

**AUTONOMOUS SYLLABUS**  
**ENGINEERING MATHEMATICS - I**

Subject code: 12MA11	Credit : 04
CIE : 50 Marks	SEE : 50 Marks    SEE : 03hrs
Hours/Week : 4hrs. (Theory)	Total Hours : 52

**PART – A**

**ANALYTICAL SOLID GEOMETRY :** **06 hours**

Direction cosine and directions ratios, Planes, Straight lines, Angle between Planes/straight lines. Coplanar lines, Shortest distance between two skew lines.

**DIFFERENTIAL CALCULUS :** **06 hours**

$n$ th derivative of standard functions. Leibnitz's theorem (with out proof) and problems. Polar curve and angle between polar curves, pedal equations of polar curves. Derivative of arc lengths (only proof), radius of curvature (definition only).

**PARTIAL DIFFERENTIATION :** **06 hours**

Partial derivatives, Euler's Theorem , Total differentiation, Differentiation of composite function, Jacobian and their properties, Errors and Approximations.

**INTEGRAL CALCULUS AND APPLICATIONS :** **08 hours**

Reduction formulae for the integration of  $\sin^n x$ ,  $\cos^n x$ ,  $\tan^n x$ ,  $\sin^n x \cos^m x$  and evaluation of these with standard limits, problems. Tracing of curves in Cartesian form, parametric form and polar form.

Applications to find length of given curves, Volumes and surface area of solid revolution.

## PART - B

### **DIFFERENTIAL EQUATIONS AND APPLICATIONS: 12 hours**

Solution of first order and first degree differential equations, variable separable, homogeneous linear equations and reducible to above types and exact differential equations Illustrative example from engineering field.

Introduction, Geometric applications, orthogonal trajectories, Physical applications, Simple electric circuit, Newton's law of cooling.

### **INFINITE SERIES : 07 hours**

Convergence, divergence and oscillations of an infinite series. Comparison test, P-series, D'Almberts ratio test, Cauchy's root test (all test with out proof) and problems.

### **MATRICES : 07 hours**

Recapitulation of matrix theory, Rank of a matrix, consistency of a system of linear equations and solution. Solution of a system of linear homogeneous equations (trivial and non-trivial solutions). Solution of a system of non-homogeneous equations by Gauss-Jordan methods.

**Question paper pattern:** Solve any five full questions, choose atleast two full questions from each part

#### **Text Books :**

1. B.S Grewal " Higher Engg. Mathematics 36<sup>th</sup> Edn.,
2. Advanced Engg. Mathematics by E. Kreyszing John willey & Sons 8<sup>th</sup> Edn.

#### **Reference Books:**

1. Advanced Engg. Mathematics by E. Kreyszing John willey & Sons 8<sup>th</sup> Edn.
2. A short course in differential questions – Rainville E.D. 4<sup>th</sup> Edn. 1969.

**Note: In each main question two sub-divisions from the same chapter and one third sub-division from another chapter of the same part.**

# AUTONOMOUS SYLLABUS

## ENGINEERING MATHEMATICS - II

Subject code: 12MA21	Credit : 04
CIE : 50 Marks	SEE : 50 Marks SEE : 03hrs
Hours/Week : 4hrs. (Theory)	Total Hours : 52

### PART – A

#### **DIFFERENTIAL CALCULUS:**

**12 hrs**

Rolle's theorem (without proof), Lagrange's and Cauchy's mean values theorem for a function of a single variable and Maclaurins series expansions (with out proof), Indeterminate forms, L-Hospitals rule (with out proof), Taylor's theorem for a function of two variables (with out proof), Maxima and minima for a function of two variables, Lagranges method of undetermined multipliers for extreme values (with one subsidiary conditions).

#### **DIFFERENTIAL EQUASTIONS AND RLC APPLICATIONS:**

**07 hrs**

Linear differential equations of second and Hiegher order with constant coefficients, method of variation of parameters, solution of couchy's homogeneous linear equation and Legendres linear differential equations, solution of initial and boundary value problems. Electrical circuits, deflection of beams.

#### **INTEGRAL CALCULUS:**

**07 hrs**

Multiple integrals, evaluation by change of order of untegration, change of variables and applications to area, Volume, Beta and Gamma functions, definitions under integral sign (with constant limits).

### PART – B

**LAPLACE TRANSFORMS:****13 hrs**

Definition, transform of elementary functions, derivatives and integral transforms problems, periodic function, Unit step functions, Inverse transform, Properties, Convolution theorem, Solution of linear differential questions.

**VECTOR CALCULUS AND VECTOR INTEGRATION:****13 hrs**

Vector differentiation, Gradient, Divergence, curl, Laplacian, Solenoidal and irrotational vector problems line integrals, Surface integral and volume integrals, Greens, Stokes and Gauss theorems (with out proof).

**Question paper pattern:**

Solve any five full questions, choose atleast two full questions from each part

**Text Books :**

1. B.S Grewal “ Higher Engg. Mathematics 36<sup>th</sup> Edn.,
2. Advanced Engg. Mathematics by E. Kreyszing John willey & Sons 8<sup>th</sup> Edn.

**Reference Books:**

1. Advanced Engg. Mathematics by E. Kreyszing John willey & Sons 8<sup>th</sup> Edn.
2. A short course in differential questions – Rainville E.D. 4<sup>th</sup> Edn. 1969.

**Note: In each main question two sub-divisions from the same chapter and one third sub-division from another chapter of the same part.**

## PROGRAMMING IN C

**Sub Code: 12CS16/26**

**CIE : 50**

**Marks**

**Hours/Week : 3 hrs + 2hrs Tutorials**

**SEE: 50**

**Marks**

**SEE : 03 hrs Duration**

**Credits:04**

**Total Hours:**

**42**

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### Part-A

**Introduction to Computers, Algorithms, Flowcharts and Operators:** History, Block diagram of Computer and Information processing cycle. Input devices, Output devices, Storage devices, Operating System, Computer Network and Internet. Algorithms, flowcharts, Basic Structure of C Program, Executing a 'C' program. C tokens, Data types, Declaration of variables.      **5 Hrs.**

**Expressions, Managing Input/Output and Operators:** Arithmetic operators, relational operators, logical operators, assignment operators, increment/ decrement operators, conditional operators, bit wise operators, special operators. Evaluation of expression, precedence of arithmetic operators, type conversions in expression, operator precedence and associativity. Unformatted and Formatted Input and Output.      **5 Hrs.**

**Control Statements:** Decision Making with if statement, Simple if statement, the if else and nested if statements, the else if ladder, Switch statement, the ? Operator, Unconditional control Statements.      **5 Hrs.**

**Decision Making and Looping:** While statement, Do-While statement, For statement, Unconditional Statement.      **6 Hrs.**

### Part – B

**Arrays, Structures and Unions:** One dimensional Array, declaration, Initialization, Two dimensional Arrays notations and representations, manipulating with arrays, Initialization. Defining a Structures, Declaration of Structure variables, Accessing Structure Members,

Structure Initialization, Copying and comparing structure variables, operations on individual members. **6 Hrs.**

**Strings :** Declaring and Initializing String Variables, Reading Strings from Terminal, Writing strings to Screen, Arithmetic Operations on Characters, String-handling functions, Table of Strings. **5 Hrs.**

**Functions and Recursion :** Need for User-defined Functions, A multi-function program, Elements of User-defined Functions, Definition of functions, Return value and their types, Function calls, Function declaration, Category of functions, Recursion. **6 Hrs.**

**File Management and Pointers:** Defining and opening/closing the file, Input/Output Operations on files, Simple examples. Pointer : Accessing the address of a variable, Declaring pointer variables, Initializing of pointer variables, Accessing a variable through its pointer. **4 Hrs.**

**Text Books:**

1. Peter Norton, "Introduction to Computers", Sixth Edition, Tata McGraw Hill, 2005
2. E. Balagurusamy, "Programming in ANSI C", Tata McGraw Hill – III Edition.

**Reference Books:**

1. Herbert Schildt, "Complete Reference in C", TMH Publication
2. Yashwant Kanetakar, "Let us C", BPB Publications

**Programming in C Lab (12CS 18/28)**

**Subject Code :12CS18/28**

**Hours/Week : 3 hrs (Practical)**

**C.I.E : 50 Marks**

**Credits :1.5**

**S.E.E:03 Hrs**

**S.E.E : 50 Marks**

**Part – A**

1. Explain basic structure of C program and write a program to print college name.
2. Identify syntax error in the following program. After correction what output would you expect when you execute it
  - a. #define Pi 3.1415
  - b. main()

```

c. {
d. int r,c;
e. float perimeter, area;
f. c = pi;
g. r = 5;
h. perimeter = 2.0*c*r;
i. area = c*r*r;
j. printf(“%f”,”%d”, &perimeter, &area);
k. getch();
l. }

```

3. Write C assignment statements to evaluate the following equations:

- $Area = \pi r^2 + 2\pi rh$
- $Troque = \frac{2m m_2}{m_1 + m_2} \bullet g$
- $Side = \sqrt{a^2 + b^2 - 2ab\cos(x)}$
- $Energy = mass \left[ acceleration \times height + \frac{velocity^2}{2} \right]$
- $C = 5/9 (F-32)$
- Volume of cone =  $1/3 \pi r^2 \times height$

4. Determine the value of each of the following logical expressions if a=5, b=10 & c=-6

- $a > b \ \&\& \ a < c$
- $a < b \ \&\& \ a > c$
- $a = c \ \|\ b > a$
- $b > 15 \ \&\& \ c < 0 \ \|\ a > 0$
- $(a/2.0 == 0.0 \ \&\& \ b/2.0 != 0.0) \ \|\ c < 0.0$

5. State the outputs produced by the following printf statements:

- `printf(“%d %c %f“, 10, 'x', 1.23);`
- `printf(“%2d %c %4.2f“, 1234, 'x', 1.23)`
- `printf(“%d\t %4.2f“, 1234, 456);`
- `printf(“%d%d%d”, 10, 20);`

6. Assuming x = 10, state whether the following logical expressions are true or false

- $x == 10 \ \&\& \ x > 10 \ \&\& \ !x$
- $x == 10 \ \|\ x > 10 \ \&\& \ !x$
- $x == 10 \ \&\& \ x > 10 \ \|\ !x$
- $x == 10 \ \|\ x > 10 \ \|\ !x$

7. Simplify the following compound logical expressions (x=1 ,y=2 ) and z = 0)

- $!(x <= 10)$

- b. `!(x == 10) || !(y == 5) || (z < 0)`
  - c. `!((x + y == z) && !(z > 5))`
  - d. `!((x <= 5) && (y == 10) && (z < 5))`
8. Practices the mathematical built in functions( pow ,abs ,sqrt ,sin ,cos ,tan ,floor and ceil).
9. Practice different types of Operators (arithmetic operator, relational operator, logical operator, bitwise operator, conditional operator ? .
10. Assuming that `x = 5`, `y = 0` and `z = 1` initially, what will be there values after executing the following code segments.
- a. `if( x && y)`  
`x = 10;`  
`else`  
`y = 10;`
  - b. `if( x || y || z)`  
`y = 10;`  
`else`  
`z = 0;`
  - c. `if( x )`  
`if( y)`  
`z = 10;`  
`else`  
`z = 0;`
  - d. `if ( x == 0 || x && y)`  
`if( !y)`  
`z = 0;`  
`else`  
`y = 1;`
  - e. `switch(x)`  
`{`  
`case 5:`  
`x=1;`  
`y=x+1;`  
`case 4:`  
`x=0;`  
`break;`  
`default:`  
`x=1;`  
`y=0;`  
`}`
11. Practice programs on while, do while, switch case, elseif ladder and nested if Syntax and examples.



12. Practice programs on variations in for loop (including post increment, pre increment, post decrement, pre decrement)

13. What is the output of the following program:

```
main()
{
int m;
for(m=1;m<5;m++)
    printf("%d\n", (m%2)?m : m*2);
}
```

14. What will be the value of x when the following statement is executed.

```
int x =10, y =15;
x = ( x<y ? (y + x) : ( y - x));
```

15. Analyze each of the program segments that follow and determine how many times the body of the each loop will be executed.

a) x=0;  
y=50;  
while(x<=y)  
{  
x=y/x;  
-----;  
-----;  
}

b) m=1;  
do  
{  
-----;  
-----;  
m=m+2;  
}

c) int i;  
for(i=0;i<=5;i=(i+2)/3)  
{  
-----;  
-----;  
}

d) int m=10;  
int n=7;  
while(m%n>=0)  
{  
-----;  
-----;  
m=m+1;  
n=n+2;

}

16. Practice a program on unconditional statements (Example break, continue, goto).
17. Practice a program on to read and write Single dimension array and two dimensional array.
18. Practices programs on string built in functions( strlen,strcpy, strcat, strcmp, strncmp and+ strncpy).
19. Practice programs on functions including all categories.( without arguments, with arguments, without return type, with return type)
20. Write a program to declare, initialize and access structure and union members.

### **Part - B**

1. Write a C program to find and output all the roots of a given quadratic equation for non-zero coefficients using if/switch .
2. Write a C program using nested if statement ,for n integers (zero, +ve, -ve) into an array A and to
  - i. Find, the sum of negative numbers.
  - ii. Find, the sum of positive numbers.
  - iii. Find, the average of all input numbers.Output the various results computed with proper headings.
3. Write a C program to simulate a simple calculator that performs arithmetic operations and error should be reported if any attempt is made for divide by zero using switch statement.
4. Write C program to find whether given number is palindrome or not using while.
5. Write a C program to generate Fibonacci numbers using do while.
6. Write a C program to compute using for loop
  - i)  $\cos(x) = 1 - \frac{x^2}{2!} + \frac{x^4}{4!} - \dots$  up to 15 terms and tabulate the values from 0 to 180 degree in steps of 10 degree.
  - ii)  $\sin(x) = x - \frac{x^3}{3!} + \frac{x^5}{5!} - \frac{x^7}{7!} + \dots$  Also print the Sin (x) value using library function.

7. Write a program to evaluate the given polynomial.

$$P(x) = a_n x^n + a_{n-1} x^{n-1} + a_{n-2} x^{n-2} + \dots + a_1 x + a_0$$

8. Write a Program to find largest, smallest, Sum & average of numbers in a given single dimensional array.

9. A and B are two arrays each with 10 elements. Write a program to find array C such that

$$C[0] = A[0] + B[9]$$

$$C[1] = A[1] + B[8]$$

|  
|

$$C[9] = A[9] + B[0]$$

10. Write a C program to find intersection, union and difference of two arrays A and B with Size 'm' and 'n' respectively.

11. Write a program to input 'N' Real numbers & to find mean, variance & Standard Deviation where  $\text{mean} = (\sum x[i]) / N$ ,  $\text{variance} = (\sum x[i] - \text{mean})^2 / N$ , Standard Deviation =  $\sqrt{\text{Variance}}$ , for  $1 \leq i \leq N$ . Output the computed results on different lines.

12. Write a C program to input N integer numbers into a single dimension array. Sort the array in ascending order using bubble sort technique. Print both the given array and sorted array with suitable headings and find a given key using Linear search.

13. Write a C program to compute the product of A[m x n] and B[p x q] matrices.

14. Write a C user defined function for 'n' input integers in ascending order into a single dimension array and binary search for given key and report success or failure in the form of a suitable message.

15. Write a C program to read a matrix A (M x N) and to find the following  
i) Sum of all the elements of the specified row  
ii) Sum of the elements of the specified column  
iii) Sum of all the elements of the matrix

16. Write a C program to find binominal coefficient  $n!/[r!(n-r)!]$  using user defined function
17. Write a C program to find binary equivalent of a positive integer entered through the Keyboard using recursion function.
18. Write a C program to convert from upper case to lower case letters using string functions
19. Write a C program to arrange the names in alphabetical order.
20. Write a C program to calculate average of student marks for a student database using structure.

**Note:**

1. *Part A program is for practice.*
2. *Student has to execute one program from the Part B .*
3. *For S.E.E, programs similar to the above list will be asked.*

## Basic Electronics

<b>Subject Code : 12EC14/24</b>	<b>Total Hours : 42</b>	<b>Credits : 3:2:0:4</b>
<b>CIE : 50 Marks</b>	<b>Exam Hours : 3hrs.</b>	<b>SEE : 50 Marks</b>

### Part A

**Semiconductor Physics:** Introduction, definition of matter, atomic structure – shells, energy levels in isolated atom, energy bands in solids – conduction in solids – hole formation and its movement, conductors, semiconductors and insulators, Types of semiconductors - Intrinsic and Extrinsic semiconductors, drift current, diffusion current **(04 Hrs)**

**PN Junction:** Formation of depletion layer – junction/barrier voltage, effect of temperature on barrier voltage, FB, RB, VI-characteristics, Junction capacitance, equivalent circuit of PN junction, Zener diodes, voltage regulation. **(03 Hrs)**

**DC Power Supplies:** Introduction – regulated power supply, unregulated power supply, Half-wave rectifier, Full-wave rectifiers and their comparison, Shunt capacitance filter **(03 Hrs)**

**Transistor (BJT) :** Transistor biasing, Transistor currents, CE, CB, CC configurations characteristics of CE configuration, leakage currents, thermal runaway, DC load line, Q-point, different biasing methods, analysis of voltage divider circuit, comparison of stability factors **(05 Hrs)**

**Amplifiers :** Transistor as an amplifier, RC coupled two stage amplifier, gain in dB, frequency response, bandwidth **(02 Hrs)**

**Oscillators: Comparison of amplifier and oscillator, Theory of feedback, -ve and +ve feedback and their merits & demerits, Barkhausen's criteria, LC tank circuit, Hartley oscillator, RC phase shift oscillator, Crystal oscillator, astable multivibrator (04 Hrs)**

## Part B

**Communication systems:** Electro-Magnetic spectrum and frequency ranges, Modulation - need & advantages. Modulation types – AM, FM (Only standard forms), mathematical analysis of AM, Block diagram of AM transmitter, Envelope detector, Superheterodyne receiver

**(04Hrs)**

**Boolean Algebra:** Signed Magnitude representation of numbers, 2's complement and 2's complement arithmetic, Boolean algebra - basic theorems and properties. Boolean functions and truth tables, Simplification of Boolean functions **(05 Hrs)**

**Logic Gates:** Realization of Boolean functions, AND & OR gates using diodes, RTL circuit - NOR, DTL NAND circuit, Half adder and Full adder **(04 Hrs)**

**Transducers:** Introduction to transducers, Classification, transducers for measurement of physical parameters – resistive position transducer, LVDT, temperature (thermistor), strain gauge, carbon microphone, loudspeaker, light (photo-diode) **(04 Hrs)**

**Measurements:** Qualities of measuring instruments-static and dynamic characteristics. CRO – block diagram, CRT working principle, measurements of amplitude, frequency & phase (Lissajous figures) .

**(04 Hrs)**

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**Text Book:** B. L. Theraja, Basic Electronics Solid State, S. Chand & Company Ltd., 1998

### References:

1. Millman & Halkias, Electronic Devices and circuits, McGraw- Hill
2. G. Kennedy, Communication systems, McGraw- Hill
3. Millman & Halkias, Integrated Electronics, McGraw- Hill.
4. R.L. Boylestead et al, Electron Devices and Circuits,

## BASIC ELECTRICAL ENGINEERING

**Subject Code: 12EE14/24**

**Credits : 04**

**CIE Marks:50**

**SEE Marks: 50**

**Hours/week: 03 Hours(Theory)+ 2 Hrs. (Tutorial)**

**Objectives of overall learning of the subject:**

- ❖ To study D.C circuit & its analysis.
- ❖ To understand the basic concepts of Electromagnetism.
- ❖ To study 1-ph & 3-ph a .c. circuits and their analysis.
- ❖ To understand measuring instruments & domestic wiring.
- ❖ To understand the basics of D.C machines and their applications.
- ❖ To study single phase Transformer.
- ❖ To understand about Alternator & 3ph Induction motor.

**PART-A**

**Introduction on Power scenario in India (this must be covered in the first tutorial class)**

**1. D.C. Circuits:**

Ohm's law and its limitations. Kirchoff's laws and its applications. Analysis of series, parallel and series-parallel resistive circuits excited by independent voltage sources. Power and Energy in such circuits. Illustrative examples. 05 Hrs.

**2. Electromagnetism:**

Faraday's laws, Lenz's law, Fleming's rules. Statically and Dynamically induced E.M.F.'s. Concept of self, mutual inductance and coefficient of coupling. Energy stored in magnetic field . Illustrative examples. 03 Hrs.

**3. a. Single Phase A.C Circuits:**

Generation of sinusoidal AC voltage, definition of average value, R.M.S value, form factor, peak factor. Phase and phase difference of sinusoidal varying voltage and current. Phasor representation of alternating quantities. Definition of real power, reactive power, apparent power and power factor. Analysis with phasor diagram of R, L, C, R-L, R-C, R-L-C series and parallel circuits. Illustrative Examples. 07 Hrs.

**b. Three Phase A.C Circuits::**

Necessity and advantages of three phase systems. The relationship between line and phase voltage & currents in balanced 3phase Star and Delta connections. Power and its measurement by two wattmeter method. Illustrative Examples. 03 Hrs.

**4. Measuring Instruments and Domestic Wiring:**

Construction and principle of operation of dynamometer type of wattmeter and single-phase induction type energy meter, two-way position control of a lamp. Necessity and types of earthing. Elementary discussion on fuses. Electric shock and precautions against it. 03 Hrs

## **PART-B**

### **5. DC Machines:**

Working principle of DC machine as a generator and motor. Types and constructional feature. E.M.F equation of generator, relation between induced E.M.F and terminal voltage taking into account both brush drop as well drop due to armature reaction. Back E.M.F and it's importance, torque equation of D.C motor. Types of D.C. motors- Characteristics and applications. Necessity of a starter for motor. Illustrative examples (on E.M.F Equation, back E.M.F & Torque Equation only) 09 Hrs.

### **6. Transformer:**

Principle of operation and construction and types of single phase transformers. E.M.F equation, power losses, efficiency and voltage regulation. Illustrative examples. 04 Hrs.

### **7. Alternator:**

Principle of operation, types and constructional features. E.M.F equation of alternator. (Numerical examples on E.M.F. equations only.) 04 Hrs.

### **8. Three Phase Induction Motor:**

Concept of rotating magnetic field. Principle of operation, constructional features, types, slip and its significance. Applications of squirrel- cage and slip-ring motors, Star-Delta starter. Illustrative examples (only on slip calculation.) 04 Hrs.

### **Reference Books:**

1. D.C. Kulshreshtha "Basic Electrical Engineering", TMH, 2009 Edition
2. Rajendra Prasad, " Fundamentals of Electrical Engineering", Prentice-Hall of India Pvt. Ltd., second edition 2009.
3. E. Hughes; "Electrical Technology", International students 9<sup>th</sup> Edition, Pearson, 2005.
4. D.P.Kothari "Basic Electrical Engineering" .

**Outcome:** At the end of the course student will understand about basics of Electrical Engg and use of different d.c.& a.c machines for different applications.

Question Paper Pattern for SEE: Four questions are set from each PART –A and PART- B. The students has to attempt Five full questions selecting atleast two questions from each part.

## COMPUTER AIDED ENGINEERING DRAWING

<b>Subject Code: 12ME15/25</b>	<b>Credits: 03</b>	
<b>CIE: 50 Marks</b>	<b>SEE: 50 Marks</b>	<b>SEE: 03Hrs</b>
<b>Hours/Week: 2hrs. (Theory) + 2 Hrs. (Comp. Lab.)</b>	<b>Total Hours: 56</b>	

### **1.Introduction to Computer Aided Sketching:**

Introduction, Drawing instruments and their uses. BIS conventions, Lettering, Dimensioning and free hand practicing. Computer screen, layout of the software, standard tool bar/ menus and description of most commonly used tool bars, navigational tools. Co ordinate system and reference planes. Definitions of HP, VP, RPP and LPP, creation of 2D/3D environment, selection of drawing size and scales, commands and creation of lines, coordinate points axes, poly-lines, square, rectangle, polygons, splines, circle, ellipse, text, move, copy, offset, mirror, rotate, trim, extend, break, chamfer, fillet, curves, constraints VIZ tangency, parallelism, inclination and perpendicularity, dimensioning, line conventions and lettering.

**02Hrs.**

### **2.Orthographic Projections:**

Introduction, definitions, planes of projection. Reference line and conventions employed, Projection of points in all the four quadrants, Projections of straight lines (located in first quadrant / First angle only), True and apparent lengths, True & apparent inclinations to reference planes (No application problems).

**06Hrs.**

### **3.Orthographic Projections of Plane Surfaces (First Angle Projection Only):**

Introduction, definitions-projections of plane surfaces -triangles, square, rectangle, rhombus, Pentagon, Hexagon and Circular laminas in different positions, by change of position method only (No problems on punched plates and composite plates).

**05Hrs.**

### **4.Projections of Solids (First Angle Projection Only):**

Introduction, definitions-Projections of right regular tetrahedron, hexahedron (cube), Prisms, Pyramids, (triangular, square, rectangular, pentagonal and hexagonal), right circular cylinders and cones in different positions (No problems on octahedrons and combination solids).

**07Hrs.**

### **5.Sections and Development of Lateral Surfaces of Solids:**

Introduction, section planes, section, sectional views (No problems on sections of solids). Development of lateral surfaces of Prisms, pyramids, right circular cylinders and cones resting on HP, their frustums and truncations. (No problems on development of Lateral Surfaces of trays, tetrahedrons, spheres and transition pieces).

**03Hrs.**

### **6.Isometric projection (using isometric scale Only):**

Introduction, isometric scale, isometric projection of simple plane figures. Isometric Projection of tetrahedron, hexahedron (cube), right regular prisms, pyramids, cylinders,



cones, sphere, cut spheres and combination of solids (Maximum of three solids placed co-axially). **05Hrs.**

**TEXT BOOKS:**

1. A primer on Computer Aided Engineering Drawing - Published by VTU, Belgaum.2006
2. Engineering Drawing –N.D Bhatt & V.M Panchal, 48<sup>th</sup> edition -Charotar Publishing House, Gujarat.2005

**REFERENCE BOOKS:**

- 1.Computer Aided Engineering Drawing – S Trymbaka Murthy, -3<sup>rd</sup> revised edition I K International Publishing House Pvt. Ltd New Delhi.2006
- 2.Engineering Graphics – K R Gopalkrishna 32<sup>nd</sup> edition –Subash Publishers, Bangalore. 2005

## MECHANICAL ENGINEERING SCIENCE

<b>Subject Code: 12ME16/26</b>	<b>Credits: 04</b>
<b>CIE: 50 Marks</b>	<b>SEE: 50 Marks</b>
<b>Hours/Week: 4hrs.</b>	<b>Total Hours: 56</b>

### PART-A

**ENERGY AND STEAM:** Forms, Sources and Classification of energy, Utilization of energy with simple block diagrams. Steam formation. Types of steam. Steam properties- specific volume, enthalpy and internal energy (Simple numerical problems). Steam boilers – classification, Lancashire boiler, Babcock and Wilcox boiler, boiler mountings and accessories, their locations and applications. (No Sketches for mountings and accessories). **7 Hrs**

**TURBINES :** Steam turbines –classification, principle of operation of impulse and reaction turbines, Delaval’s turbine, Parson’s turbine. Gas turbines - classification, working principles and operations of open cycle and closed cycle gas turbines. Water turbines – classification, principles and operations of Pelton wheel, Francis turbine. **7 Hrs**

**INTERNAL COMBUSTION ENGINES:** Classification, I.C Engine parts, 2/4-stroke petrol and 4-stroke diesel engines. PV-diagrams of Otto and Diesel cycles. Simple problems on indicated power, brake power, indicated thermal efficiency and specific fuel consumption. **7 Hrs**

**REFRIGERATION AND AIR CONDITIONING:** Refrigerants, properties of refrigerants, list of commonly used refrigerants. Refrigeration – Definitions, Refrigerating effect, Ton of Refrigeration, Ice making capacity, COP, relative COP, unit of refrigeration. Principle of working of vapour compression refrigeration and vapour absorption refrigeration. Principles and applications of air conditioners. **7 Hrs**

### PART-B

#### LATHE AND DRILLING MACHINES:

**LATHE MACHINE:** principle of working of a Centre Lathe. Parts of a lathe. Operations on lathe-turning, facing, knurling, drilling, taper turning by compound rest swiveling, thread cutting. Specification of lathe.

**DRILLING MACHINE :** Principle of working and classification of drilling machines - Bench drilling machines, Radial drilling machines. Operations on drilling machine- drilling, boring, reaming, tapping, counter-sinking, counter boring and spot facing. Specifications of a radial drilling machine. **7 Hrs**

#### GRINDING & MILLING MACHINE :

**GRINDING MACHINES :** Principle of grinding, grinding machines, cylindrical grinding and centerless grinding. Specification of a grinding wheel (No problems).

**MILLING MACHINE:** Principle of milling - up milling and down milling, types of milling machines, principle and working of horizontal, vertical and universal milling machines.

Milling processes – plane milling, end milling, slot milling, angular milling, form milling, straddle milling, T-slot milling and gang milling. **7 Hrs**

**JOINING PROCESSES & FRICTION, LUBRICATION & BEARINGS:**

**JOINING PROCESSES:** Definition, comparison, classification and applications of soldering, brazing and welding (arc and gas welding only).

**FRICTION:** Introduction to friction, causes and effects.

**LUBRICATION AND BEARINGS:** Lubricants-classification and properties, types of lubrications - drop feed, ring, splash and full pressure lubrication. Bearings, classification and applications - bushed bearing, collar bearings and anti-friction bearings. **7 Hrs.**

**POWER TRANSMISSION :** Belt drives-classification and applications, definitions- velocity ratio, creep, slip, idler pulley, stepped pulley and fast & loose pulley. Gears- definitions-terminology types and uses. Gear drives and gear trains - definitions and classification. Simple problems. **7 Hrs.**

**TEXT BOOKS:**

1. A Text Book of Elements of Mechanical Engineering – KR Gopalkrishna, Subhash Publishers, Bengaluru.
2. Elements of Workshop Technology, Vol. I & II – SKH Choudrhy, AKH Chowdhary & Nirjar Roy, 11<sup>th</sup> Edn., Media Promoters & Publishers, Mumbai.

**REFERENCE BOOKS:**

1. Welding Allied Processes, R.S. Parmar, Khanna Publishers, New Delhi
2. A Text Book of Elements of Heat Engines – RC Patel & CJ Karamchandani, Charotar Publishers, Anand.

**SCHEME OF SEE:**

1. EACH QUESTION PAPER WILL BE SET FOR A MAXIMUM OF 100 MARKS.THERE WILL BE TWO SECTIONS COMPRISING FOUR QUESTIONS OF 20 MARKS EACH.
2. STUDENTS ARE REQUIRED TO ANSWER 5 QUESTIONS CHOOSING ATLEAST TWO FROM EACH SECTION.
3. MIXING OF QUESTIONS FROM TOPICS WITHIN A PARTICULAR SECTION IS PREFERABLE, BUT NOT COMPULSORY.

## WORKSHOP PRACTICE

<b>Subject Code: 12WS18/28</b>	<b>Credits: 1.5</b>
<b>CIE: 50 Marks</b>	<b>SEE: 50 Marks</b>
<b>Hours/Week: 3hrs.</b>	

Students should prepare three models from Fitting covering different types of joints and three models on different Welding joints.

The drawing of models to be prepared are provided by the workshop superintendent at the beginning of each Semester.

### **Civil Engineering science: Elements of Civil Engineering & Engineering Mechanics**

Subject code : 12CV15		Credits : 04.
CIE : 50 Marks	SEE : 50 Marks	SEE : 03 Hrs.
Hours/Week : 3 hrs Lecture +2 hrs Tutorial.		Total Hours : 42

Objective: To study the fundamentals & scope of the the Civil engineering science & to expose to basics of Engineering Mechanics.

#### PART - A

Introduction to Civil Engineering, Scope of different field of Civil Engineering – Surveying, Building materials, Construction Technology, Geotechnical Engineering, Structural Engineering, Hydraulics, Water resources and Irrigation Engineering, Transportation Engineering, Environmental Engineering. 02 hrs.

Types of infrastructure, Role of Civil Engineer in the infrastructural development, Effect of infrastructural facilities on socio – economic development of a country. 02 hrs

Roads: Types of roads, Components and their functions, Bridges and Dams: Different types with simple sketches. 02 hrs.

Introduction to Engineering mechanics: Basic idealizations – Particle, Continuum, Rigid body and Point force, Newton’s laws of motion, Definition of force, Introduction to SI units, Elements of a force, Classification of force & force system, Principles physical independence of forces, Principle of superposition of forces, Principle of transmissibility of forces, Resolution of forces, composition of forces, composition & resolution of coplanar concurrent force system, Numerical examples on composition & resolution coplanar concurrent force system. 05 hrs.

Moment of a force, Couple system, Equivalent force Couple system, Composition of coplanar non-concurrent force system, Varignon’s principle of moment, Numerical problems on

composition of coplanar non-concurrent force system, Numerical problems on moment of force & couple system, equivalent force couple systems.

05 hrs

Equilibrium of force – Definition of Equilibrant, free body diagram, Condition of static equilibrium for different force system, Lami's theorem, Numerical problems a

## PART – B

Types of supports, types of loads, concept of statically determinate and indeterminate types of beams, numerical problems on equilibrium of coplanar non-concurrent force system and support reactions for statically determinate beams. 05 hrs.

Frictions: Types of friction, limiting friction, angle of friction, angle of repose, Laws of static friction, Impending motion on horizontal and inclined planes, Wedge friction, Ladder friction, Numerical problems. 06 hrs.

Centroid of plane figures: Locating the centroid of triangle, semicircle, quadrant of a circle and sector of a circle using method of integration, Centroid of simple built up sections & composite areas, Numerical problems. 04 hrs.

Moment of Inertia of an area, Rectangular moment of inertia, polar moment of inertia, Radius of gyration, Perpendicular axis theorem, Parallel axis theorem, Moment of inertia of rectangular, Circular, Triangular, Semi-circular, and quadrant areas from method of integration, Moment of inertia of Composite areas with above elementary areas, Numerical problems. 06 hrs.

Pattern of question paper: Total four questions to be set from each part by intermingling the syllabus of respective part. Students have to answer any five full questions by selecting minimum two questions from each part.

Outcome: After exposing to this subject, the students can understand the engineering mechanics techniques that are coming in the other advanced subjects of higher semester.

### Text Books:

1. S.S. Bhavikatti, "Elements of Civil Engineering", (IV edition), Vikas Publishing House Pvt. Ltd., New Delhi.
2. Jagadeesh T.R. and Jayaram, "Elements of Civil Engineering", Sapna Book House, Bangalore.

### Reference Books:

1. Timoshenko and Young, "Engineering Mechanics", McGraw-Hill Book Company, New Delhi.
2. Ferdinand P. Beer and E. Russel Johnston Jr., "Mechanics for Engineers: Statics", McGraw-Hill Book Company, New York.
3. K.L. Kumar, "Engineering Mechanics", Tata McGraw-Hill Publishing Company, New Delhi.

<b>ENVIRONMENTAL STUDIES</b>		
<b>Subject Code: 12CV 13/23</b>	<b>Credit: 02</b>	
<b>CIE: 50 Marks</b>	<b>SEE : 50 Marks</b>	<b>SEE: 03 Hrs</b>
<b>Hours / Week: 2 Hrs. (Theory)</b>		<b>Total Hours: 28</b>

**Objective: To study the various types of pollutants and their harmful effects to the environment.**

**Part-A**

Environment-Definition, Ecosystem-Balanced Ecosystem, Human Activities-Food Shelter, economic and social security. Effects of human activities on Environment- Agriculture, Housing, Industry, Mining and Transportation activities.

**06hrs**

Natural Resources –Water resources-Agriculture and quality aspects. Water borne diseases, Water induced diseases, fluoride problems in drinking water, mineral resources, forest wealth, and material cycles-carbon nitrogen and sulphar cycles.

**05 hrs**

Energy – different types of energy, Electro magnetic radiations, conventional and non conventional sources- Hydro electric, fossil fuel based, nuclear, solar, Biomass and Bio-gas.

**03 hrs**

**Part-B**

Hydrogen as an alternative future source of energy. Environmental impact assessment. Sustainable development.

**03 hrs**

Environmental pollution and their effects. Water pollution, Land pollution, Noise pollution, public health aspects. Current Environmental issues of importance: Population Growth, climate change and global warming- Effects, Urbanization, Automobile pollution.

**06 hrs**

Acid Rain, Ozone layer depletion, Animal Husbandry. Environmental Protection – Role of Government, legal aspects, Initiatives by Non Governmental Organizations (NGO) Environmental Education, Women Education.

**05 hrs**

**Outcome: Students are made aware about various pollutants and proper utilization of various minerals and fossil fuels and also to mitigate the effects of pollutants on the environment.**

**Extent of Teaching:** Clearly defined in the syllabus

**Text Books:**

1. Environmental Studies- Benny Joseph- Tata McgrawHill-2005.
2. Environmental Studies-Dr. D.L. Manjunath, Pearson Education-2006

**Reference Books:**

1. Principals of Environmental Science and Engineering-P.Venugopala Rao Prentice Hall of India
2. Environmental Science and Engineeing-Meenakshi, Prentice Hall India

**Pattern of question paper:** Four questions to be set from each part (in total eight) by inter-mixing the syllabus of respective part. Students have to answer any five full questions by selecting minimum two questions from each part.

**ENGINEERING CHEMISTRY**

**Sub. Code 12CH12/22**

**Hours / week 03 and Tutorial 02 Hours**

**Total Hours 42**

**CIE MARKS 50**

**SEE MARKS 50**

**Exam Hours 03**

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**PART-A**

**ELECTROCHEMICAL ENERGY**

Electrode potential and EMF– definition, sign-convention., and notations. Measurement of single electrode potential and emf. Derivation of Nernst equation. Standard electrode

potential. Galvanic cell- classification- primary, secondary and concentration cells.. Reference electrodes- calomel and Ag/AgCl electrode. Ion-selective electrode-glass electrode, determination of pH using glass electrode. Numerical problems.

**10 Hours**

### **CORROSION SCIENCE**

Definition, chemical and electrochemical mechanism. Types of corrosion – differential metal and differential aeration (pitting and water line), stress corrosion. Factors affecting the rate of corrosion. Corrosion control- Inorganic coating (Anodising and Phosphating) metal coating (Galvanization and tinning). Corrosion Inhibitors.

**05 Hours**

### **SURFACE COATING**

Mechanism and difference between electroplating and electroless plating. Factors effecting electroplating and application of electroplating and electro-less plating.

**03 Hours**

### **WATER TECHNOLOGY**

Sources and Impurities in water, hardness and their types and Numerical Problems . BOD and COD, and their determination . Potable water- purification using chlorination and reverse osmosis, .

**03 Hours**

## **PART-B**

### **POLYMER TECHNOLOGY**

Definition, classification with examples. Polymerization, types of polymerization (Addition and condensation) Mechanism of polymerization – Free radical with ethylene as an example. Methods of polymerization – Bulk , solution, suspension and emulsion polymerization. Glass transition temperature. Synthesis, properties and application of Teflon , Polyethylene ,PMMA, Polyurethane . Elastomers- deficiencies of natural rubber and advantages of synthetic rubber. Synthesis and application of neoprene, Butyl rubber. Adhesives- Manufacturing and



application of epoxy resin. Conducting polymers- definition mechanism of conduction in polyacetylene. Structure and application of polyaniline.

**08 Hours**

### **FUELS TECHNOLOGY**

**Introduction to energy, fuels – definition, classification, characteristics of fuels, calorific value – definition, gross and net calorific value. Determination of calorific value of a solid / liquid fuels using Bomb Calorimeter. Petroleum cracking – Fluidized catalytic cracking. Reforming of petrol. Numerical problems.**

**04 Hours**

### **BATTERY TECHNOLOGY**

Batteries- characteristic ,classification –primary and secondary, construction, working and application of dry and acid storage batteries. Modern batteries- construction working and application of Zn- Air, and Ni – Metal hydride batteries. Fuel cells- meaning, construction and working of H<sub>2</sub>-O<sub>2</sub> fuel cells.

**04 Hours**

### **SURFACE PHENOMEN AND COLLOIDAL PROPERTIES:**

Terms involved in adsorption, Classification , Freundlich and langmuir's adsorption. Derivation of langmurs Equation. Application of adsorption.

Classification and types of colloids. Preparation, optical and electrical properties of colloids. Application of colloids.

**05 Hours.**

### **Reference Books:**

1. Text book of Engg., chemistry by Jain and Jain.
2. Text book of Engg., chemistry by M.M Uppal.
3. Text book of Engg., chemistry by O.P Agrawal.
4. Principles of physical chemistry by Puri and Sharma.
5. Text book by polymer science by F.W.BillMeyer.
6. Text book by polymer science by Gouriker.

## ENGINEERING CHEMISTRY LABORATORY

Sub. Code 12CH 17/27

Hours / week 03

CIE MARKS 50

SEE MARKS 50

Exam Hours 03

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1. Determination of total hardness of water using standard EDTA
2. Determination of percentage of copper in Brass using standard  $\text{Na}_2\text{S}_2\text{O}_3$ .
3. Determination of Iron using internal indicator method.
4. Determination of COD of waste water.
5. Estimation of CaO in cement.
6. Potentiometric estimation of Iron using  $\text{K}_2\text{Cr}_2\text{O}_7$ .
7. Colorimetric determination of copper.
8. Conductometric estimation of acid (HCl) using standard NaOH.
9. Determination of Pka of weak acid.
10. Determination of viscosity of the liquid using Ostwald's viscometer.

Reference Books:

11. Text book of quantitative analysis by A.I Vogel.
12. Practicals of physical chemistry by J.B Yadav.

Note: 1. Students have to answer any five full questions  
Selecting at least two questions from each part.

2. Paper setters have to mix the questions with in the part

## ENGINEERING PHYSICS

Sub. Code: 12PH12/22

Hrs / Week: 03 and Tutorials 2 Hrs

Total Hrs: 42

Credits: 04

CIE Marks : 50

SEE Marks : 50

Total Marks: 100

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## PART- A

**Modern Physics:**

Photoelectric effect and Compton effect (qualitative), de-Broglie Hypothesis. Phase velocity and Group velocity. Relations between phase velocity, group velocity and particle velocity. De-Broglie wavelength, Davisson & Germer's Experiment. **04 Hrs**

### **Quantum Mechanics :**

Heisenberg's uncertainty principle and its physical significance. Time independent Schrodinger's wave equation. Applications of Schrodinger wave equation, particle in one dimensional potential well of infinite height. Eigen values and Eigen function. **04 Hrs**

### **Dielectric Properties of Materials :**

Types of dielectric materials, Polarization mechanisms, Dielectric Constant, loss. Equation for internal field in liquids and solids. Clausius – Mossotti equation. Frequency dependence of dielectric constant. Ferro and Piezo – electricity (qualitative). **04 Hrs**

### **Magnetic Properties of Materials :**

Atomic Origin of Magnetization, magnetic moment of atom, classification of magnetic materials: dia, para and ferro – magnetic materials, Weiss's theory of ferromagnetism. Hard and Soft magnetic materials, applications. **04 Hrs**

### **Electrical Conductivity in Metals :**

Classical free electron theory of metals. Expression for electrical conductivity in metals. Drawbacks of classical free electron theory. Quantum free electron theory. Fermi energy – Fermi factor. Expression for density of states. Expression for electrical resistivity/ Conductivity (no derivation). Temperature dependence of resistivity of metals. Merits of Quantum free – electron theory. **05 Hrs**

## **PART- B**

### **Superconductivity:**

Superconductivity, Meissner effect. Type I and Type II superconductors. BCS theory (Qualitative). High temperature superconductors. Applications of superconductors

**04 Hrs**

### **Applied Optical- Lasers:**

Basic principle of laser, Condition for Laser action. Boltzmann factor. Construction and working of He-Ne , Nd:YAG Laser and semiconductor Laser.

Applications of Laser: Measurement of pollutants and Holography. Optical fibres: principle and propagation of light, condition for propagation, acceptance angle, numerical aperture, and fractional index, types of optical fibres, attenuation mechanisms. **08 Hrs**

### **Crystal Structure:**

Space lattice, Bravais lattice, unit cell, Types of crystal systems. Miller indices, Planes in a cubic unit cell. Expression for interplanar spacing. Packing factor for SC, BCC and FCC. Crystal structure of NaCl. **05 Hrs**

### **X-Rays & Nanotechnology :**

Continuous and characteristic x-rays, Bragg's law, Bragg's spectrometer. Introduction to Nanoscience and Nanotechnology, nanomaterials, Wonders of nanotechnology: Discovery of Fullerene and Carbon nanotubes. **04 Hrs**

### **Text & Reference Books**

1. Solid State Physics- Fifth Edn.- S.O. Pillai, New Age International.
2. Solid State Physics – Charles Kittel, IEEE publisher.
3. Engineering Physics – Gaur & Gupta, Dhanpathrai and Sons, New Delhi.
4. Fundamentals of Physics – Resnick & Halliday, Wiley Eastern Ltd.
5. Modern Engineering Physics – A. S. Vasudeva, S. Chand Publisher.
6. Nanosystems – Molecular Machinery, Manufacturing and Computation – K. Eric Drexler, John Wiley & sons 2005 Ed.
7. Modern Physics – A. Beiser

Question Pattern:

- Answer five full questions selecting, atleast two from each part.

## **ENGINEERING PHYSICS LABORATORY**

**Sub. Code : 12PH17/27**  
**Hrs/ Week : 03**  
**Total Expts : 10 (To be completed)**

**CIE Marks : 50**  
**SEE Marks : 50**  
**Total Marks : 100**

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1. Series and Parallel LCR Circuits
  2. Characteristics of a Transistor
  3. Energy Gap of a Semiconductor
  4. Dielectric Constant (Measurement of Dielectric Constant)

5. Diffraction ( Laser / Hg Source using diffracting grating)
6. Verification of Stefan's law
7. Determination of Fermi Energy
8. Newton's Rings
9. Y-by Searle's Method.
10. Sonometer (Frequency f Ac)
11. n and I by torsional pendulum .
12. Air wedge
13. Planck's Constant
14. Magnetic properties ( B-H Graph Method)
15. Black box experiment – identification and determination of unknown passive electrical elements ( L.C. and R)

### **Reference Book**

<b>Title</b>	<b>Author/s/ Editor</b>	<b>Publishers</b>
1. Laboratory Manual in Applied Physics - Second Edition	H.Sathyaseelan	New Age International

**Subject : Constitution of India & Professional Ethics (12HU: 13/23)**

### **Scheme of Teaching and Examination**

Subject Code : 12HU13/23	Credits: 02
CIE: 50 Marks	SEE : 50 Marks
Hours/Week: 2hrs (Theory)	Total Hours : 30

#### **Part – A**

1. Introduction: The constitution of India. Evolution of the Constitution. The Constitution Assembly of India. Sources of Indian Constitution. Features of the Constitution of India. Preamble to the COI. **3hrs**
2. Fundamental Rights : Salient features of Fundamental rights & Classification. General Exercise of Fundamental rights & limitations. Spirit of Human Rights and its Significance. Children Rights and Protection. **4hrs**
3. Directive Principles of the State Policy: Relevance of Directive Principles of the state Policy Under Part IV of the Constitution of India. Fundamental Duties & their importance. **3 hrs**

4. The State Executive: The Government of the State, powers and functions of the Governor. Appointment etc. The Chief Minister his powers & functions Council of Ministers. State Legislature and State Council. The High Court and its power and Jurisdictions. **4 hrs**

**Part – B**

5. The Union Executive: The President of India. Election of the President of Indian, Powers and functions of the President of India. The Vice President of India his election. The Supreme-Court of India. Appointment of Judges of Supreme Court Structure of the Judiciary in India. Powers and Jurisdiction of Supreme Court of India. Public Intrest Litigation. The Parliament of India. The Prime Minister, appointment, powers and functions. The Union Council of Ministers & their responsibility. **5hrs**

6. Constitutional Provisions : For Women, Children and Backward Classes, SC's & ST's **3hrs**

7. Emergency Provisions & Election Process : Different types of Emergency Under COI.. The Election Commission of India its functions and Powers. The State Election Commission. **3 hrs**

8. Scope and Aims Of Engineering Ethics : Responsibility of Engineers, impediments to responsibility, Honesty, Integrity and Reliability, RISK and Safely and liabilities of Engineers. **6 hrs**

**Text Books :**

1. An introduction to the Constitution of India & Proffessional Ethics  
By B.R.Venkatesh & Merunandan K.B.  
Publisher : Idea International Publications Bangalore.
2. Constitution of India & Proffesional Ethics By K.R.Phaneesh  
Published by Sudha Publications Bangalore.

**Exam Pattern:**

Duration : 3 hrs

Marks : 100 ( Scaled down to 50 mrks)

Question Pattern : The Question paper consists of 8 questions. Four questions in each Part. Five questions are to be answered choosing two questions from each part.