

Government Polytechnic, Aurangabad.

(An autonomous Institute of Govt. of Maharashtra)

Programme Curriculum Structure (6th Revision : Outcome Based Education - 2017-18)

Name of Programme : DIPLOMA IN MECHANICAL ENGINEERING

First Semester Courses

Sr. No.	Semester	Course Code	Course Name	Teaching Scheme/Credits				Examination Scheme (Maximum Marks)							Theory Exam Hours	Compulsory/Optional
				Theory	Practical	Tutorial	Total Credit	PT	TH	PR	OR	PA (TW)	Total			
1	I	6G101	Basic Mathematics	3	--	1	4	20	80	--	--	--	100	3	Compulsory	
2	I	6G104	Engineering Chemistry	3	2	--	5	20~	80~	25@	--	25	150	3	Compulsory	
3	I	6G201	Engineering Graphics	2	2	--	4	--	--	50@	--	50	100	--	Compulsory	
4	I	6G202	Workshop Practice	--	3	--	3	--	--	--	--	50	50	--	Compulsory	
5	I	6G203	Basics of Computers	--	2	--	2	--	--	25@	--	25	50	--	Compulsory	
6	I	6G301	English	2	2	--	4	20	80	--	--	25	125	3	Compulsory	
7	I	6G304	Environmental Science	--	2	--	2	--	--	--	--	50	50	--		
				10	13	1	24	60	240	100		225	625			

Legends : L-Lecture; T-Tutorial/Teacher Guided Theory Practice ; P- Practical; C- Credits; ESE- End Semester Examination; PT – Progressive Test, PA- Progressive Assessment, PR- Practical Examination, OR – Oral Examination, TW - Term Work, # External, @ Internal examination , ~ Online Examination.



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Programme Curriculum Structure (6th Revision : Outcome Based Education - 2017-18)
Name of Programme : DIPLOMA IN MECHANICAL ENGINEERING
Second Semester Courses

Sr. No.	Semester	Course Code	Course Name	Teaching Scheme/Credits				Examination Scheme (Maximum Marks)							Compulsory/Optional
				Theory	Practical	Tutorial	Total Credit	PT	TH	PR	OR	PA (TW)	Total	Theory Exam Hours	
1	II	6G102	Engineering Mathematics	3	--	1	4	20	80	--	--	--	100	3	Compulsory
2	II	6G103	Engineering Physics	3	2	--	5	20~	80~	25	--	25	150	3	Compulsory
3	II	6Q201	Engineering Mechanics	4	2	--	6	20	80	-	--	25	125	3	Compulsory
4	II	6R201	Engineering Drawing	2	4	--	6	--	--	50@	--	50	100	--	Compulsory
5	II	6G302	Communication Skills	1	2	--	3	--	--	-	25@	50	75	--	Compulsory
6	II	6M204	Mechanical Technology	2	3	--	5	20	80	-	25@	25	150	3	Compulsory
7	II	6G311-25	Non exam	--	2	--	2	--	--	--	--	--	--	--	
				14	15	2	31	80	320	75	50	175	650		

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COURSE TITLE : BASIC MATHEMATICS

COURSE CODE : 6G101

Diploma Programme in which this course is offered	Semester in which offered
CE/ME/EE/ET/IT/CO/AE	First Semester

1. RATIONALE :

This course is classified under foundation level courses and intends to teach students basic facts, concepts and principles of mathematics, as a tool to analyse engineering problems. Diploma engineers have to solve the problems in engineering. Basic mathematics is an attempt to initiate the multi-dimensional logical thinking and reasoning capabilities of the students.

2. COMPETENCY :

At the end of studying this course students will be able to
“Solve engineering problems by using analytical and systematic approach.”

3. COURSE OUTCOMES :

Students will be able to

Apply rules of Logarithms in solving simple engineering problems

1. Solve simultaneous equations using concepts of Determinants and Matrices
2. Solve simple engineering problems using concepts of Partial Fractions
3. Solve simple engineering problems by applying formulae of trigonometry.
4. Solve simple engineering problem of function using the different definition of Function
5. Solve simple engineering problem of function using the rules of Limits.

4. TEACHING AND EXAMINATION SCHEME :

Teaching Scheme (In Hours)			Total Credits (L+T+P)	Examination Scheme				Total Marks
L	T	P		Theory Marks		Practical Marks		
			C	ESE	PT	ESE	PA	
03	01	--	04	80	20	--	--	100
Exam Duration				03 Hrs	01 Hr			

Legends : L-Lecture; T-Tutorial/Teacher Guided Theory Practice ; P- Practical; C- Credits; ESE- End Semester Examination; PT – Progressive Test, PA- Progressive Assessment, PR-Practical Examination, OR – Oral Examination, TW - Term Work, # External, @ Internal examination, ~ Online Examination.



5. COURSE DETAILS :

Unit	Major Learning Outcomes (in cognitive domain)	Topics and Sub-topics
Unit I Revision	1a.To recall/know the basic concept of Logarithms and Determinant of order 2and3	1.1 Logarithms 1.2 Definition natural and common logarithms. 1.3 Laws of logarithm . 1.4 Definition of Determinant, Order of Determinant. 1.5 Expansion of Determinant of order 2 and 3. 1.6 Properties of Determinant.
Unit II Determinant And Matrices	2a.Students will be able to Solve simultaneous equations using concepts of Determinants and Matrices	2.1 Cramer’s Rule. (solution of simultaneous equations in two and three unknowns) 2.1 Definition of matrix: Type of matrix: viz.- null, row, column, Square, diagonal, scalar, unit, Triangular. 2.2 Algebra of matrices –addition, subtraction and multiplication . 2.3 Transpose of a matrix. 2.4 adjoint of a matrix Relation. 2.5 Inverse of matrix by adjoint method. 2.6 Solution of simultaneous equations in two and three Unknowns using Inverse of matrix method .
Unit III Partial Fractions	3a.Students will be able to solve simple problems Using concepts of Partial Fractions	3.1 Definition of Partial fraction, proper and improper fractions, rational fractions. 3.2 To resolve given rational fraction into partial fractions. 3.3 Denominator containing non repeated linear factors. 3.4 Denominator containing repeated linear factors. 3.5 Denominator containing irreducible non-repeated quadratic factors. 3.6 Different types of examples.
Unit IV Trigonometry	4a.Students will be able to Solve simple problems by	4.1 Trigonometric ratios of allied, compound and multiple angles.

	applying using concepts of trigonometry.	4.2 Trigonometric Ratios of allied angles. 4.3 Trigonometric Ratios of compound angles. 4.4 Trigonometric Ratios of multiple angle Product, sum and difference formulae. 4.5 Sub-multiple angles. 4.6 Definition of inverse trigonometric ratios. 4.7 Principal value of inverse trigonometric ratios. Relation between inverse trigonometric ratios. 4.8 Examples on inverse circular functions.
Unit V Function	5a. Students will be able to Solve the problem of function using the concept of Function	5.1 Cartesian products of sets. 5.2 Definition of relation, definition of function, real value. Function, domain, co-domain of a function. 5.3 Types of Functions. 5.4 Value of the function at given point 5.5 Composite function. 5.6 Different types of examples on functions.
Unit VI Limits	6a. Students will be able to Solve the problem of function using the concept of Limit	6.1 Definition and concept of limit, limits of algebraic functions. 6.2 Limits of trigonometric functions. 6.3 Limits of exponential functions. 6.4 Limits of logarithmic functions.

6. SUGGESTED SPECIFICATION TABLE WITH HOURS AND MARKS (THEORY):

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
1	Revision	02	0	0	0	0
2	Determinants and Matrices	12	04	08	12	24
3	Partial Fractions	06		04	04	08

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
4	Trigonometry	14	04	08	12	24
5	Function	04	02	02	04	08
6	Limits	10	04	04	08	16
TOTAL		48	14	26	40	80

Legends: R = Remembrance; U = Understanding; A = Application and above levels (Revised Bloom's taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

7. SUGGESTED EXERCISES/PRACTICAL/TUTORIAL :

- 1) The tutorial/practical/exercises should be properly designed and implemented with an attempt to develop different types of cognitive and practical skills so that students are able to acquire the competencies.
- 2) Form a batch of 20 students and at least 10 problems should be given to get necessary exercise.

Sr. No.	Title/Topic	Exercises/Tutorial	Approx. hours
1	Determinants and Matrices	Solving problems on cramer's rule Examples on Matrix Addition/Subtraction and Product Co-factors, Ad joint and Inverse of Matrix Solution of Simultaneous Equation using 3X3 Matrix and its Applications	02 02 02
2	Partial Fractions	Examples related Definition and cases	02
3	Trigonometry	Practice Examples: Allied & Compound Angles. Examples related inverse trigonometric ratios	04
4	Function	Examples related Definition and Rules.	02
5	Limits	Examples related to different types of function.	02



8. SUGGESTED STUDENT ACTIVITIES :

9. SPECIAL INSTRUCTIONAL STRATEGIES (if any) :

- 1 Chalk-board method.
- 2 Projector method.
- 3 Tutorial method.

10. SUGGESTED LEARNING RESOURCES :

Sr. No.	Title of Book	Author	Publication
1	Mathematics for polytechnic students for first year	S.P.Deshpande	Pune vidhyarti grup prakshan Pune
2	Mathematics for polytechnic students for first year	G.V.Kumbhojkar	Phadke prakashan Kholapur
3	Mathematics for polytechnics	TTTI Bhopal	TTTI Bhopal

11. Major Equipment/ Instrument with Broad Specifications :

Sr.NO	Name of the Equipment	Specification
	NA	

12. Software/Learning Websites :

13. POs and PSOs assignment and its strength of assignment with each CO of the Course :

CO. NO.	Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	To able the basic concept of Logarithms and Determinant of order 2 and 3	1	1	-	-	-	-	-	-	-	-	-	-	-
CO2	Students will be able to Solve simultaneous equations using concepts of Determinants and Matrices	3	1	1	-	-	-	-	-	-	-	-	-	-
CO3	Students will be able to solve simple problems Using concepts of Partial Fractions	1	1	1	-	-	-	-	-	-	-	-	-	-
CO4	Students will be able to Solve simple problems by applying using concepts of trigonometry.	3	2	1	-	-	-	-	-	-	-	-	-	-
	Students will be able to Solve the	1	1	-	-	-	-	-	-	-	-	-	-	-

CO5	problem of function using the concept of Function													
CO6	Students will be able to Solve the problem of function using the concept of Limits	1	3	-	-	-	-	-	-	-	-	-	-	-

COURSE CURRICULUM DEVELOPMENT COMMITTEE :

Sr. No	Name of the faculty member	Designation and Institute
1	Mr. M.A. Ali	Lecturer in Mathematics, Government Polytechnic Aurangabad
2	Mr. R.B. Borulkar	Lecturer in Mathematics, Government Polytechnic Aurangabad
3	Mrs. H.H. Bhumkar	Lecturer in Mathematics, Government Polytechnic Aurangabad

Member Secretary PBOS

Chairman PBOS

Co-coordinator
science and Humanities

COURSE TITLE ENGINEERING CHEMISTRY

COURSE CODE 6G104

Diploma Programme in which this course is offered	Semester in which offered
ME/CE/EE/ET/CO/IT/AE	First/ Second Semester

1. RATIONALE :

Chemistry is a basic science subject which is essential to all engineering courses. It gives knowledge of engineering materials, their properties, related applications and selection of materials for specific engineering applications/work/job.

Due to technological progress, there are hazardous effects of chemicals, waste water and sewage water on environment & human life. The core knowledge of environmental effects will bring awareness; generate curiosity in students about the precautions & preventions to be taken to carry out further development resultantly to reduce the ill effects.

2. COMPETENCY :

At the end of studying this course students will be able to

“Apply basic knowledge and principles of chemistry to solve different industrial problems.”

3. TEACHING AND EXAMINATION SCHEME :

Teaching Scheme (In Hours)				Total Credits (L+T+P)	Examination Scheme					
L	T	P	C		Theory Marks		Practical Marks		Term work	Total Marks
				ESE	PT	ESE	PA	ESE	TOTAL MARKS	
3	0	2	5	80~	20~	25@	00	25	150	
Examination Duration				2Hrs	1/2Hr	2Hrs	--	--	--	

Legends : L-Lecture; T-Tutorial/Teacher Guided Theory Practice ; P- Practical; C- Credits; ESE- End Semester Examination; PT ~ Progressive Test, PA- Progressive Assessment, PR- Practical Examination, OR – Oral Examination, TW - Term Work, # External, @ Internal examination, ~ Online Examination.

4. COURSE OUTCOMES :

After providing classroom teaching and laboratory experiences related to this course, students will be able to

1. Draw the orbital configuration of different elements
2. Represent the formation of molecules schematically.
3. Compare and use different types of cells.
4. Identify the properties of metals & alloys related to engineering applications.

5. Identify the properties of nonmetallic materials, related to engineering applications.
6. Select a proper material for specific purpose.
7. Select and use the lubricants at proper/ specific conditions of machines.

5. COURSE DETAILS :

Unit	Major Learning Outcomes	Topics and Sub-topics
UNIT-I Electronic Theory Of Valency & Molecule Formation	1a. Identification of structure and nature of atom, element and molecule.	1.1 Atomic no, atomic mass no. numerical problems on it, orbit & orbitals. 1.2 Electronic configuration, electronic configuration of first 30 elements. 1.3 Molecule formation: Valency, types of valency, electrovalency and covalency with suitable examples. Study of Formation of Electrovalent compounds e.g. NaCl, CaCl ₂ & MgCl ₂ and formation of Covalent Compounds examples H ₂ O, Cl ₂ , CO ₂ , N ₂
UNIT-II Electrochemistry	2a. Verify Principle, construction, working and applications of different cells.	2.1 Arrhenius Theory of Ionization, Degree of ionization. 2.2 Basic concepts of Conductors, Insulators, Dielectrics, Electrolyte, Non Electrolyte 2.3 Electrolysis, Electrolytic Cell, Electrodes. 2.4 Electrolysis of CuSO ₄ Solution by using Cu Electrode & Platinum Electrode 2.5 Faraday's first law of Electrolysis & numerical problems on it Application of Electrolysis such as Electroplating. 2.6 Electrochemical Cells & Batteries Types of cell Primary & secondary cell construction And Working of Dry cell & Lead – Acid Storage.



UNIT III Metals and Alloys	3a. Identify different mechanical properties and extraction methods of pure metal, Correlate properties, composition and applications of alloys with metal.	<p>3.1 Definition of Metallurgy, Mineral, Ore, Gangue, Flux & Slag, Occurrence of Metals.</p> <p>3.2 Mechanical Properties of metals such as hardness, Toughness, ductility, malleability, tensile strength.</p> <p>3.3 Stages of Extraction of Metals from its Ores in detail i.e. its flow sheet Crushing, Concentration, methods of concentration (physical and chemical).</p> <p>3.4 Reduction of iron in blast furnace with chemical reactions, Reactions in zone of reduction.</p> <p>Alloys</p> <p>3.5 Definition of Alloy, Purposes of Making alloy.</p> <p>3.6 Methods of Preparation of alloy such as fusion method & compression method</p> <p>3.7 Classification of Alloys, Ferrous alloys & Non Ferrous alloys, their examples.</p> <p>3.8 Composition, Properties & Applications of some common alloys such as Alnico, Duralumin, Wood's Metal</p>
UNIT-IV Corrosion of Metals And its Application	4a. Classify corrosion from action of surrounding environment and its protection methods.	<p>a. Definition of corrosion</p> <p>b. Atmospheric corrosion or dry Corrosion, corrosion due to oxygen , different types of film formation.</p> <p>c. Electrochemical Corrosion Hydrogen evolution mechanism.</p> <p>d. Applying protective Coatings like metal coating by galvanising, tinning</p>
UNIT-V Water	5a. Recognize ill effect of hard water and methods for purification of water.	<p>5.1 Hard water & soft water, types of hardness, causes of hardness</p> <p>5.2 Effects of hard water in different industries (such as paper , sugar , dyeing and textile industries) and domestic purposes.</p> <p>5.3 Softening of hard water by Permutit process and ion exchange process,.</p> <p>5.4 Potable water & its condition for pot-ability. Different methods of purification of water for drinking purposes chlorination and ozonation</p> <p>5.5 pH – value of water its applications Numericals on pH values.</p>

UNIT-VI Non Metallic Materials	6a. Identification of types , preparation, properties and applications of plastic, rubber and thermal insulating material.	<p>6.1 Plastics Definition of Plastic, Formation of Plastic by Addition Polymerisation with examples Polyethylene & PVC.</p> <p>6.2 Formation of Plastic by Condensation Polymerisation with suitable example as Nylon 6, 6; Bakelite plastic.</p> <p>6.3 Types of Plastics, Thermo softening & Thermosetting Plastic & difference between them.</p> <p>6.4. Engineering properties of plastic and its related uses.</p> <p>RUBBER</p> <p>6.5 Natural rubber its extraction from latex, drawbacks of natural rubber. Synthetic Rubber its examples</p> <p>6.6 Vulcanisation of rubber with chemical reaction.</p> <p>6.7 Properties of rubber such as elasticity, tack, resistant to abrasion, rebound capacity.</p> <p>6.8 Engineering Applications of rubber based on its properties.</p> <p>6.9 Thermal insulating materials Definition & characteristics of ideal thermal insulator. Glass wool preparation, properties & applications. Thermocole properties and its applications.</p>
Unit-VII Lubricants	7a. Select proper lubricant for different types of machineries.	<p>7.1 Definition of lubricant and Lubrication.</p> <p>7.2 Functions of lubricants.</p> <p>7.3 Classification of lubricants with examples,</p> <p>7.4 Mechanism of Lubrication by Fluid Film, Boundary & Extreme Pressure,</p> <p>7.5 Physical Characteristics of Lubricants Such as Viscosity, Viscosity Index, Oiliness, Volatility, Flash & Fire Point, Cloud & Pour Point.</p> <p>7.6 Selection of proper Lubricants for Various types of machines.</p>



6. SUGGESTED SPECIFICATION TABLE WITH HOURS AND MARKS (THEORY):

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
I	Electronic Theory of Valency and Molecular Formatin	8	2	6	4	12
II	Electrochemistry	6	2	8	2	12
III	Metals and Alloys	8	2	8	4	14
IV	Corrosion of Metals and it's Applications	6	2	4	2	8
V	Water	7	2	2	6	10
VI	Non Metallic Materials	7	4	8	4	16
VII	Lubricants	6	2	4	2	8
Total		48	16	40	24	80

Legends: R = Remembrance; U = Understanding; A = Application and above levels (Revised Bloom's taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

7. SUGGESTED EXERCISES/PRACTICALS :

The tutorial/practical/exercises should be properly designed and implemented with an attempt to develop different types of cognitive and psychomotor skills (**Outcomes in cognitive, psychomotor and affective domain**) so that students are able to acquire the competencies.

(Any TEN from following)

Sr. No.	Unit No.	Practical Exercises	Approx. Hrs. required
1	1	Write Orbital electronic configuration of different elements (First 30 elements)	2
2	2	Verify Faraday's first Law of electrolysis	2
3	7	Find the normality & strength in grams per liter of the given solution (NaOH) with the help of standard hydrochloric acid.	2
4	5	Determine pH value of given solutions, water samples, by using, universal indicator and pH meter.	2
5	7	Determine the normality & strength of given hydrochloric acid solution by titrating it against standard potassium hydroxide solution.	2
6	3	Determine percentage of iron from steel by titration method	2
7	5	Determine the hardness of potable water and boiler feeding water.	2
8	5	Determine the chloride content potable water and boiler feeding water.	2
9	6	Prepare phenol formaldehyde resin.	2
10	7	Determine the acid value of oil sample by neutralization method	2
11	2	Qualitative analysis of given salt solutions, i.e. to determine one acidic and one basic radical from given salt solution. (At least 05 salt solutions.)	For each salt solution 2

Micro Project (Any one of following will be opted by a group of 5-6 students)

Sr. No.	Unit No.	Practical Exercises
1	1	Prepare power point presentation to show/demonstrate covalent bond, ionic bond.
2	4	Effect of acid or alkali on rate of corrosion for different metals.
3	5	Study of hard and soft water of different samples of water
4	2	Study of mechanism and working of different batteries.
5	2	Preparation of small scale batteries/ Galvanic cells. Collect chemicals and material from lab and household and prepare working model of cell.
6	6	Collect different polymers and prepare the chart on the basis of its type, properties and uses.

8. SUGGESTED STUDENT ACTIVITIES

- Verify the properties of different types of compounds used in day to day life.
- Differentiate properties and uses of different metals.
- Differentiate composition, properties and application of different alloys.
- Co-relate the effect of acidic environment with neutral environment.
- Library survey regarding engineering chemistry topics regarding curriculum.
- Animated Power point presentation containing current research development related to topics mentioned in curriculum.

9. SPECIAL INSTRUCTIONAL STRATEGIES

- Search various sites to teach various topics/sub topics.
- Instead of the traditional lecture method, use different types of teaching methods such as improved lecture method, question answer method, laboratory method to attained specific outcome.
- Some topics are relatively simpler in nature is to be given to the students for self-learning by seminar or by classroom presentations
- Teachers provide theme to create multiple choice questions.
- Provide super visionary assistance for completion of micro-projects.

10. SUGGESTED LEARNING RESOURCES

Sr.No.	Title of Book	Author	Publication
1	Engineering Chemistry	Jain & Jain	Dhanpat Rai and Sons Co. ISBN 9789352160006
2	Engineering Chemistry	S. S. Dara	S. Chand Publication ISBN 8121903599
3	Chemistry of Engineering Materials	S.N. Narkhede	Nirali Prakashan

11. MAJOR EQUIPMENTS/ INSTRUMENTS WITH BROAD SPECIFICATIONS

Sr. No.	Name of the Equipment	Specification
1	pH meter	Digital, Range 0 to 14 with Sensitive Glass electrode



COURSE TITLE : ENGINEERING GRAPHICS.

COURSE CODE : 6G201

DIPLOMA PROGRAMME IN WHICH THIS COURSE IS OFFERED	SEMESTER
ME, CE, EE, E&TC, AE	First

1. RATIONALE :

Engineering Drawing is the language of engineers and technicians. Always the engineers come across different types of drawings. It is therefore very important to understand the fundamentals and basic concepts involved in drawing.

It describes the scientific facts, concepts, principles and techniques of drawings in any engineering field to express the ideas, conveying the instructions, which are used to carry out jobs in engineering fields. The course aim for building foundation for the further course in drawing and other allied subjects.

It covers knowledge & application of drawing instruments & also familiarizes the learner about Bureau of Indian standards. The curriculum aims at developing the ability to draw and read various drawings, curves and projections.

2. COMPETENCY :

The course content should be taught and implemented with the aim to develop different types of skills leading to the achievement of the following competencies:

“Prepare engineering drawings manually with given geometrical dimensions using prevailing drawing standards and drafting instruments.”

“Draw orthographic views and isometric views.”

3. TEACHING AND EXAMINATION SCHEME :

Teaching Scheme (In Hours)			Total Credits (L+T+P)	Examination Scheme				Total Marks
L	T	P		Theory Marks		Practical Marks		
2	--	2	4	ESE	PT	ESE (PR)	PA	100
Exam duration						02 hrs		

Legends : L-Lecture; T-Tutorial/Teacher Guided Theory Practice ; P- Practical; C- Credits; ESE- End Semester Examination; PT – Progressive Test, PA- Progressive Assessment, PR- Practical Examination, OR – Oral Examination, TW - Term Work, # External, @ Internal examination, ~ Online Examination.

**4. COURSE OUTCOMES (COs) :**

1. Draw geometrical figures and scales.
2. Drawing of various engineering curves.
3. Draw orthographic views of given component.
4. Draw isometric view of given component.
5. Use various drawing codes, conventions and symbols as per IS SP-46 in engineering drawing.

5. COURSE DETAILS :

Unit	Major Learning Outcomes (in cognitive domain)	Topics and Sub-topics (Containing POs and PSOs assignment in each Sub-topic)
Unit – I Introduction	1 Use drawing equipments and instruments effectively. 2 Draw and prepare simple drawings. 3 Follow and apply standard practice as per bureau of I.S. for planning and layout. 4 Choose appropriate scale factor for the drawing.	1.1 Drawing Instruments and their uses 1.2 Letters and numbers (single stroke vertical) for main title, sub-title and normal use. 1.3 Different types of lines, Convention of lines and their applications. 1.4 Scale (reduced, enlarged & full size), Plain scale and Diagonal scale. 1.5 Sheet sizes and layout, Geometrical Constructions. 1.6 Dimensioning, its methods, parallel and chain dimensioning, radius and diameter dimensioning, leader and its use, dimension with text.
Unit – II Simple Drawing Practices	1 Select line types and divide given line, circle into equal number of parts. 2 Draw different regular polygons and circle.	2.1 Drawing of different circles with thin, thick, center line use, dividing circle into number of equal parts, dividing line into equal parts. 2.2 Drawing pentagon, hexagon and rhombus, drawing correct arrows to dimension lines, drawing tangent to circle from given point
Unit – III Engineering Curves	1 Draw engineering curves with proficiency and speed as per given dimensions. 2 Draw curves with uniform thickness and darkness, dimensioning as	3.1 To draw ellipse by – • Arcs of circle method • Concentric circle method • Oblong method 3.2 To draw parabola by – • Directrix focus method

	per IS.	<ul style="list-style-type: none"> • Rectangle method 3.3 To draw hyperbola by – <ul style="list-style-type: none"> • Transverse axis & focus method. • Passing through a given point. (Rectangular hyperbola) 3.4 To draw involute of square, pentagon hexagon and circle. 3.5 To draw cycloid, epicycloid, hypocycloid.
Unit – IV Orthographic Projections	1 Draw the orthographic views of object. 2 Interpret given orthographic views and imagine the actual shape of the component.	4.1 Converting pictorial view into orthographic views. (pictorial view of components with holes, cylinders, ribs, plates, slots) 4.2 Sectional orthographic projection of simple objects. (Use First angle method of Projection).
Unit – V Isometric Projections	1 Draw isometric view of given object. 2 Draw isometric scale.	5.1 Isometric projection of simple objects 5.2 Isometric projection of objects having circular holes, slots on sloping surface.

**6. SUGGESTED SPECIFICATION TABLE WITH HOURS & MARKS :
(End semester examination)**

Unit	Unit Title	Teaching Hours	Distribution of practical examination marks			
			R Level	U Level	A Level	Total Marks
I	Introduction	4	2	2	2	6
II	Simple Drawing Practices	4	2	2	2	6
III	Engineering Curves	8	4	4	6	14
IV	Orthographic Projections	8	2	4	8	14
V	Isometric Projections	8	2	4	4	10
Total		32	12	16	22	50

Legends: R = Remembrance; U = Understanding; A = Application and above levels

7. LIST OF EXERCISES/PRACTICALS :

The practical/exercises should be properly designed and implemented with an attempt to develop different types of skills (**outcomes in psychomotor and affective domain**) so that students are able to acquire the competencies/ programme outcomes.

A3 size sketch book should be used by the students. It is necessary to draw all the sheet problems in sketch book first and then redrawn on the sheets

S. No.	Unit Number	Practical Exercises	Hrs. required
1	I	1. Drawing of lines of different types, lettering and numbers. 2. Drawing of plain and diagonal scale. 3. Redraw any 2D drawing with circles, slots and curves. Show dimensions on it. (Drawing on sketchbook.)	2 2 2
2	II	1. Drawing of regular pentagon, hexagon with standard procedure. Measure internal and external angles. 2. Divide line, circle, and angles in equal number of parts. (Drawing on sketchbook.)	2
2	III	Sheet 1: Drawing of engineering curves. (3 problems) each on ellipse, parabola and hyperbola. Sheet 2: Drawing of Engineering curves. (3 problems) each on scale, involute and cycloid.)	4 4
3	IV	Drawing of Orthographic views from given pictorial view. (Minimum 2 objects on sketchbook) Sheet 3: Drawing orthographic views from pictorial view. (2 objects) Use of first angle method only	4 4
4	V	Drawing of Isometric views of simple Objects. (Minimum 2 objects on sketch book). Sheet 4: Drawing of Isometric views of simple objects (any 2 objects).	4 4
Total			32

Notes:

a: Use one side of sheet

b: Theory & practice should be in first angle projections and IS codes should be followed wherever applicable.



c: The dimensions of line, distances, angle, side of polygon, diameter, etc. may be different for different batches.

d: The sketchbook has to contain data of all problems, solutions of all problems and student activities performed. Students activities are compulsory to be performed.

e: A hand out containing applicable standards from IS codes including title block as per IS standard should be given to each student by concerned teacher.

f: For ESE Practical examination, students are to be assessed for competencies achieved. Students are to be given data for practical ESE to prepare drawings.

g: At the end of term practical examination of 50 marks of 2 Hours duration is compulsory to all students. External and Internal Examiners should set and assess the Question paper jointly as per following guidelines

- Engineering curves and geometric construction (three problems) 24 marks
- Simple Orthographic projection (One Problem) 16 marks
- Isometric projection with slots and holes (One Problem) 10 marks

8. LIST OF STUDENT ACTIVITIES :

Sr. No.	Activities
1	Sketch the combinations of set squares to draw angles in step of 15 degrees. (15°, 30°, 45°, 60°, 75°, 90°, 105°, 120°, 135°, 150°, 165°, 180°).
2	List the shapes you are observing around you in real life with place/item. (For ellipse, parabola and hyperbola).
3	Draw free hand isometric and orthographic views of any components
4	Observe and draw the locus/path of a point on circumference of a rolling wheel.
5	Prepare cuttings of circle and polygons using cardboard/drawing sheet.

9. SPECIAL INSTRUCTIONAL STRATEGIES :

Sr. no.	Unit no	Unit name	Strategy
1	I	Introduction	Conventional black board method, Use of models. Use of software.
2	II	Simple Drawing Practices	Conventional black board method, Use of models.
3	III	Engineering Curves	Planes made of sheet, cardboard.
4	IV	Orthographic Projections	Models, Use of software.
5	V	Isometric Projections	Models and cut section.



10. LEARNING RESOURCES:

S.N.	Title of Book	Author and Publication
1	Elementary Engineering Drawing	N.D.Bhatt , Charotar Publishing House
2	Engineering Drawing	Mali , Chaudhari, Vrinda Publication
3	Engineering Drawing	Sidheswar Shastri , Tata McGraw Hill
4	Engineering Graphics	Arunodaykumar, Techmax publications, Pune
5	Engineering Drawing for schools and colleges	IS CODE SP- 46

11. LIST OF MAJOR EQUIPMENT/ INSTRUMENT WITH BROAD SPECIFICATIONS :

S.N.	Major equipment/ Instrument with Broad Specification	Quantity
1	Models- full and cut. (wooden and acrylic)	12
2	Drawing equipments and instruments for class room teaching-large size.	1
3	Drawing board-half imperial size.	100
4	T-square or drafter (Drafting Machine).	1

12. MAJOR EQUIPMENT/ INSTRUMENT WITH BROAD SPECIFICATIONS :

Sr. No.	Name of the Equipment	Specification
1	Various models of standard solids such as pyramid, prism, cone, cylinder etc.	
2	Different objects or machine elements.	

13. E-LEARNING RECOURSES :

List of Software/Learning Websites.

- <http://www.slideshare.net/sahilsahil992/conic-section-1819818>
- <http://www.technologystudent.com/designpro/drawdex.htm>
- http://www.engineeringdrawing.org/engg_curves/problem-3-8-engineering-curves/490/
- <http://web.iitd.ac.in/~hirani/mel110-part3.pdf>
- <http://www.studyvilla.com/ed.aspx>
- http://www.youtube.com/watch?v=a703_xNeDao
- E-learning package from KOROS.
- E-learning package from Cognifront.

POs and PSOs assignment and its strength of assignment with each CO of the course.

CO. NO.	Course Outcome	P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 10	P O 11	P O 12	P O 13	No. of hours allocat ed in curricu lum
CO1	Draw geometrical figures and scales.	3	3	2	3	-	-	-	-	3	2	2	2	3	6
CO2	Drawing of various engineering curves	3	3	2	3	-	-	-	-	3	2	2	2	3	8
CO3	Draw orthographic views of given components.	3	3	2	3	-	-	-	-	3	2	2	2	3	8
CO4	Draw isometric views of given component.	3	3	2	3	-	-	-	-	3	2	2	-	3	8
CO5	Use various drawing codes, conventions and symbols as per IS SP-46 in engineering drawing.	3	3	2	3	-	-	-	-	3	2	2	-	3	2

Name and Designation of Course Designer :

- 1 Prof. Aher S M
- 2 Prof. Dhimbassi G D

HOD

CDIC coordinator



COURSE TITLE : WORKSHOP PRACTICE

COURSE CODE : 6G202

Diploma Programme in which this course is offered	Semester in which offered
CE/ME/AE/EE/ET/IT/CO	First/Second

1. RATIONALE :

Workshop Practice is a basic engineering course. Diploma Engineers while working at worksites / in industries, supervises various skilled man power during industrial / site related process. He is required to be conversant with various skills. These basic skills are imparted in basic shops like wood working, fitting, welding, plumbing and sheet metal shop is essential for technician to perform his/her duties in industries. Students are able to perform various operations using hand tool equipment and machineries in various shops. Working in workshop develops the attitude of group working and safety awareness. This course provides industrial environment in the educational institute.

2. COMPETENCY :

“Prepare simple jobs on the shop floor of the engineering workshop.”

3. TEACHING AND EXAMINATION SCHEME :

Teaching Scheme (In Hours)			Total Credits (L+T+P)	Examination Scheme				
				Theory Marks		Practical Marks		Total Marks
T	P	C	ESE	PT	ESE (OR)	PA		
--	03	03	--	--	--	50	50	

Legends : L-Lecture; T-Tutorial/Teacher Guided Theory Practice ; P- Practical; C- Credits; ESE- End Semester Examination; PT – Progressive Test, PA- Progressive Assessment, PR- Practical Examination, OR – Oral Examination, TW - Term Work, # External, @ Internal examination, ~ Online Examination.

4. COURSE OUTCOMES :

At the end of this course, students would be able to –

1. Select tools and machinery according to job.
2. Use hand tools in different shops for performing different operation.
3. Operate equipment and machinery in different shops.



4. Prepare job according to drawing.

5. Maintain workshop related tools, equipment and machineries

5. DETAILED COURSE CONTENTS :

Unit	Major Learning Outcomes (in cognitive domain)	Topics and Sub-topics
Unit – I General Workshop Practice	1a. Follow safety practices 1b. Explain the procedure for extinguishing fire 1c. Use firefighting equipment 1d. Locate various machines and equipment in workshop 1e. Follow good housekeeping.	1.1 Safety Practices, Causes of accidents, General safety rules, Safety signs and symbols. 1.2 First Aid 1.3 Fire, Causes of Fire, Basic ways of extinguishing the fire Classification of fire, Class A, B,C, D, Firefighting equipment, fire extinguishers, and their types . 1.4 Workshop Layout 1.5 Issue and return system of tools, equipment and consumables
Unit– II Fitting	2a. Identify fitting tools. 2b. Explain operation of fitting shop machines 2c. Use hand tools 2d. Operate machineries. 2e. Perform fitting operations 2f. Maintain tools, equipment and machineries.	2.1 Fitting hand tools bench vice, hammers, chisels, files, hacksaw, surface plate, punch, v block, angle plate, try square, marking block , steel rule, twist drills, reamers, tap set, die set and their Specifications 2.2 Operation of fitting shops machineries - Drilling machine, Power saw, grinder their specifications and maintenance. 2.3 Basic process chipping, filling, scraping, grinding, marking, sawing, drilling, tapping, dieing, reaming etc.
Unit– III Plumbing	3a. Identify plumbing tools. 3b. Explain operation of fitting shop machines 3c. Use hand tools 3d. Operate machineries. 3e. Perform plumbing operations 3f. Maintain tools, equipment	3.1 Plumbing hand tools pipe vice, pipe bending equipment, pipe wrenches, dies and their Specifications 3.2 Pipe fittings- bends, elbows, tees, cross, coupler, socket, reducer, cap, plug, nipple and their Specifications

	and machineries.	3.3 Operation of Machineries in plumbing shops- pipe bending machine their specifications and maintenance. 3.4 Basic process cutting, threading
Unit-IV Metal Joining	4a. Identify metal joining tools. 4b. Explain gas and arc welding procedure 4c. Use hand tools. 4d. Perform welding, soldering, brazing operations 4e. Maintain tools, equipment and machineries.	4.1 Gas welding hand tools- welding torch, welding tip, pressure regulator, oxygen and acetylene cylinders, spark lighter and their Specifications 4.2 Arc welding hand tools- electrode holder, cable connector, cable lugs, chipping hammer, earthing clamp, wire brush and their Specifications 4.3 Operation of machineries in welding shops- arc welding transformer their specifications and maintenance. 4.4 Welding Electrode, filler rod, fluxes, and solders. 4.5 Basic process welding, brazing and soldering.
Unit- V Furniture Making	5a. Select wood working tools as per job/ requirement. 5b. Explain operation of wood working machines 5c. Use hand tools 5d. Operate machineries. 5e. Perform wood working operations 5f. Maintain tools, equipment and machineries.	5.1 Types of artificial woods such as plywood, block board, hardboard, laminated boards, Veneer, fiber Boards and their applications. 5.2 Wood working hand tools carpentry vice, marking and measuring tools, saws, claw hammer, mallet, chisels, plans, squares, and their specifications 5.3 Operation of wood working machineries - Wood turning lathe, circular saw, their specifications and maintenance. 5.4 Basic process- marking, sawing, planning, chiseling, turning, grooving, boring.
Unit-VI Sheet Metal	6a. Identify sheet metal tools. 6b. Explain operation of sheet metal machineries. 6c. Use hand tools 6d. Operate sheet metal	6.1 Sheet metal hand tools snip, shears sheet gauge, straight edge, L square, scribe, divider, trammel, punches, pliers, stake groovers, limit set and their

	machineries. 6e. Perform bending operations 6f. Maintain tools, equipment and machineries.	Specifications 6.2 Operation of machineries in sheet metal shops- sheet cutting and bending machine their specifications and maintenance. 6.3 Basic process-marking, bending, folding, edging, seaming, staking, riveting.
--	--	--

6. SUGGESTED SPECIFICATION TABLE WITH HOURS AND MARKS (Practical)

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
I	General Workshop Practice	03	01	01	03	05
II	Fitting	12	-	03	06	09
III	Plumbing	06	-	02	07	09
IV	Metal Joining	09	01	02	06	09
V	Furniture Making	09	-	02	07	09
VI	Sheet Metal	09	-	02	07	09
	Total	48	02	12	36	50

Legends: R = Remembrance; U = Understanding; A = Application and above levels
(Revised Bloom's taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

7. SUGGESTED EXERCISES/PRACTICALS :
The tutorial/practical/exercises should be properly designed and implemented with an attempt to develop different types of cognitive and practical skills (Outcomes in cognitive, psychomotor and affective domain) so that students are able to acquire the competencies.

Sr. No.	Unit No.	Practical Exercises (Outcomes in Psychomotor Domain)	Approx. Hrs. required
1	I	Perform mock drill session in group of minimum 10 students for extinguishing fire.	03
2	II	Prepare job involving marking, punching, sawing, chamfering, drilling, tapping operations as per given	09



		drawing. (simple job individually)	
3	III	Prepare plumbing job as per given drawing (individually)	06
4	III	Prepare black smithy job involving cutting, bending, drawing/ upsetting operations as per drawing (individually)	06
5	IV	Prepare lap joint/butt joint using arc welding as per given drawing (individually)	06
6	IV & V	Prepare utility job/ different working joints involving wood work as per given drawing (in group of 4 to 5 students)	12
7	VI	Prepare sheet cutting, bending, edging, end curling, lancing, soldering and riveting operations. (in group of 4 to 5 students)	06
Total			48

8. SUGGESTED STUDENT ACTIVITIES :

Following is the list of proposed student activities like:

1. Prepare work diary based on practical performed in workshop. Work diary consist of job drawing, operations to be perform, required raw materials, tools, equipments, date of performance with teacher signature.
2. Prepare journals consist of free hand sketches of tools and equipments in each shop, detail specification and precautions to be observed while using tools and equipment.
3. Prepare/Download a specifications of followings:
 - a) Various tools and equipment in various shops.
 - b) Precision equipment in workshop
 - c) Various machineries in workshop
4. Undertake a market survey of local dealers for procurement of workshop tools, equipment machineries and raw material.
5. Visit any fabrication/wood working/sheet metal workshop and prepare a report.



9. SPECIAL INSTRUCTIONAL STRATEGIES (if any) :

1. Demonstration

10. SUGGESTED LEARNING RESOURCES

S.N.	Title of Book	Author	Publication
1.	Workshop Practice	Bawa, H.S.	McGraw Hill Education, Noida; ISBN-10: 0070671192 ISBN-13: 978-0070671195
2.	A Textbook of Manufacturing Process (Workshop Tech.)	Gupta, J.K.; Khurmi, R.S.	S.Chand and Co. New Delhi ISBN: 81-219-3092-8
3.	Workshop Practice Manual For Engineering Diploma & ITI Students	Hegde, R.K.	Sapna Book House, 2012, ISBN: 13: 9798128005830
4.	Introduction to Basic Manufacturing Process & Workshop Technology	Singh, Rajender	New Age International, New Delhi; 2014, ISBN: 978-81-224-3070-7

11. Major Equipment/ Instrument with Broad Specifications

S. No.	Equipment Name with Broad Specifications	Experiment S.No.
1	Fire buckets with stand of medium size	I, II, III, IV, V, VI
2	Fire extinguisher A, B and C types	I, II, III, IV, V, VI
3	Wood Turning Lathe Machine, Height of Centre: 200mm, Distance between Centers: 1200mm. Spindle Bore: 20mm with Taper, Range of Speeds: 425 to 2800 with suitable Motor Drive. with all accessories	II
4	Circular Saw Machine, Diameter of saw blade 200 mm, Maximum Depth of Cut 50 mm, Table Size -350 x 450 mm, Table Tilting - 45°	II
5	Wood working tools- marking and measuring tools, saws, claw hammer, mallet, chisels, plans, squares,	II
6	Carpentry Vice 200 mm	II
7	Work Benches- size: 1800 x 900 x 750 mm	III
8	Bench Drilling machine (up to 13 mm drill cap.) with ½ H.P. Motor 1000 mm. Height.	III

9	Power Saw machine 350 mm mechanical with 1 HP Motor & all Accessories.	III
10	Bench Grinder 200 mm Grinding Disc diameter 200 mm. with 25 mm. bore 32 mm. with ½ HP/1HP Motor.	III
11	Vernier height Gauge 450 mm	III
12	Surface Plate 600 x 900 mm Grade I	III
13	Angle Plate 450 x 450 mm	III
14	Welding machine 20 KVA 400A welding current 300A at 50, 100, 200, 250, 300 with std. Accessories and Welding Cable 400 amp. ISI with holder	IV
15	Oxygen and acetylene gas welding and cutting kit with cylinders and regulators.	IV
16	Pipe Bending Machine	IV
17	Pipe Vice ~ 100 mm	IV
18	Pipe Cutter- 50 mm	IV
19	Bench Vice 100 mm	II,III,IV,V,VI
20	Portable Hammer Drill Machine 0-13 mm A.C 230 V, 2.5Amp, Pistol type, having different types of bits	II, III, IV, V, VI
21	Sheet Bending Machine	VI
22	Sheet Cutting Machine	VI
23	Brazing Equipment	VI
24	Fitting tools - hammers, chisels, files, hacksaw, surface plate, punch, v block, angle plate, try square, marking block, steel rule, twist drills, reamers, tap set, die set.	III
25	Plumbing tools-pipe vice, pipe bending equipment, pipe wrenches dies.	IV
26	Gas welding hand tools- welding torch, welding tip, pressure regulator, oxygen and acetylene cylinders, spark lighter	V
27	Arc welding hand tools- electrode holder, cable connector, cable lugs, chipping hammer, earthing clamp, wire brush.	V
28	Sheet metal hand tools-snip, shears sheet gauge, straight edge, L square, scriber, divider, trammel, punches, pliers, stakes, groovers, limit set	VI

12. E-learning recourses

(Please mention complete URL of the E- recourse CO wise)

1. <http://www.asnu.com.au>

2. <http://www.abmtools.com/downloads/Woodworking%20Carpentry%20Tools.pdf>
3. <http://www.weldingtechnology.org>
4. <http://www.newagepublishers.com/samplechapter/001469.pdf>
5. <http://www.youtube.com/watch?v=TeBX6cKKHWY>
6. <http://www.youtube.com/watch?v=QHF0sNHnttw&feature=related>
7. <http://www.youtube.com/watch?v=KvIzo9CAxt4&feature=relmfu>
8. <http://www.piehtoolco.com>
9. <http://sourcing.indiamart.com/engineering/articles/materials-used-hand-tools/>
10. https://www.youtube.com/watch?v=9_cnkaAbtCM

13. POs and PSOs assignment and its strength of assignment with each CO of the Course :

CO. NO.	Course Outcome	P	P	P	P	P	P	P	P	P	PS	PS
		O 1	O 2	O 3	O 4	O 5	O 6	O 7	O 8	O 9	O 10	O 1
CO 1	Prepare simple jobs on the shop floor of the engineering workshop	1	2	3	3	1	-	1	2	2	2	3
CO 2	Select tools and machinery according to job	1	2	3	3	1	-	1	2	2	2	
CO 3	Use hand tools in different shop for performing different operation.	1	2	3	3	1	-	1	2	2	2	3
CO 4	Operate equipment and machinery in different shops	1	2	3	3	1	-	1	2	2	2	3
CO 5	Prepare job according to drawing	1	2	3	3	1	-	1	2	2	2	
CO 6	Maintain workshop related tools, equipment and machineries	1	2	3	3	1	-	1	2	2	2	3

Sr. No.	Name of the faculty members	Designation and Institute
1	D.V.Tammewar	Workshop Superintendent
2	Dr.U.V.Pise	Head of Mechanical Engineering

(Member Secretary PBOS)

(Chairman PBOS)



COURSE TITLE : **BASICS OF COMPUTER SYSTEM**COURSE CODE : **6G203****PROGRAMME & SEMESTER**

Diploma Programme in which this course is offered Common to all branches (CE/ME/EE/ET/CO/IT/AE/DDGM)	Semester in which offered FIRST SEMESTER
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1. RATIONALE :

This course pertains to basic technology level. It aims to developing fundamentals of Computer and its Applications in students of various programs. This will enable students in using application software's such as word processor, spreadsheets, and power point presentations in their professional fields. Further it will enable students to be lifelong learner.

2. COMPETENCY :

"Use of computer and software application proficiently".

3. TEACHING AND EXAMINATION SCHEME :

Teaching Scheme (Hours/ Credits)			Total Credits (L+T+P)	Examination Scheme (Marks)				
L	T	P		Theory		Practical	Total	
--	--	2	2	ESE	PT	ESE (PR)	PA (TW)	50
--	--	2	2	--	--	25@	25	
Duration of the Examination (Hrs)			--	--	--	--	--	

Legends : L-Lecture; T-Tutorial/Teacher Guided Theory Practice ; P- Practical; C- Credits; ESE- End Semester Examination; PT – Progressive Test, PA- Progressive Assessment, PR- Practical Examination, OR – Oral Examination, TW - Term Work, # External, @ Internal examination, ~ Online Examination.

4. COURSE OUTCOMES :

On successful completion of the course, the students will be able to:

1. Connect and operationalize computer system with its peripheral devices.
2. Create and Format documents in Microsoft Word.
3. Create spreadsheets in Microsoft Excel by using formulae.
4. Create and edit basic power point presentations in Microsoft PowerPoint.
5. Use internet for creating email-id, receive and send email with attachment & search information on internet.

**5. DETAILED COURSE CONTENTS :**

Unit	Major Learning Outcomes (Cognitive Domain Only)	Topics And Sub-Topics
Unit-1 Basics of Computer System	1a. Describe computer hardware and software 1b. Identify & use of I/O devices 1c. Describe functioning of CU ALU and memory unit 1d. Differentiate various types of printers 1e. Explain use of OS 1f. Demonstrate various file handling operations	1.1 Concept of Hardware and Software 1.2 Computer block diagram and its component like CPU, Control Unit, Arithmetic logic Unit (ALU) & Memory Unit 1.3 Input Output Devices: Keyboard, Mouse, Scanner, Monitor, Printers: Dot matrix, Laser, Inkjet, Plotters. 1.4 System software and Application Software 1.5 Operating system concepts, purpose and functions 1.6 Operations of Windows OS. 1.7 Creating and naming of file and folders 1.8 Copying file, renaming and deleting of files and folders, 1.9 Searching files and folders, installation application, creating shortcut of application on the desktop 1.10 Overview of control Panel, Taskbar.
Unit-2 Word Processor	2a. Create, edit and save word document using basic text formatting features, page setup options & print options. 2b. Apply spell check & grammatical check in the created document. 2c. Insert graphics/clipart/ smart art/shapes/charts in the document. 2d. Create tables, insert, delete rows and columns and apply different table properties.	2.1 Overview of Word processor 2.2 Basics of Font type, size, colour 2.3 Effects like Bold, italic, underline, Subscript and superscript, 2.4 Case changing options, 2.5 Inserting, deleting, undo and redo, Copy and Moving (cutting) text within a document, 2.6 Formatting Paragraphs and Lists 2.7 Setting line spacing; single, multiple 2.8 Page settings and margins including header and footer 2.9 Spelling and Grammatical checks 2.10 Table and its options, Inserting rows or columns, merging and splitting cells. 2.11 Insert Picture, Clipart, shapes, smart art & charts. 2.12 Working with pictures, Inserting Pictures from Files, Wrapping it with image. 2.13 Finding & replacing text. 2.14 Using Drawings and WordArt; Lines

Unit	Major Learning Outcomes (Cognitive Domain Only)	Topics And Sub-Topics
		and Shapes, Modifying Drawn Objects. 2.15 Printing: print preview, select printer & appropriate print options.
Unit- 3 Excel (Spreadsheets)	3a. Create, open, save and print worksheet with page setup and print options. 3b. Enter data and insert, delete and format cells, rows, and columns. Use formula and functions 3c. Insert formulas, functions and named ranges in worksheet. 3d. Create chart of different types.	3.1 Introduction to Excel, 3.2 Introduction to data, Cell address, Excel Data Types, Concept of hyperlink 3.3 Introduction to formatting number, text and date. 3.4 Concept of worksheet and workbook. 3.5 Understanding formulas, Operators in Excel, Operators Precedence, Understanding Functions, Common Excel Functions such as sum, average, min, max, date, sqrt, power, upper, lower, count, countif, roundup, sin, cos. 3.6 Introduction to charts, overview of different types of charts available with Excel. 3.7 Hide, unhide rows and columns. 3.8 Concept of print area, margins, header, footer and other page setup options.
Unit- 4 Power Point Presentation	4a. Create a simple text slide using formatting, selecting a slide layout and insert pictures & backgrounds. 4b. Use different design templates for creating slides. 4c. Apply slide transitions and slide timings and animation effect for slide show. 4d. Insert hyperlink in the created slides.	4.1 Outline of an effective presentations 4.2 Starting a New Presentation Files, Saving work, 4.3 Creating new Slides, Working with textboxes. 4.4 Changing a slides Layout, Applying a theme, Changing Colours, fonts and effects, Creating and managing custom Colour & font theme, Changing the background. 4.5 Use of design template and auto content wizard. 4.6 Apply animation and transition to slides with timing effect. 4.7 Slideshow: from beginning slideshow, from current slideshow, custom slideshow. 4.8 Creating hyperlinks, Using action buttons
Unit- 5 Introduction to	5a. Know different terms related to internet and browsers. 5b. Understand need & duty of	5.1 What is the Internet? 5.2 Web pages, Home Pages. 5.3 Use of web sites

Unit	Major Learning Outcomes (Cognitive Domain Only)	Topics And Sub-Topics
Internet	ISP & List out different ISP in city. 5c. Use internet for searching information and create, receive & send email with attachment.	5.4 ISP: need & duties of ISP, different ISP in city 5.5 Browsers 5.6 Universal resource locators (URL) 5.7 Browsing or surfing the web 5.8 Search engines 5.9 E-mail and Creation of E-mail ID. Sending & Receiving email with attachment. 5.10 Chatting & Video Conferencing tools: Skype and GTalk 5.11 Applications of the Internet

6. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN :

Unit No	Title Of Unit	Practical Hours	Distribution Of Theory Marks			
			R level	U Level	A Level	TOTAL
1	Basics of Computer System	08				NA
2	Word Processing	08				NA
3	Spreadsheet	06				NA
4	Presentation	06				NA
5	Introduction to Internet	04				NA

Legends: R – Remember, U – Understand, A – Apply and above (Bloom's revised Taxonomy)

7. LIST OF PRACTICAL / LABORATORY EXPERIENCES/ TUTORIALS :

Sr. No.	Unit	Title Practical/ Lab. Work/ Assignments/ Tutorials	Hours
1	1	Connect the peripherals to a computer system. Get the information about the manufacturers and prices of various components of a PC and laptop.	2
2	1	Start and shutdown of windows, starting different applications. Use of accessories like calculator, paint, notepad & WordPad, Use of system tools like Disk Cleaner, Disk defragmenter, System Information, System Restore & Control panel.	4
3	1	Perform file management operations such as copying, deleting, renaming, creating folders, renaming folders using My computer. Windows Explorer, searching files and folders.	2



4	1	Change windows format such as wall paper, date & time, installing printer, installing and removing programs by using add/remove programs.	2
5	2	Prepare a sample doc files such as resume, application, time table etc. using all word processor tools from menu bar.	6
6	3	Prepare sample spreadsheets such as sample result sheet, salary sheet of employees using all MS-Excel tools from menu bar. (applying excel formulae/functions)	6
7	4	Prepare sample power point presentation by applying MS-Power Point tools such as design template, background, transition and animation effect to slides.	6
8	5	Search information on internet Use Internet to create email account, send email with attachment, receive email and management of email account.	2
9	5	Use of E-commerce sites, Mobile apps for various online transactions.	2
			32

8. SUGGESTED STUDENTS ACTIVITIES :

Following is the list of proposed student activities like: assignments based on MS-Office, teacher guided self learning activities and lab based mini-projects on MS-Word, MS-Excel and MS-PowerPoint. These could be individual or group-based.

- Visit institute website.
- Manage files and folder using Windows.
- Prepare letter and project report using word processor
- Create result sheet by inserting student marks and show it in chart form on the same worksheet using Excel spreadsheet.
- Develop effective presentation of project report using PowerPoint Presentation.
- Use open source software like openoffice.org (latest version).

9. SUGGESTED SPECIFIC INSTRUCTIONAL STRATEGIES

These are sample strategies, which a teacher can use to facilitate the attainment of course outcomes.

- Group based.
- Q & A technique.
- Individual based.
- Activity based learning
- Self Line learning.



10. SUGGESTED LEARNING RESOURCE :

S.No.	Name of Book	Author	Publication
1.	Fundamentals of computers	P.K. Sinha	BPB Publication
2.	Computer course	R Taxali	TMGH Publication
3.	MS-Office for Dummies	Wallace Wang	Wiley India, New Delhi
4.	Basic Computer Engineering	Dr. Shailendra Singh, Pawan Thakur, Anurag Jain	Satya Prakashan, New Delhi, India.
5.	Microsoft Office	Ron Mansfield	BPB Publication
6.	Fundamentals of computers	P.K. Sinha	BPB Publication

11. LIST OF MAJOR EQUIPMENTS AND MATERIALS REQUIRED :

Sr. No.	Name of equipment	Brief specification
1.	Computer System with latest configuration along with Windows Operating System and latest MS-Office.	Desktop Computer/Personal Computer (Windows OS Prof. Edition/Academic edition) with preloaded operating systems windows 7/windows 8 (academic Lic)
2.	PROJECTOR	Multimedia Projector with wireless connectivity between PC and Projector
3.	PRINTER	HP 1022n laser printer
4.	SCANNER	HP scanner ,Color Scan Method: Color, Flatbed, Mirror Moving Scanner Optical Resolution: 800 x 1600 dpi Maximum Scanning Area 304.8 x 431.8 mm (12x17 inch)
5.	Computer System with latest configuration along with Windows Operating System and latest MS-Office.	Desktop Computer/Personal Computer (Windows OS Prof. Edition/Academic edition) with preloaded operating systems windows 7/windows 8 (academic Lic)
6.	PROJECTOR	Multimedia Projector with wireless connectivity between PC and Projector

12. LEARNING WEBSITE & SOFTWARE :

(Please mention complete URL of the E- resource CO wise)

- <https://www.youtube.com/watch?v=cXBVMYKQ3ZY>
- <http://www.gcflearnfree.org/computerbasics/>
- http://www.homeandlearn.co.uk/word2007_2010/Word-2007-2010.html
- <http://www.homeandlearn.co.uk/excel2007/Excel2007.html>
- <https://support.office.com/>

13. MAPPING OF PROGRAMME OUTCOMES (POs) AND PROGRAMME SPECIFIC OUTCOMES (PSOs) WITH COURSE OUTCOMES (COs) :

SNo	Course Outcomes	POs										PSOs	
		1	2	3	4	5	6	7	8	9	10	01	02
1	Connect and operationalize computer system with its peripheral devices.	2	2	2	0	0	0	0	0	0	2	0	0
2	Create and Format documents in Microsoft Word.	3	0	3	3	0	0	0	0	0	3	0	0
3	Create spreadsheets in Microsoft Excel by using formulae.	3	0	3	3	0	0	0	0	0	3	0	0
4	Create and edit basic power point presentations in Microsoft PowerPoint.	3	0	3	3	0	0	0	0	0	3	0	0
5	Use internet for creating email-id, receive and send email with attachment & search information on internet.	1	1	1	1	0	0	0	0	0	1	0	0

Course Curriculum Design Committee

Sr No	Name of the faculty members	Designation and Institute
1	R.T.Aghao	Sr.Lecturer in APM Dept. , Govt. Polytechnic, Aurangabad
2	O.R.Varma	Lecturer in IT Dept., Govt. Polytechnic,Aurangabad



(Member Secretary PBOS)

(Chairman PBOS)

COURSE TITLE ENGLISH
COURSE CODE 6G301

Diploma Programme in which this course is offered	Semester in which offered
Common to all programmes	First

1. RATIONALE :

English language has become a supreme necessity to pick up a solid core of knowledge. It has a power of linking us with the outside world. Competency in English is also important in business matters like transactions including e-mails, memos, reports and contracts in writing not only for Indian industry, but also worldwide. Students having proficiency in reading, writing and speaking English has become a prospect of employment in the industry. Hence, this course is designed to help the students to communicate in English effectively.

2. COMPETENCY :

At the end of studying this course students will be able to
"Communicate in English language in spoken and written form."

3. TEACHING AND EXAMINATION SCHEME :

Teaching Scheme (In Hours)			Total Credits (L+T+P)	Examination Scheme				Total Marks
L	T	P		Theory Marks		Practical Marks		
			C	ESE	PT	ESE	PA	
2	-	2	4	80	20	-	25*	125
Exam Duration				3 Hrs	1 Hr	-	-	-

(*): Out of 25 marks, 05 marks -micro-project assessment; 20 marks-progressive assessment.

Legends : L-Lecture; T-Tutorial/Teacher Guided Theory Practice ; P- Practical; C- Credits; ESE- End Semester Examination; PT – Progressive Test, PA- Progressive Assessment, PR-Practical Examination, OR – Oral Examination, TW - Term Work, # External, @ Internal examination, ~ Online Examination.

4. COURSE OUTCOMES :

- Interpret the meaning of new words from the text.
- Formulate grammatically correct sentences using new words.
- Prepare resume in proper format.
- Use relevant vocabulary to construct sentences.

5. COURSE DETAILS :

Unit	Major Learning Outcomes (in cognitive domain)	Topics and Sub-topics
UNIT-I Comprehension	1a. Understanding meaning of new words from the text. 1b. Write summary of the text 1c. Responding to the questions from the text 1d. Express ideas and views on learned topics	Text from the book & Vocabulary Building 1.1. Man Versus Machine—M. K. Gandhi 1.2. Say No to Plastic Bags



		1.3. Interview of Dr.A.P.J.AbdulKalam 1.4. Dare to Dream-N.R.Narayan Murthy 1.5. The History Maker—MultiHolla
UNIT-II Functional Grammar	2a. Apply correct verbs in given sentences 2b. Use of correct structures in writing 2c. Identify different types of sentences 2d. Apply correct auxiliaries 2e. Use appropriate connectors in the given sentences 2f. Use appropriate prepositions in the given sentences 2g. Apply correct and exact rules and structures to transform the sentences 2h. Use of correct punctuations in writing	Functional Grammar 2.1. Tenses & Time 2.2. Sentence Patterns 2.3. Types of Sentences 2.4. Modal Auxiliaries 2.5. Connectors 2.6. Prepositions 2.7. Voice, Degree and Reported Speech 2.8. Punctuation Marks
UNIT-III Craft of writing	3a. Writing a paragraph effectively 3b. Writing e-mail in proper formats 3c. Prepare resume in suitable format	3.1. Paragraph Writing 3.2. E-mail writing 3.3. Resume Writing
UNIT-IV Listening & Speaking Skills	4a. Formulate sentences using new words 4b. Enrich vocabulary through reading and listening 4c. Follow correct pronunciations, intonations & accents in communication	4.1. Importance of effective listening 4.2. Barriers in listening and how to overcome them 4.3. Problems in speaking English faced by Indian Students

6. SUGGESTED SPECIFICATION TABLE WITH HOURS AND MARKS (THEORY):

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
I	Text from the book & Vocabulary Building	12	08	12	10	30
II	Functional Grammar	12	05	08	13	26
III	Craft of Writing	06	04	04	08	16
IV	Listening & Speaking Skills	02	02	02	04	08
	Total	32	19	26	35	80

Legends: R = Remembrance; U = Understanding; A = Application and above levels (Revised Bloom's taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from the above table.

7. SUGGESTED EXERCISES/PRACTICALS :

The tutorial/practical/exercises should be properly designed and implemented with an attempt to develop different types of cognitive and practical skills (**Outcomes in cognitive, psychomotor and affective domain**) so that students are able to acquire the competencies.

Sr. No.	Unit No.	Practical Exercises (Outcomes in Psychomotor Domain)	Approx. Hrs. required
1.	I	Make Sentences Using Correct Collocations	04
2.	II	Frame Sentences Using Appropriate Preposition/Conjunction	04
3.	III	Make Sentences Using Correct Tenses	04
4.	IV	Make Sentences Using Seven Basic Sentence Patterns	04
5.	V	Transform Sentences in Reported Speech	04
6.	VI	Prepare an Effective Resume in a Proper Format	04
7.	VII	Draft Formal E-mails	04
8.	VIII	Listen a Paragraph/Speech/Story and Make a Summary	04
Total			32

8. SUGGESTED STUDENT ACTIVITIES :

Following is the list of proposed student activities like:

- Read newspapers daily.
- Solve exercises on lexical items.
- Use apps for practice.
- Use pocket dictionary to increase vocabulary.
- Listen the news bulletin on radio.
- Play different word games to improve vocabulary.
- Write different articles & posts.
- Practice role-playing.
- Write a story of own experiences.
- Practice listening comprehension.
- Collect articles from newspapers & make a collection.
- Practice paragraph writing.
- Collect different business letters.

9. SPECIAL INSTRUCTIONAL STRATEGIES (if any) :

- Arrange different competitions to solve various grammatical items.
- Motivate students to listen, speak, read and write English in their day-to-day life.
- Student centered methods and techniques of teaching and learning e.g. group discussion, role-play, individual and group assignments should be used so as to make the students actively participate in the teaching-learning process.

SUGGESTED TITLES FOR MICRO-PROJECTS :

A *micro-project* is planned to be undertaken by a student. He/she ought to submit it by the end of the semester to develop the industry oriented COs. The micro-project could be industry application-based, internet-based, workshop-based, laboratory-based or field-based. Each student will have to maintain dated work diary consisting of individual contribution in the project work and give a seminar presentation of it before submission. A suggestive list is given here. Similar micro-projects could be added by the concerned faculty:



- The use of English language in the user manual of electronic appliances used at home.
- Prepare an advertisement for five daily used products using contextual vocabulary.
- Observe environmental problems in your locality and frame at least ten slogans to create awareness.
- Take an interview of any successful person in your locality in context with his life journey, inspiration, social contribution, role model and keys to success.
- Prepare a leaflet giving information about your institute.
- Write a review of your favourite movie/drama/novel.
- Find out the difficulties in speaking English faced by the students from rural areas.

10. SUGGESTED LEARNING RESOURCES :

Sr. No.	Title of Book	Author	Publication
1	English Grammar & Composition	R. C. Jain	Macmillan
2	Business Letters & E-mails	Jyoti Nandedkar	Saket Pub.
3	Business Correspondence and Report writing	R. C. Sharma & Krishna Mohan	Tata McGraw Hill
4	Contemporary English Grammar	David Green	Macmillan
5	A Communicative Grammar of English	Geofray Leech & Jansvartvik	Pearson Education
6	*Spectrum- A Text Book on English	-	MSBTE
7	* A Text Book on English	-	MSBTE

11. Major Equipments/ Instruments with Broad Specifications

Sr.No.	Name of the Equipment	Specification
1	Digital English Language Laboratory	
2	Computers and Headphones	
3	Magazines, Articles, Journals in Lab.	

12. E-learning resources

(Please mention complete URL of the E- resources CO wise)

1	https://www.nptel.ac.in/courses
2	https://www.k12reader.com
3	https://www.education.com
4	https://www.k5learning.com
5	https://www.english4u.com

13. POs and PSOs assignment and its strength of assignment with each CO of the Course

CO NO	Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	Interpret the meaning of new words from the text.	3	1	1	1	1	1	1	1	3	1	-	-	-

CO2	Formulate grammatically correct sentences using new words.	3	1	1	1	1	1	1	1	1	3	1	-	-	-
CO3	Prepare resume in proper format.	1	1	2	1	3	3	2	3	3	3	-	-	-	-
CO4	Use relevant vocabulary to construct sentences.	1	1	1	1	1	1	1	1	2	1	-	-	-	-

Sr. No	Name of the faculty member	Designation and Institute
1	Mrs. P.Y. Kamble	Lecturer in English, Government Polytechnic, Aurangabad
2	Mrs. M.S. Ban	Lecturer in English, Government Polytechnic, Aurangabad
3	Mr. P.V. Deshmukh	Lecturer in English, Government Polytechnic, Aurangabad
4	Mr. R.L. Korde	Lecturer in English, Government Polytechnic, Aurangabad
5	Mr. D.D. Gangthade	Lecturer in English, Government Polytechnic, Aurangabad
6	Mr. A.P. Jagtap	Lecturer in English, Government Polytechnic, Osmanabad

Member Secretary PBOS

Chairman PBOS

Co-coordinator
science and Humanities

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GPA

ENVIRONMENTAL SCIENCE

COURSE TITLE : ENVIRONMENTAL SCIENCE

COURSE CODE : 6G304

DIPLOMA PROGRAMME IN WHICH THIS COURSE IS OFFERED	SEMESTER
ME, CE, EE, E&TC, CO, IT, AE	FIRST

1. RATIONALE :

The present plight of the world as a victim to a number of environmental setbacks ranging from global warming, ozone layer depletion, acid rains led to alarmingly increase in world pollution levels. This has led to the dangerous situation threatening existence of biosphere on the earth. Diploma engineers also get confronted with this issue in their professional life.. Diploma engineers need to be aware of environment and associated issues so that he can help in protection and preservation of environment.

2. COMPETENCY :

“Contribute in overall preservation of eco system of organization.”

3. TEACHING AND EXAMINATION SCHEME :

Teaching Scheme (In Hours)			Total Credits (L+T+P)	Examination Scheme				Total Marks
L	T	P		Theory Marks		Practical Marks		
0	--	2	2	ESE	PT	ESE (PR)	PA	50
Exam duration			--	--	--	--	--	

Legends : L-Lecture; T-Tutorial/Teacher Guided Theory Practice ; P- Practical; C- Credits; ESE- End Semester Examination; PT – Progressive Test, PA- Progressive Assessment, PR- Practical Examination, OR – Oral Examination, TW - Term Work, # External, @ Internal examination, ~ Online Examination.

4. COURSE OUTCOMES :

At the end of this course, students would be able to -

- Identify elements of biodiversity.
- Assess the impact of biodiversity
- Apply provisions of various environmental protection acts in practice.
- Undertake survey on environmental concerns and remedial measures

5. COURSE DETAILS :

Unit	Major Learning Outcomes (in cognitive domain)	Topics and Sub-topics
Unit –I Environment and	1a. Write genesis of environmental concerns 1b. Identify the various types	1.1 Definition , Scope and importance of Environmental



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studies	of environmental issues.	studies 1.2 Meaning of environment, Environment and its components, Segments of environment, scientific aspects 1.3 Global environment crisis and factors affecting it. Deforestation, aquatic life and tsunami effects ,Population, Carbon dioxide emissions, pollution, Extinction of species etc. Ecological Foot print
Unit– II Environmental Natural Resources	2a. Classify different resources 2b. Outline issues associated with different resources. 2c. Develop strategies to conserve of natural resources.	2.1. Renewable and Nonrenewable natural resources and associated issues as under, a. Forest resources b. Water resources c. Energy resources d. Land resources e. Food resources f. Energy resources 2.2. Role of individual in conservation of natural resources
Unit– III Ecosystems	3a. Outline ecosystem. 3b. Categorize various ecosystems .	3.1 Concept of Ecosystem 3.2 Structure and function of ecosystem 3.3 Structure and functions of following ecosystems, a. Forest Ecosystem b. Grassland Ecosystem c. Desert Ecosystem d. Aquatic ecosystem
Unit– IV Biodiversity and Conservation	4a. Outline Biographical classification of India 4b. Assess Biodiversity loss and its impact.	4.1 Introduction, Values of the Biodiversity, Biographical classification of India 4.2 Biodiversity loss and its impact 4.3 Conservation of Biodiversity, Efforts made in India.
Unit - V	5a. Describe pollution and its typs	5.1 Definition of pollution and its types

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Environmental Pollution	5b. Describe cause, effect relationship. 5c. Conduct Survey on Environmental Pollution	5.2 Causes, effects and control measures of following types of pollutions a. Air Pollution b. Water Pollution c. Soil Pollution d. Marine Pollution e. Thermal Pollution f. Nuclear hazards and pollution 5.3 Pollution norms, rules and bye laws 5.4 Solid waste management: Causes, Effects and control measures of urban and industrial waste.
Unit – VI Social Issues and Environment	6a. Identify social issues related to environment 6b. Suggest control measures to counter the issues,	6.1 Urban problems related to Energy, Measures of water conservation including Rain water harvesting, Watershed Management 6.2 Climatic changes, Global Warming, Acid rain, Ozone layer depletion issue, Nuclear accidents and holocaust. Kyoto Protocol, Climate justice 6.3 Introduction to Environment (protection) act(prevention and control of pollution),Wildlife protection act, Forest protection act Air (Prevention and control of pollution) Act, Water related Environment laws ,issues in enforcement of environmental legislation, public awareness.
Unit – VII Human population and environment	7a. Use of ICT in environment and human health areas.	7.1Concepts of Population Growth, Environment and human health, Role of information technology in environment and human health

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6. SUGGESTED SPECIFICATION TABLE WITH HOURS AND MARKS (THEORY) :

Unit	Unit Title	Teaching Hours	Distribution of practical examination marks			
			R Level	U Level	A Level	Total Marks
I	Environment and studies	6	NA	NA	NA	NA
II	Environmental Natural resources	6	NA	NA	NA	NA
III	Ecosystems	6	NA	NA	NA	NA
IV	Biodiversity and conservation	6	NA	NA	NA	NA
V	Environmental Pollution	12	NA	NA	NA	NA
VI	Social issues and environment	6	NA	NA	NA	NA
VII	Human population and environment	6	NA	NA	NA	NA
Total		48	NA	NA	NA	NA

Legends: R = Remembrance; U = Understanding; A = Application and above levels (Revised Bloom's taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

7. SUGGESTED EXERCISES/PRACTICALS :

The tutorial/practical/exercises should be properly designed and implemented with an attempt to develop different types of cognitive and practical skills (**Outcomes in cognitive, psychomotor and affective domain**) so that students are able to acquire the competencies.

Here all the practical exercises are to be completed by students in a group. The group size should be 10 to 12. The groups should be formed by concerned teacher in consultation with students. Every group should be assigned a group leader. All groups will complete the practical assignments in spare time and during Sundays and holidays. No separate time slots will be allotted to these practical exercises. Teacher will guide and give necessary inputs for modus operandi of exercises.

S. No.	Unit No.	Practical Exercises (Outcomes in Psychomotor Domain)	Approx. Hrs. required
1	I	Prepare report on environmental issues of your institute / Selected Premises	04
2	II	Collect information related to natural resources of India and methods adopted for conservation of these resources	02
3	I, II	Prepare "Energy Audit Report" of a small home. And give suggestions for conservation of energy.	02



4	III, IV	Examine water usage of a small community/locality in city/Apartment /Your Institute and prepare a Report on actions that could be taken to conserve the water from following point of view: How much water is consumed How much wastage of water occurs How can demand of water be reduced How can ecological footprint of water they get can be reduced What other environment friendly ways of getting water can one implement What is the quality of water and how can it be improved How reuse and recycling of water can be done How users can be educated for proper use of water	02
5	I,II,III, VI	Visit, "Roof water harvesting" system installed in nearby area and prepare a detailed report. Include local bodies legislation as regards roof water harvesting	02
6	I,II,III	Undertake "Tree plantation project" and plant at least 03 trees per student in your Institute. Prepare detailed report on tree plantation.	02
7	I,II,III	Visit ,study and analyze a "Solar systems" installed in nearby area and prepare a detailed report. Include following types of systems, a. Household Solar water heating systems b. Solar P-V Systems c. Solar roof top Net metering systems	02
8	IV	Preparation of Biodiversity Report: Select a small park or garden in your area. Prepare a Biodiversity register: list all the species found in place ,find their scientific names with the help of a botanist. Interview long term users of the place and find out about loss of biodiversity. Write a report describing your observations and your recommendations for conservation of biodiversity.	03
9	V	Prepare a report on water pollution scenario in your institute and make a detailed report. Following activities can be undertaken with permission, Locating and studying water consumption locations in institute like Water coolers , R.O units, Filters, taps. Taking and checking drinking water samples periodically from testing authorities and keeping records. Preparing and executing schedule for cleaning water tanks, water filters, RO units etc.	06
10	V	Prepare report Vehicular pollution checking in your institute: Here sample check the two wheelers, four wheeler vehicles of employees, students with the help of Exhaust gas analyzer / Smokemeter periodically and check the levels of pollution.	02
11	V	Prepare report of Noise and Air pollution levels at a crowded square of city using Deciblemeter and Air sampling device	02
12	VI	Collect information on Global Warming, Acid rain, Ozone layer depletion issue, Nuclear accidents and holocaust. Kyoto Protocol, Climate justice, Environment protection laws and regulations.	02
Total			32

8. SUGGESTED STUDENT ACTIVITIES :

Following is the list of proposed student activities like:

- 1 Search different journals on Environment
- 2 Collect info of Environmental laws and regulations from websites.
- 3 Collect various news paper cuttings on the issues of environment
- 4 Observe and celebrate following important days on environment,
 - 22 April- Earth Day
 - 1 – 7 July – Vanamahotsava Week
 - 11 International Mountain day
 - 2 February – Worlds wetland day
 - 5 April – National Maritime day
 - 8 June – World Oceans day
 - 22 May – international Day of Biological diversity
 - 22 March – World Water day.
 - 21 March – World Forestry Day
 - 16 October – Worlds food day
 - 22 September – Car free day
 - 29 October- National disaster reduction day
 - 21 July – Worlds Population day
 - 8 March – Womans day
- 5 Prepare charts, banners, posters on environment and its protection and display in class, notice boards.
- 6 Participate in social campaigns concerning environment and its preservation.
- 7

9. SUGGESTED SPECIFIC INSTRUCTIONAL STRATEGIES :

1. Q & A Techniques.
2. Field Visits
3. Expert Lectures.

10. SUGGESTED LEARNING RESOURCES :

	Title of Book	Author	Publication
1	Environmental Studies	R.Rajgopalan	OXFORD university press
2	Environmental Studies	Anindata Basak	Pearson education
3	Air Pollution	M.N. Rao	Tata Macgrawhill
4	Elements of Environmental Science and Engineering	P. Meenakshi	Prentice Hall
5	Introduction to Environmental Engineering	P.Aarne Vesilind and Susan Morgan	Thomson



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11. Major Equipment/ Instrument with Broad Specifications :

Sr. No.	Major equipment/ Instrument with Broad Specification	Quantity
1	Biological Microscope	01
2	Air sample testing setup	01
3	Water sample testing setup	01
4	Exhaust gas Analyzer	01
5	Smoke meter	01
6	PC with Net connectivity	01
7	LCD Projector	01 et

12. E-learning resources :

(Please mention complete URL of the E- recourse CO wise)

1. www.unep.org
2. www.ipcc.ch
3. www.grida.no
4. www.wildlifeindia.com
5. www.fsi.nic.in/sfr_2009.htm
6. www.unesco.org
7. www.chilika.com
8. www.foodfirst.org/media/opeds/2000/4-greenrev.html
9. www.cites.org
10. <http://projecttiger.nic.in/>
11. www.iwmi.cgiar.org/
12. www.worldwater.org
13. www.indiaenergyportal.org
14. <http://www.lifeaftertheoilcrash.net/>
15. www.mmpindia.org/
16. www.pcri.com
17. http://www.unwater.org/statistics_pollu.html

List of Films

1. The 11th hour
2. The many faces of madness
3. Planet Earth-BBC documentary
4. The childrens of Amazon
5. The Blue Planet-BBC documentary
6. End of Line
7. The State of planet – BBC Documentary
8. The truth about Tigers
9. Bringing home rain- A film by SushamaVeerappa.
10. Drinking the sky – BBC documentary
11. A Crude Awakening :The OIL Crash – A documentary by Basil Gelpke
12. Poison on a platter – Documentary by Mahesh Bhatt
13. The story of bottled water – A documentary by Annie Leonard on packaged water industry (Download from www.storyofstuff.org)



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13. POs and PSOs assignment and its strength of assignment with each CO of the Course :

CO. NO.	Course Outcome	P	P	P	P	P	P	P	P	P	P	P	P
		O	O	O	O	O	O	O	O	O	O	O	O
		1	2	3	4	5	6	7	8	9	10	11	12
CO1	Analyze and assess the impact of biodiversity and its loss on environment.	2				2	2						
CO2	Identify causes of pollution in working system and apply control measures for prevention.					2	2						
CO3	Apply provisions of various environmental protection acts in practice.	2				3	3			3			
CO4	Appreciate correlation between Human population and its effect on environment.	2				2	2			3			
CO5	Read, analyze and apply various laws and regulations concerning environmental issues.	2				3	3						

Course Curriculum Design Committee

Sr No	Name of the faculty members	Designation and Institute
1	Prof.S.P.Shiralkar	Lecturer in Mechanical Engineering Department
2	Prof. A.B. Deshpande	Lecturer in Mechanical Engineering Department

(Member Secretary PBOS)

(Chairman PBOS)