown the laboratories, workshops & other faculties.

3.0 Schedule

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

3.1 Initial Phase

Time	*Activity*
Day 0	
Whole day	*Students arrive - Hostel allotment. (Preferably do pre-allotment).*
Day 1	
09:00 am - 03:00 pm	*Academic registration*
04:30 pm - 06:00 pm	Orientation
Day 2	
09:00 am - 10:00 am	Diagnostic test (for English etc.)
10:15 am - 12:25 pm	Visit to respective depts.
12:30 pm - 01:55 pm	*Lunch*
02:00 pm - 02:55 pm	Director's address
03:00 pm - 05:00 pm	Interaction with parents
03:30 pm - 05:00 pm	Mentor-mentee groups - Introduction within group. (Same as Universal Human Values groups)

3.2 Regular Phase

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

3.2.1 Daily Schedule

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

Sessn.	*Time*	*Activity*	*Remarks*
	Day 3 onwards		
	06:00 am	*Wake up call*	
I	06:30 am - 07:10 am	Physical activity (mild exercise/yoga)	
	07:15 am - 08:55 am	*Bath, Breakfast, etc.*	
II	09:00 am - 10:55 am	Creative Arts / Universal Human Values	Half the groups do Creative Arts
III	11:00 am - 12:55 pm	Universal Human Values / Creative Arts	Complementary alternate
	01:00 pm - 02:25 pm	*Lunch*	
IV	02:30 pm - 03:55 pm	Afternoon Session	See below.
V	04:00 pm - 05:00 pm	Afternoon Session	See below.
	05:00 pm - 05:25 pm	*Break / light tea*	
VI	05:30 pm - 06:45 pm	Games / Special Lectures	
	06:50 pm - 08:25 pm	*Rest and Dinner*	
VII	08:30 pm - 09:25 pm	Informal interactions (in hostels)	

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

3.2.2 Afternoon Activities (Non-Daily)

The following five activities are scheduled at different times of the Induction Program, and are not held daily for everyone:

1. Familiarization to Dept./Branch & Innovations
2. Visits to Local Area
3. Lectures by Eminent People
4. Literary
5. Proficiency Modules

Here is the approximate activity schedule for the afternoons (may be changed to suit local needs):

Activity	*Session*	*Remarks*
Familiarization with Dept/Branch & Innovations	IV	For 3 days (Day 3 to 5)
Visits to Local Area	IV, V and VI	For 3 days - interspersed (e.g., 3 Saturdays)
Lectures by Eminent People	IV	As scheduled - 3-5 lectures
Literary (Play / Book Reading / Lecture)	IV	For 3-5 days
Proficiency Modules	V	Daily, but only for those who need it

3.3 Closing Phase

Time	*Activity*
Last But One Day	
08:30 am - 12 noon	Discussions and finalization of presentation within each group
02:00 am - 05:00 pm	Presentation by each group in front of 4 other groups besides their own (about 100 students)
Last Day	
Whole day	Examinations (if any). May be expanded to last 2 days, in case needed.

3.4 Follow Up after Closure

A question comes up as to what would be the follow up program after the formal 3-week Induction Program is over? The groups which are formed should function as mentor-mentee network. A student should feel free to approach his faculty mentor or the student guide, when facing any kind of problem, whether academic or financial or psychological etc. (For every 10 undergraduate first year students, there would be a senior student as a *student guide*, and for every 20 students, there would be a *faculty mentor*.) Such a group should remain for the entire 4-

5 year duration of the stay of the student. Therefore, it would be good to have groups with the students as well as teachers from the same department/discipline.

Here we list some important suggestions which have come up and which have been experimented with.

3.4.1 Follow Up after Closure – Same Semester

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

3.4.2 Follow Up – Subsequent Semesters

It is extremely important that continuity be maintained in subsequent semesters.

It is suggested that at the start of the subsequent semesters (upto fourth semester), three days be set aside for three full days of activities related to follow up to Induction Program. The students be shown inspiring films, do collective art work, and group discussions be conducted. Subsequently, the groups should meet at least once a month.

4.0 Summary

Engineering institutions were set up to generate well trained manpower in engineering with a feeling of responsibility towards oneself, one's family, and society. The incoming undergraduate students are driven by their parents and society to join engineering without understanding their own interests and talents. As a result, most students fail to link up with the goals of their own institution.

The graduating student must have values as a human being, and knowledge and metaskills related to his/her profession as an engineer and as a citizen. Most students who get demotivated to study engineering or their branch, also lose interest in learning.

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

The *Universal Human Values* component, which acts as an anchor, develops awareness and sensitivity, feeling of equality, compassion and oneness, draw attention to society and nature, and character to follow through. It also makes them reflect on their relationship with their

families and extended family in the college (with hostel staff and others). It also connects students with each other and with teachers so that they can share any difficulty they might be facing and seek help.

[4]We are aware that there are advantages in mixing the students from different depts. However, in mixing, it is our experience that the continuity of the group together with the faculty mentor breaks down soon after. Therefore, the groups be from the same dept. but hostel wings have the mixed students from different depts. For example, the hostel room allotment should be in alphabetical order irrespective of dept.

References:

Motivating UG Students Towards Studies,

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

Contact:

Prof. Rajeev Sangal

Director, IIT (BHU), Varanasi

(director@iitbhu.ac.in)

18 June 2017

Four Year Degree Course in Engineering and Technology
Course and Examination Scheme with Model AICTE Curriculum
First Semester Common to GROUP-A branches of Engineering & Technology

Course Category	Course Code	BoS	Subject	Teaching Scheme				Examination Scheme									
				Hours Per Week			Number of Credits	THEORY						PRACTICAL			
				L	T	P		Duration of Paper (Hrs.)	Max. Marks ESE	Max. Marks Sessional		Total	Min. Passing Marks	Max. Marks TW	Max. Marks POE	Total	Min. Passing Marks
										MSE	IE						
BSC	FE101	S&H	Physics	3	1	0	4	3	80	10	10	100	40	--	--	--	--
BSC	FE102	S&H	Mathematics –I	3	1	0	4	3	80	10	10	100	40	--	--	--	--
ESC	FE103	Electrical	Basic Electrical Engineering	3	0	0	3	3	80	10	10	100	40	--	--	--	--
ESC	FE104	Mechanical	Engineering Graphics & Design	2	0	0	2	4	80	10	10	100	40	--	--	--	--
HSMC	FE105	S&H	Soft Skill	2	0	0	2	-	-	40	10	50	20	--	--	--	--
			Laboratory														
BSC	FE106	S&H	Physics Lab	0	0	3	1	-	-	-	-	-	-	25	25	50	25
ESC	FE107	Electrical	Basic Electrical Engineering Lab	0	0	2	1	-	-	-	-	-	-	25	25	50	25
ESC	FE108	Mechanical	Engineering Graphics & Design Lab	0	0	4	2	-	-	-	-	-	-	25	25	50	25
		Total		**13**	**2**	**9**						**450**				**150**	
		Semester Total		**24**			**19**	**600**									

Four Year Degree Course in Engineering and Technology
Course and Examination Scheme with Model AICTE Curriculum
First Semester Common to GROUP-B branches of Engineering & Technology

Course Category	Course Code	BoS	Subject	Teaching Scheme				Examination Scheme									
				Hours Per Week			Number of Credits	THEORY						PRACTICAL			
				L	T	P		Duration of Paper (Hrs.)	Max. Marks ESE	Max. Marks Sessional		Total	Min. Passing Marks	Max. Marks TW	Max. Marks POE	Total	Min. Passing Marks
										MSE	IE						
BSC	FE201	S&H	Chemistry-I	3	1	0	4	3	80	10	10	100	40	--	--	--	--
BSC	FE102	S&H	Mathematics –I	3	1	0	4	3	80	10	10	100	40	--	--	--	--
ESC	FE203	Computer	Programming for Problem Solving	3	0	0	3	3	80	10	10	100	40	--	--	--	--
HSMC	FE204	S&H	English	2	0	0	2	-	-	40	10	50	20	--	--	--	--
			Laboratory														
BSC	FE205	S&H	Chemistry-I Lab	0	0	3	1	-	-	-	-	-		25	25	50	25
ESC	FE206	Computer	Programming for Problem Solving Lab	0	0	2	1	-	-	-	-	-		25	25	50	25
ESC	FE207	Mechanical	Workshop/ Manufacturing Practices	1	0	4	3	-	-	-	-	-		50	50	100	50
HSMC	FE208	S&H	English	0	0	2	1							50	-	50	25
		Total		**12**	**2**	**11**						**350**				**250**	
		Semester Total		**25**			**19**	**600**									

Four Year Degree Course in Engineering and Technology
Course and Examination Scheme with Model AICTE Curriculum
Second Semester Common to GROUP-A branches of Engineering & Technology

Course Category	Course Code	BoS	Subject	Teaching Scheme				Examination Scheme									
				Hours Per Week			Number of Credits	THEORY						PRACTICAL			
				L	T	P		Duration of Paper (Hrs.)	Max. Marks ESE	Max. Marks Sessional		Total	Min. Passing Marks	Max. Marks TW	Max. Marks POE	Total	Min. Passing Marks
										MSE	IE						
BSC	FE201	S&H	Chemistry-I	3	1	0	4	3	80	10	10	100	40	--	--	--	--
BSC	FE202	S&H	Mathematics –II	3	1	0	4	3	80	10	10	100	40	--	--	--	--
ESC	FE203	Computer	Programming for Problem Solving	3	0	0	3	3	80	10	10	100	40	--	--	--	--
HSMC	FE204	S&H	English	2	0	0	2	-	-	40	10	50	20	--	--	--	--
			Laboratory														
BSC	FE205	S&H	Chemistry-I Lab	0	0	3	1	-	-	-	-	-		25	25	50	25
ESC	FE206	Computer	Programming for Problem Solving Lab	0	0	2	1	-	-	-	-	-		25	25	50	25
ESC	FE207	Mechanical	Workshop/ Manufacturing Practices	1	0	4	3	-	-	-	-	-		50	50	100	50
HSMC	FE208	S&H	English	0	0	2	1							50	-	50	25
		Total		**12**	**2**	**11**						**350**				**250**	
		Semester Total		**25**			**19**	**600**									

Four Year Degree Course in Engineering and Technology
Course and Examination Scheme with Model AICTE Curriculum
Second Semester Common to GROUP-B branches of Engineering & Technology

Course Category	Course Code	BoS	Subject	Teaching Scheme				Examination Scheme									
				Hours Per Week			Number of Credits	THEORY						PRACTICAL			
				L	T	P		Duration of Paper (Hrs.)	Max. Marks ESE	Max. Marks Sessional		Total	Min. Passing Marks	Max. Marks TW	Max. Marks POE	Total	Min. Passing Marks
										MSE	IE						
BSC	FE101	S&H	Physics	3	1	0	4	3	80	10	10	100	40	--	--	--	--
BSC	FE202	S&H	Mathematics –II	3	1	0	4	3	80	10	10	100	40	--	--	--	--
ESC	FE103	Electrical	Basic Electrical Engineering	3	0	0	3	3	80	10	10	100	40	--	--	--	--
ESC	FE104	Mechanical	Engineering Graphics & Design	2	0	0	2	4	80	10	10	100	40	--	--	--	--
HSMC	FE105	S&H	Soft Skill	2	0	0	2	-	-	40	10	50	20	--	--	--	--
			Laboratory														
BSC	FE106	S&H	Physics Lab	0	0	3	1	-	-	-	-	-	-	25	25	50	25
ESC	FE107	Electrical	Basic Electrical Engineering Lab	0	0	2	1	-	-	-	-	-	-	25	25	50	25
ESC	FE108	Mechanical	Engineering Graphics & Design Lab	0	0	4	2	-	-	-	-	-	-	25	25	50	25
		Total		**13**	**2**	**9**						**450**				**150**	
		Semester Total		**24**			**19**	**600**									

Four Year Degree Course in Engineering and Technology
Course and Examination Scheme with Model AICTE Curriculum
Third Semester <branch of Engineering & Technology>

Course Category	Course Code	BoS	Course title	Teaching Scheme				Examination Scheme									
				Hours Per Week			Number of Credits	THEORY						PRACTICAL			
				L	T	P		Duration of Paper (Hrs.)	Max. Marks ESE	Max. Marks Sessional		Total	Min. Passing Marks	Max. Marks TW	Max. Marks POE	Total	Min. Passing Marks
										MSE	IE						
BSC/ESC/ HSMC	SE101							3	80	10	10	100	40	--	--	--	--
PCC	SE102							3	80	10	10	100	40	--	--	--	--
PCC	SE103							3	80	10	10	100	40	--	--	--	--
PCC	SE104							3	80	10	10	100	40	--	--	--	--
PCC	SE105							3	80	10	10	100	40	--	--	--	--
Laboratory																	
PCC	SE106							-	-	-	-	-	-	25	25	50	25
PCC	SE107							-	-	-	-	-	-	25	25	50	25
PCC	SE108							-	-	-	-	-	-	25	25	50	25
MC	SE109						0										
		Total		**0**	**0**	**0**						**500**				**150**	
		Semester Total		**0**			**20**	**650**									

Four Year Degree Course in Engineering and Technology
Course and Examination Scheme with Model AICTE Curriculum
Fourth Semester <branch of Engineering & Technology>

Course Category	Course Code	BoS	Course title	Teaching Scheme				Examination Scheme									
				Hours Per Week			Number of Credits	THEORY						PRACTICAL			
				L	T	P		Duration of Paper (Hrs.)	Max. Marks ESE	Max. Marks Sessional		Total	Min. Passing Marks	Max. Marks TW	Max. Marks POE	Total	Min. Passing Marks
										MSE	IE						
BSC/ESC/ HSMC	SE201							3	80	10	10	100	40	--	--	--	--
BSC/ESC/ HSMC	SE202							3	80	10	10	100	40	--	--	--	--
PCC	SE203							3	80	10	10	100	40	--	--	--	--
PCC	SE204							3	80	10	10	100	40	--	--	--	--
PCC	SE205							3	80	10	10	100	40	--	--	--	--
Laboratory																	
PCC	SE206							-	-	-	-	-		25	25	50	25
PCC	SE207							-	-	-	-	-		25	25	50	25
PCC	SE208							-	-	-	-	-		25	25	50	25
		Total		**0**	**0**	**0**						**500**				**150**	
		Semester Total		**0**			**20**	**650**									

Four Year Degree Course in Engineering and Technology
Course and Examination Scheme with Model AICTE Curriculum
Fifth Semester <branch of Engineering & Technology>

Course Category	Course Code	BoS	Course title	Teaching Scheme				Examination Scheme									
				Hours Per Week			Number of Credits	THEORY						PRACTICAL			
				L	T	P		Duration of Paper (Hrs.)	Max. Marks ESE	Max. Marks Sessional		Total	Min. Passing Marks	Max. Marks TW	Max. Marks POE	Total	Min. Passing Marks
										MSE	IE						
PEC-1	TE101							3	80	10	10	100	40	--	--	--	--
OEC-1	TE102							3	80	10	10	100	40	--	--	--	--
PCC	TE103							3	80	10	10	100	40	--	--	--	--
PCC	TE104							3	80	10	10	100	40	--	--	--	--
PCC	TE105							3	80	10	10	100	40	--	--	--	--
PCC	TE106							3	80	10	10	100	40	--	--	--	--
Laboratory																	
PCC	TE107							-	-	-	-	-		25	25	50	25
PCC	TE108							-	-	-	-	-		25	25	50	25
			Total	**0**	**0**	**0**						**600**				**100**	
			Semester Total	**0**			**20**	**700**									

Four Year Degree Course in Engineering and Technology
Course and Examination Scheme with Model AICTE Curriculum
Sixth Semester <branch of Engineering & Technology>

Course Category	Course Code	BoS	Course title	Teaching Scheme				Examination Scheme									
				Hours Per Week			Number of Credits	THEORY						PRACTICAL			
				L	T	P		Duration of Paper (Hrs.)	Max. Marks ESE	Max. Marks Sessional		Total	Min. Passing Marks	Max. Marks TW	Max. Marks POE	Total	Min. Passing Marks
										MSE	IE						
PEC-2	TE201							3	80	10	10	100	40	--	--	--	--
OEC-2	TE202							3	80	10	10	100	40	--	--	--	--
HSMC/BSC	TE203							3	80	10	10	100	40	--	--	--	--
PCC	TE204							3	80	10	10	100	40	--	--	--	--
PCC	TE205							3	80	10	10	100	40	--	--	--	--
Laboratory																	
PCC	TE206							-	-	-	-	-		25	25	50	25
PCC	TE207							-	-	-	-	-		25	25	50	25
PCC	TE208							-	-	-	-	-		25	25	50	25
		Total		**0**	**0**	**0**						**500**				**150**	
		Semester Total		**0**			**20**	**650**									

Four Year Degree Course in Engineering and Technology
Course and Examination Scheme with Model AICTE Curriculum
Seventh Semester <branch of Engineering & Technology>

Course Category	Course Code	BoS	Course title	Teaching Scheme				Examination Scheme									
				Hours Per Week			Number of Credits	THEORY						PRACTICAL			
				L	T	P		Duration of Paper (Hrs.)	Max. Marks ESE	Max. Marks Sessional		Total	Min. Passing Marks	Max. Marks TW	Max. Marks POE	Total	Min. Passing Marks
										MSE	IE						
HSMC/BSC	FE101							3	80	10	10	100	40	--	--	--	--
PEC-3	FE102							3	80	10	10	100	40	--	--	--	--
PEC-4	FE103							3	80	10	10	100	40	--	--	--	--
PEC-5	FE104							3	80	10	10	100	40	--	--	--	--
OEC-3	FE105							3	80	10	10	100	40	--	--	--	--
Laboratory																	
PEC	FE106							-	-	-	-	-		25	25	50	25
PROJ	FE107							-	-	-	-	-		50	50	100	50
		Total		**0**	**0**	**0**						**500**				**150**	
		Semester Total		**0**			**21**	**650**									

Four Year Degree Course in Engineering and Technology
Course and Examination Scheme with Model AICTE Curriculum
Eighth Semester <branch of Engineering & Technology>

Course Category	Course Code	BoS	Course title	Teaching Scheme				Examination Scheme									
				Hours Per Week			Number of Credits	THEORY						PRACTICAL			
				L	T	P		Duration of Paper (Hrs.)	Max. Marks ESE	Max. Marks Sessional		Total	Min. Passing Marks	Max. Marks TW	Max. Marks POE	Total	Min. Passing Marks
										MSE	IE						
PEC-6	FE201							3	80	10	10	100	40	--	--	--	--
PEC-7	FE202							3	80	10	10	100	40	--	--	--	--
OEC-4	FE203							3	80	10	10	100	40	--	--	--	--
OEC-5	FE204							3	80	10	10	100	40	--	--	--	--
Laboratory								3	80	10	10	100	40	--	--	--	--
PROJ	FE205																
		Total		**0**	**0**	**0**		-	-	-	-	-		50	50	200	50
		Semester Total		**0**			**21**					**400**				**200**	
								600									