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Subject Code: R13205/R13 **Set No - 1**

I B. Tech II Semester Regular Examinations August - 2014
COMPUTER PROGRAMMING
(Common to ECE, EEE, EIE, Bio-Tech, E Com.E, Agri. E)

Time: 3 hours **Max. Marks: 70**

Question Paper Consists of **Part-A** and **Part-B**
Answering the question in **Part-A** is Compulsory,
Three Questions should be answered from **Part-B**

*****

PART-A

1.(i) What is the output of the following code, Justify your answer.

```
int main()
{
int x=1, y=5;
printf("%d", ++x +y);
return 0;
}
```

(ii) What is the meaning of 3<j &&j<5? Is it equivalent to (3<j) && (j<5)?
(iii) What is the difference between iterative and recursive execution?
(iv) Write a function that checks whether a given year is leap year or not.
(v) Demonstrate the usage of 'typedef'?
(vi) How is a file pointer declared?

[3+4+3+4+4+4]

PART- B

2.(a) What are the relational operators? Explain with examples.
(b) How is data type promotion done in an expression?

[8+8]

3.(a) Illustrate the use of special control constructs goto, break, continue and return.
(b) Give the format for conditional operator. When is it used?
(c) What is the purpose of the comma operator? Within which control statement does the comma operator usually appear?

[6+5+5]

4.(a) Illustrate the storage classes extern, static and auto with an example.
(b) Define a function for determining whether a given character is a vowel or not.

[8+8]

5.(a) What are the functions for dynamic memory management? Explain.
(b) How do you use a pointer as a formal parameter of a function which is designed to manipulate an array? Explain.

[8+8]

Subject Code: R13205/R13 **Set No - 1**

6.(a) What is an enumerated data type? Explain with example.

(b) Declare a structure to store the following information of an employee:

employee code
employee name
salary
department number
hiredate

Write a program to store the data of 'n' employees where 'n' is given by user dynamically.

(i) Use a function to display the employee records in ascending order according to their salary.

(ii) Use a function to display the department wise employee records.

[6+10]

7.(a) What are the functions used for accessing files randomly? Explain with examples.

(b) Write a program that opens a file and deletes the blank spaces.

[8+8]

Subject Code: R13205/R13 **Set No - 2**

I B. Tech II Semester Regular Examinations August - 2014

COMPUTER PROGRAMMING

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*****

PART-A

1.(i) Explain why the following identifiers are invalid?
(a) %age marks (b) x.y (c) amount_in_$ (d) marks(1)

(ii) What are the initial values of array elements if we do not explicitly initialize the array?

(iii) Which storage classes do not initialize variables to default values? Why?

(iv) Is it possible to assign a constant to a pointer variable?

(v) How is a structure different from an array?

(vi) What is the use of feof ( ) function?

[4+4+4+4+3+3]

PART- B

2.(a) What is an integer constant, floating constant and character constant? Give valid examples.

(b) What are the different data type modifiers available in C language?

[8+8]

3.(a) Write conditional expressions to perform the following operations:
Given two numbers, calculate their sum if both numbers are either odd or even; otherwise.

(b) Write a program segment using if statement to perform the following operation:
Given the coordinates centers of two circles and their radii, determine whether they overlap or not.

[8+8]

4.(a) Explain in detail about self-referential structures with an example.

(b) Demonstrate the scope rules in blocks of a program.

[8+8]

5.(a) What is call by address? Consider the swap function for swapping two numbers and illustrate how call by address is done?

(b) What is meant by dereferencing? How it is performed in 'C' [8+8]

Subject Code: R13205/R13 **Set No - 3**

I B. Tech II Semester Regular Examinations August - 2014

COMPUTER PROGRAMMING

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*****

PART-A

1.(i) Write code to output the numbers from 1 to 10 using for loop.

(ii) Can we copy an array using the assignment operator? Justify your answer.

(iii) Write a function to exchange two numbers without using temporary variable.

(iv) What is the difference between malloc ( ) and calloc ( )?

(v) What is wrong with the following code:

```
struct {
char person_ name[20];
int num;
} name=" xyz", 90;
```

(vi) What is meant by flushing of a file? [4+3+4+3+4+4]

PART- B

2.(a) Declare the variables and write the assignment statements to calculate the sum of squares of the differences between each pair of three given numbers.

(b) Determine the sum and average of n numbers entered from keyboard. With a flowchart represent the same.

[8+8]

3.(a) Give the control flow diagram of the *for loop*. How is the execution of 'for' loop proceeds?

(b) Write a program to find the factorial of a given integer number using 'while' loop.

[8+8]

4.(a) Describe the call by value mechanism with examples.

(b) Write a function that uses a function to perform the addition of two matrices.

[8+8]

5.(a) Where is a pointer stored? What is a void pointer?

(b) Demonstrate the usage of character arrays with an example.

Subject Code: R13205/R13 **Set No - 4**

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*****

PART-A

1.(i) What are formatted input and output statements in C? Give suitable examples.
(ii) Comment on the size of pointer to different datatypes (int *, char *, float *).
(iii) Identify the error in the following function.

```
int   small (  int a,   int b )
{          int   small=a;
if  (  b < small ) small=b;
}
```

(iv) What is meant by flushing of a file?
(v) Difference between do-while and while-do constructs.
(vi) What is the use of rewind( ) function?

[4+4+4+3+4+3]

PART- B

2.(a) Draw a flowchart for printing the sum of even terms contained within 0 to 20.
(b) Write short notes on symbolic and high level languages.

[8+8]

3.(a) Describe about two dimensional array of strings, initializing the sized and unsized two dimensional arrays and accessing elements in such arrays.
(b) Write a program to merge two sorted arrays into another array in a sorted order.

[8+8]

4.(a) What is a function and in what way does its use benefits a program?
(b) Write a program that uses a function to swap values stored in two integer variables to understand the concept of local and global variables.

[6+10]

5.(a) How are variables passed to a function? Explain.
(b) When should be pointers used? What are the reasons?

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I B. Tech II Semester Regular Examinations August - 2014
ENGINEERING CHEMISTRY
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Time: 3 hours **Max. Marks: 70**

Question Paper Consists of **Part-A** and **Part-B**
Answering the question in **Part-A** is Compulsory,
Three Questions should be answered from **Part-B**
*****

PART-A

1. (a) A coal has the composition by weight: C= 90%, O= 3%, S= 0.5%, N=0.5% and ash 6%. Net calorific value of the coal found to be 8490.5 K. cal/Kg. Calculate the percentage of hydrogen and high calorific value of coal.
   (b) A water sample contains $Ca(HCO_3)_2$ = 32.4 mg/L, $Mg(HCO_3)_2$ = 29.2 mg/L, $MgCl_2$ = 50 mg/L and $CaSO_4$ = 13.5 mg/L. Calculate the temporary and total hardness.
   (c) Write short notes on
   (i) photovoltaic cell (ii) differential aeration corrosion
   (iii) thermoplastics & thermosetting (iv) importance of electrochemical series

[6+4+12]

PART –B

2. (a) Explain the formation of scales and sludges, how are they not desirable in boilers. Discuss the ways to control these troubles.
   (b) Discuss the working principle of hydrogen-oxygen fuel cell with neat sketch.
   (c) Explain electrochemical theory of corrosion.

[6+5+5]

3. (a) Explain compounding of plastics.
   (b) Explain the essential requirements for potable water.
   (c) What are the different solutions that are used to absorb different constituents of flue gases.

[6+5+5]

4. (a) Write note on working principle of concentration cell.
   Given that E_o (Ni^{2+}, Ni) = -0.25 volt; E_o(Cu^{2+}, Cu) = +0.34 volt. What happens if a solution of 1M $CuSO_4$ be stored in a vessel made of nickel metal?
   (b) Explain softening of water by ion-exchange process.
   (c) What are biodegradable polymers? How they are useful?

[6+5+5]

5. (a) Give in details various factors (metal and environment) influencing the rate of corrosion.
   (b) What is natural rubber? How it is processed?
   (c) Describe the construction and working principle of glass electrode.

[6+5+5]

6. (a) What is cracking? Explain moving bed catalytic cracking to produce gasoline.
   (b) Describe the synthesis of carbon nanotubes by arc discharge method.
   (c) Write notes on importance of organic surface coatings. [6+5+5]

7. (a) Explain setting and hardening of cement with necessary chemical equations.
   (b) Explain any one method for synthesis of gasoline.
   (c) Write notes on preparation and applications of Thiokol and polyethylene. [6+5+5]

*****

Set No - 2

Subject Code: R13204/R13

I B. Tech II Semester Regular Examinations August - 2014

ENGINEERING CHEMISTRY

(Common to ECE, EEE, EIE, Bio-Tech, E Com.E, Agri. E)

Time: 3 hours **Max. Marks: 70**

Question Paper Consists of **Part-A** and **Part-B**
Answering the question in **Part-A** is Compulsory,
Three Questions should be answered from **Part-B**

*****

PART-A

1. (a) Calculate the quantity of lime and soda required to soften 20,000 liters of water containing the salts: $CaCO_3$ = 20.0 mg/L, $MgCO_3$ = 16.8 mg/L, $CaCl_2$ = 22.2 mg/L, $MgSO_4$ = 12.0 mg/L, SiO_2 = 1.2 mg/L; the purity of lime as 90% and soda as 95%.
   (b) Differentiate galvanizing and tinning.
   (c) Write notes on (i) Calomel electrode
   (ii) Buna-S, Buna-N
   (iii) Catalytic cracking [6+4+12]

PART -B

2. (a) What are boiler troubles and explain how to minimize these troubles.
   (b) Explain the working principle of methanol-oxygen fuel cell.
   (c) Define paint. Discuss its constituents and their function. [6+5+5]

3. (a) Explain the mechanism of free radical polymerization with example.
   (b) Explain the Fischer-Tropsch process for synthesis of petrol.
   (c) Write notes on desalination of saline water using electrodialysis technique. [6+5+5]

4. (a) Explain how the electrode potential of an electrode is determined.
   (b) Explain any one method of green synthesis.
   (c) Discuss the zeolite process for softening of water. [6+5+5]

5. (a) What is cathodic protection? Explain with examples how cathodic protection can be used to protect iron.
   (b) Explain the construction and working principle of nickel-cadmium battery. [6+5+5]
   (c) Define tacticity? Explain the significance of stereo specific polymers

Set No - 3

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I B. Tech II Semester Regular Examinations August - 2014

ENGINEERING CHEMISTRY

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Time: 3 hours **Max. Marks: 70**

Question Paper Consists of **Part-A** and **Part-B**
Answering the question in **Part-A** is Compulsory,
Three Questions should be answered from **Part-B**

*****

PART-A

1. (a) Calculate the quantity of lime and soda required to soften 10,000 liters of water containing the salts: $CaCO_3$ = 10.0 mg/L, $MgCO_3$ = 8.4 mg/L, $CaCl_2$ = 11.1 mg/L, $MgSO_4$ = 6.0 mg/L, SiO_2 = 1.2 mg/L, assuming the purity of lime as 90% and soda as 95%.
   (b) Discuss oxygen-hydrogen fuel cell with neat diagram.
   (c) Write short notes on
   (i) Electroplating (ii) Vulcanization of rubber
   (iii) Gross and net calorific value (iv) Deterioration of cement concrete

[6+4+12]

PART - B

2. (a) Explain the process of treatment of water for domestic use.
   (b) Write notes on construction and working of calomel electrode.
   (c) Discuss the differential aeration and pitting corrosion. [6+5+5]

3. (a) Discuss the physical and mechanical properties of polymers.
   (b) Explain how cationic and anionic resins soften the hard water.
   (c) Calculate the weight and volume of air required for the combustion of 2 Kg of carbon. Give the composition of the combustion products. [6+5+5]

4. (a) Explain the process of conductometric titrations with two examples.
   (b) Explain the hot lime soda process for softening of hard water. [6+5+5]
   (c) Write short notes on types of thermal liquid crystals.

5. (a) Write notes on passivity of metal and factors affecting rate of corrosion.
   (b) Calculate the EMF of a Daniel cell at 25^{o}C, when the concentration of $ZnSO_4$ and $CuSO_4$ are 0.01 and 0.1M respectively. The standard potential of the cell is 1.1 volts.
   (c) Explain the preparation and applications of Bakelite.

[6+5+5]

6. (a) Explain the determination of calorific value of a solid fuel using Bomb calorimeter.

Subject Code: R13204/R13 **Set No - 4**

I B. Tech II Semester Regular Examinations August - 2014

ENGINEERING CHEMISTRY

(Common to ECE, EEE, EIE, Bio-Tech, E Com.E, Agri. E)

Time: 3 hours **Max. Marks: 70**

Question Paper Consists of **Part-A** and **Part-B**
Answering the question in **Part-A** is Compulsory,
Three Questions should be answered from **Part-B**

*****

PART-A

1. (a) A water sample contains $Mg(HCO_3)_2$ = 29.2 mg/L, $Ca(HCO_3)_2$ = 32.4 mg/L, $MgCl_2$ = 30 mg/L and $CaSO_4$ = 13.5 mg/L. Calculate the permanent and total hardness.
   (b) Explain the proximate analysis of coal and its applications.
   (c) Write notes on
   (i) pitting corrosion (ii) Fullerenes
   (iii) Concentration cell (iv) Free radical polymerization

[4+6+12]

PART -B

2. (a) Write notes on (i) priming and foaming (ii) caustic embrittlement
   (b) Define specific, equivalent and molar conductance and mention the units.
   (c) Write notes on cathodic protection.

[6+5+5]

3. (a) Define mastication? Discuss the compounding of natural rubber.
   (b) What is chlorination? Explain the process of break-point chlorination.
   (c) Explain with a neat sketch fixed bed catalytic cracking to produce gasoline.

[6+5+5]

4 .(a) Explain the construction, working principle and applications of lead storage battery.
   (b) Write note on fibre reinforced plastics.
   (c) Write brief notes on determination of hardness of water by EDTA method.

[6+5+5]

5. (a) Explain how hot dipping and electroplating techniques can be used to protect metals.
   (b) Derive Nernst equation for single electrode potential.
   (c) Write the preparation and applications of PVC and Thiokol.

[6+5+5]

6. (a) The percentage composition of a sample of coal was found as: C = 75.4%: H=5.3%; O =12.6%; N =3.2%; S =1.3% and remaining is ash. Calculate the minimum weight of air necessary for complete combustion of 1 kg of coal and percentage composition of dry products of combustion by weight.

Subject Code: R13210/R13 **Set No - 1**

I B. Tech II Semester Regular Examinations August - 2014

ENGINEERING MECHANICS

(Common to ECE, EEE, EIE, Bio-Tech, E Com.E, Agri. E)

Time: 3 hours **Max. Marks: 70**

Question Paper Consists of **Part-A** and **Part-B**
Answering the question in **Part-A** is Compulsory,
Three Questions should be answered from **Part-B**

*****

PART-A

1.(i) Define Cone of friction.
(ii) State the two theorms of Pappus.
(iii) State work-energy theorem for a system of particles.
(iv) Derive the transfer formula for product of inertia.
(v) State the converse of the law of triangle of forces
(vi) Express the mass moment of inertia of a thin plate in terms of its area moment of inertia.
(vii) Develop velocity -time and displacement - time equations for a particle of weight W moving rectilinearly under the action of a force $F = F_o Sin\omega t$ if the initial displacement and velocities are zero each.

[2+4+3+4+2+3+4]

PART-B

2.(a) If a rod of length 3R is placed horizontally in a hemispherical bowl of radius R, determine the angle α the rod will make with the horizontal for the rod to be in equilibrium. Neglect friction between the bowl and the rod and assume that the bowl does not rock. see Fig. 1.

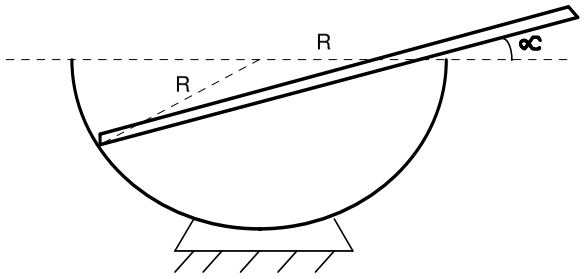

Fig. 1

(b) Determine the centroid of the line y = 1-x.

[10+6]

3.(a) A double wedge system is used to position the 800 kg shown in Fig.2. Neglecting the mass of the wedges, determine the minimum force P required t initiate movement. The coefficient of static friction between the 10 degrees wedges and all other surfaces is 0.25 and between the crate and the floor is 0.5.

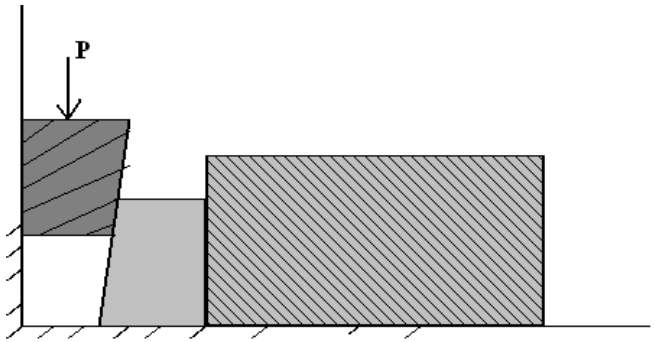

Fig. 2

(b) A car makes a left turn from a stopped position, increasing its speed at a rate of 1.5 m/s^2. If a book is on the dashboard of the car, at what time will the book to slide if the coefficient of static friction between the book and the dashboard is 0.25. The radius of the curve of motion is 8 m.

[8+8]

4.(a) Determine the center of gravity of a hemisphere of radius R.

(b) A ball is thrown with an initial velocity of V_o parallel to the rough plane as shown in Fig.3. The initial angular velocity is zero. Determine when the sphere will roll without slipping, and find the linear velocity of the ball at that time.

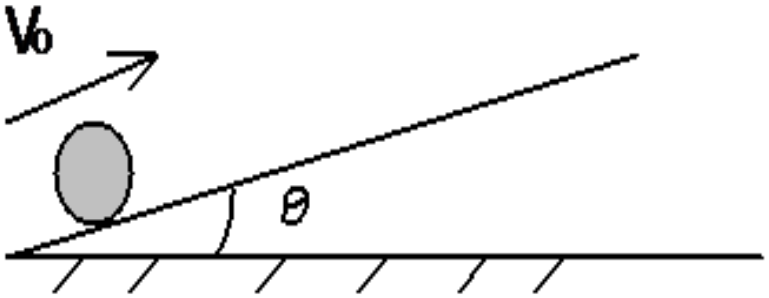

Fig.3

5.(a) A prismatic bar AB of weight W and length $l = \sqrt{2}\, r$ starts from rest in the position shown in Fig. 4 and under the action of gravity slides without friction along the constraining vertical plane curve ABD, the portion AB of which is a quadrant of a circle of radius r and the portion BD of which is a horizontal tangent to this circle. With what uniform velocity V will the bar move along the horizontal portion BD?

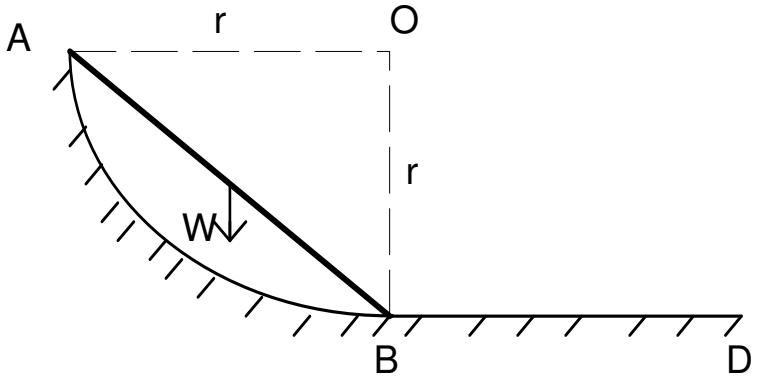

Fig. 4

(b) Find the mass moment of inertia of a hollow sphere with respect to a diameter if the mass per unit volume of the material is ρ and the outer and inner radii are r_o and r_i, respectively.

[8+8]

6.(a) The barge B weighs 160 kN and supports an automobile weighing 16 kN. If the barge is not tied to the pier P and someone drives the automobile to the other side of the barge for unloading, determine how far the barge moves away from the pier. Neglect the resistance of the water.

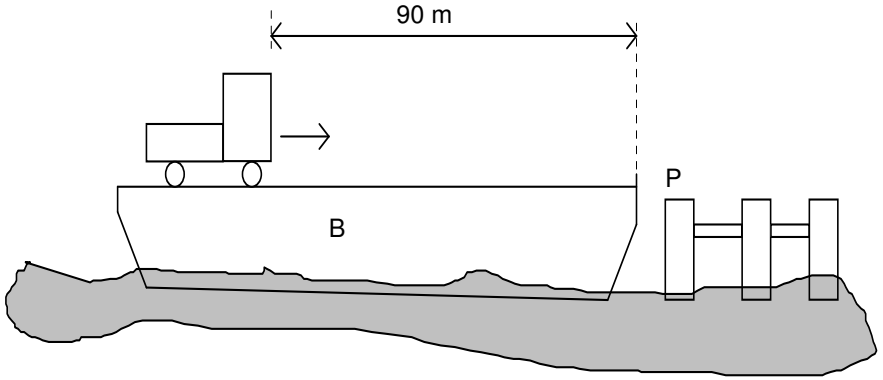

Fig. 5

6.(b) The rod shown in Fig. 6 is supported by two brackets at A and B. Determine the moment M_{AB} produced by the force F = (-500 $\boldsymbol{i}$ +200 $\boldsymbol{j}$ -300 $\boldsymbol{k}$) N, which tends to rotate the rod about the axis AB.

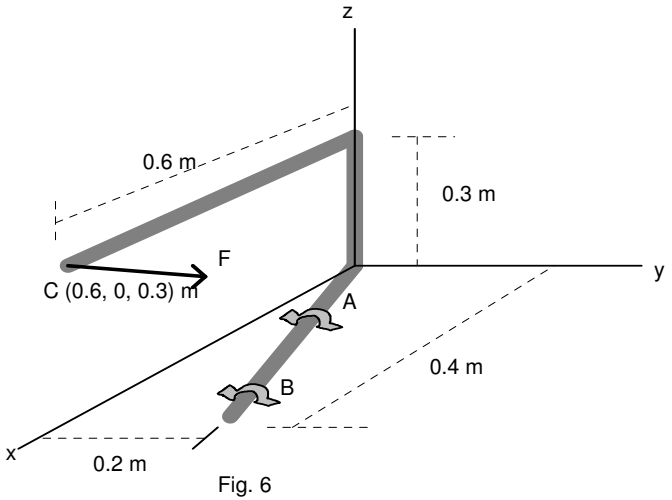

Fig. 6

[8+8]

7.(a) The 30 kg box has a speed of 2 m/s when it is at A on the smooth ramp shown in Fig. 7. If the surface is in the shape of a parabola, determine the normal force on the box at the instant x = 3. Also, what is the rate of increase in its speed at this instant?

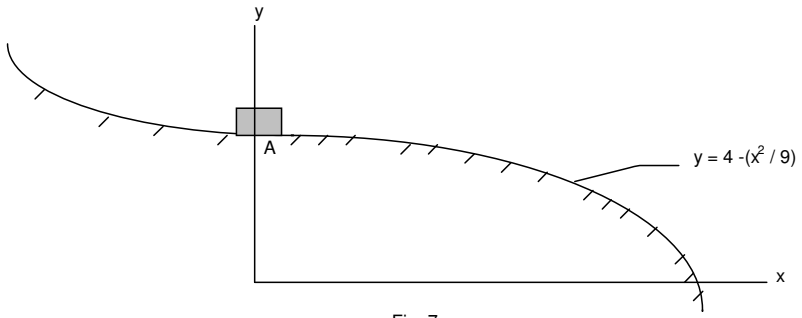

Fig. 7

(b) A pipe assembly is loaded as shown in Fig. 8. Replace the system of forces with a resultant force and couple moment at O, if the forces F1 and F2 are, respectively, are 60 N and 100 N. Express the results in cartesian vector form.

Subject Code: R13210/R13 **Set No - 2**

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ENGINEERING MECHANICS

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Three Questions should be answered from **Part-B**

*****

PART-A

1.(i) State coulomb's laws of dry friction.
(ii) State and prove the Theorem of Varignon.
(iii) Explain the how do you find the center of a system of parallel forces applies to different points in a plane.
(iv) Obtain the transfer formula for mass moments of inertia.
(v) Define normal and tangential of a particle and derive expressions for them.
(vi) State work-energy principle for plane motion of a rigid body.

[3+4+3+4+5+3]

PART-B

2.(a) The centre of mass of a front-wheel drive car is 35% of the wheel base behind the front wheels. Determine the load on the front and rear wheel tires. see Fig. 1.

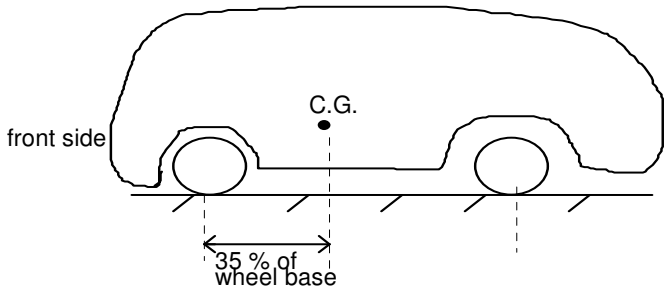


Fig. 1

(b) Determine the second moment of inertia about y-axis for the area shown in Fig. 2.

Subject Code: R13210/R13 **Set No - 2**

3.(a) The collars hang on the vertical frame composed of two smooth rods. If the mass of collar A is 10 kg and the mass of collar B is 5 kg, determine the equilibrium angle α and the tension in the cable between the collars.

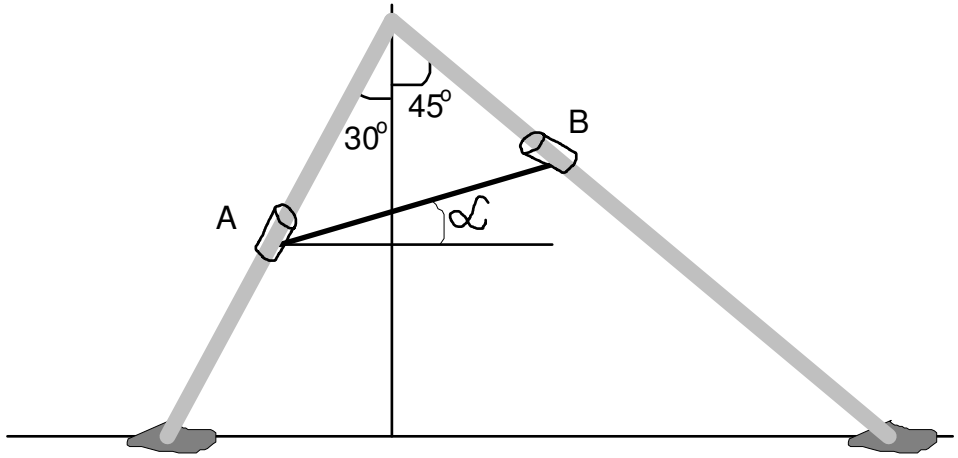


Fig. 3

(b) Calculate the centroid of the line y = sin(x) from the origin to the point $(\pi/2,1)$ mm.

[8+8]

4.(a) A crate of 100 kg mass shown in Fig. 4 is 3m tall and is loaded such that its centre of gravity is 2 m above its base of 1 m wide. Determine the force **P** required to initiate motion if, the coefficient of friction between the base and the inclined surface is 0.4. Also, determine the minimum and maximum height **h** where the force can be applied.

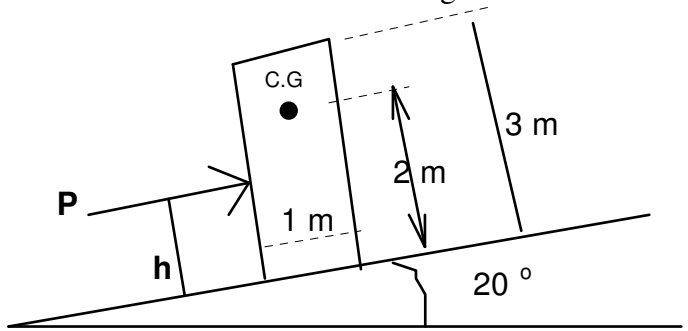


Fig. 4

(b) Locate the center of gravity of the homogeneous wire shown in Fig. 5.

5.(a) Determine the mass moment of inertia of the overhung crank shown in Fig. 6 about the x-axis. The density of the material is 7850 kg/m^3.

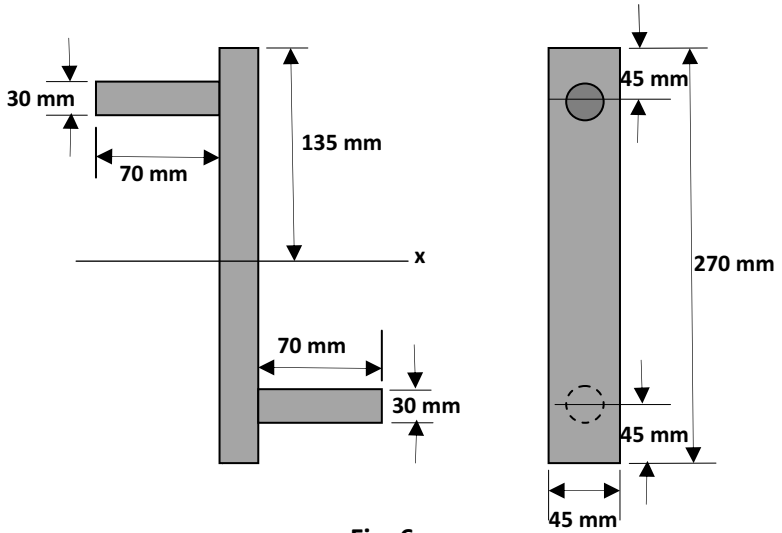


Fig. 6

(b) A block is released from rest at A and slides down the smooth circular surface AB as shown in Fig. 7. It then continues to slide along the horizontal rough surface until it strikes the spring. Determine how far it is compressed before stopping.

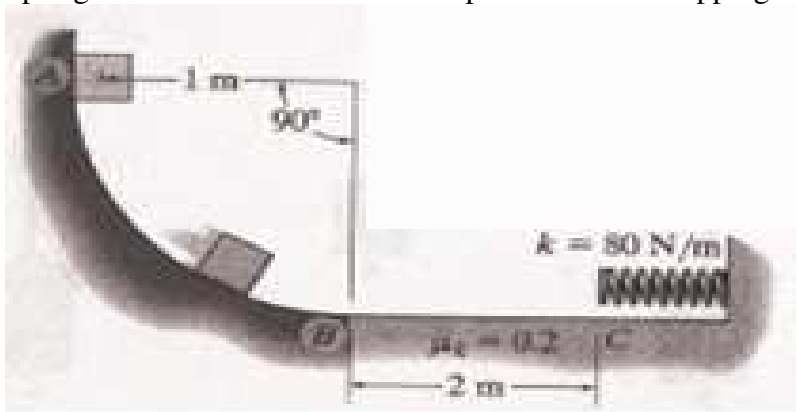


Fig. 7

[8+8]

6.(a) Determine the tension in the cables BD and CD and also the reaction force components at the ball and socket joint at A. See Fig. 8.

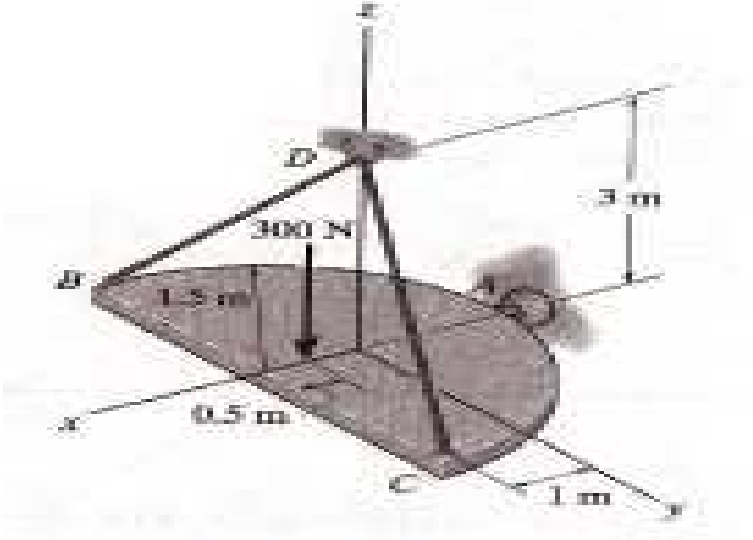


Fig. 8

(b) A block of 10 kg mass is held at rest on the smooth inclined plane by a stopper at A as shown in Fig. 9. If the 10 grams bullet travelling at 400 m/s gets embedded in the block, determine the distance the block will slide up along the plane before momentarily stopping.

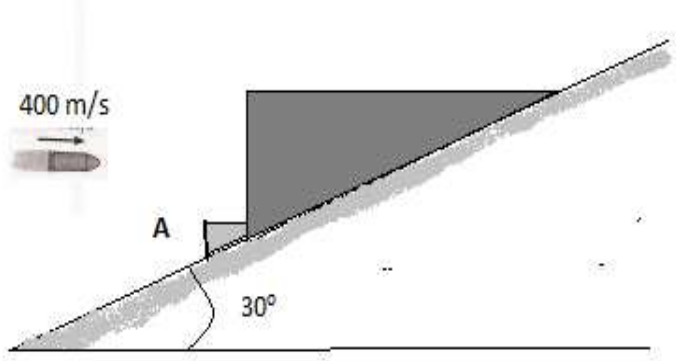


Fig. 9

[8+8]

7.(a) Determine the acceleration of the 500 kg block shown in Fig. 10 if the coefficient of friction between the block and the horizontal surface is 0.3. Also, find the reactions at the points A and B.

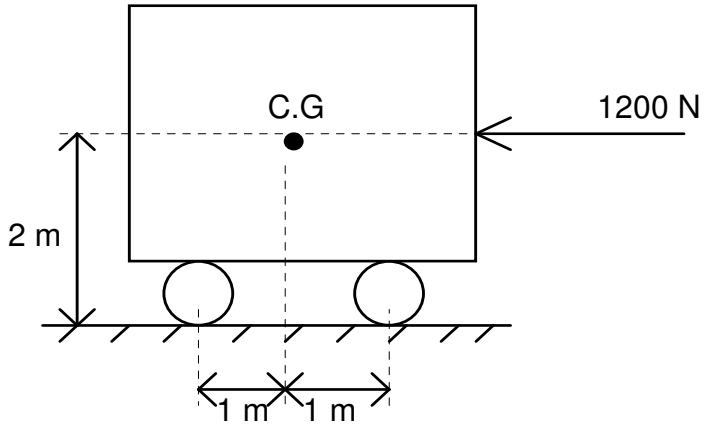


Fig. 10

(b) The unbalanced wheel shown in Fig. 11has a mass of 20 kg and a radius of gyration of 120 mm. Compute the normal and friction forces acting on the wheel at its point of contact with the horizontal surface, assuming that no slipping occurs.

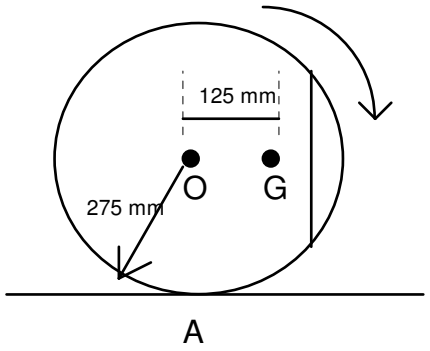


Fig. 11

[8+8]

Subject Code: R13210/R13 **Set No - 3**

I B. Tech II Semester Regular Examinations August - 2014

ENGINEERING MECHANICS

(Common to ECE, EEE, EIE, Bio-Tech, E Com.E, Agri. E)

Time: 3 hours **Max. Marks: 70**

Question Paper Consists of **Part-A** and **Part-B**
Answering the question in **Part-A** is Compulsory,
Three Questions should be answered from **Part-B**

*****

PART-A

1.(i) State equilibrium conditions for the system of coplanar non-concurrent forces and non-concurrent forces in space.

(ii) Differentiate between static friction and kinetic friction.

(iii) Determine the mass moment of inertia of an equilateral triangular plate of mass **M** and side **a** about one of its sides.

(iv) A car of 2 ton mass moving at a speed of 72 kmph is to be brought to a halt in a distance of 50 m. What should be the braking force applied assuming it to be uniform?

(v) Determine the workdone in stretching a spring to an elongation of x from its unstretched position.

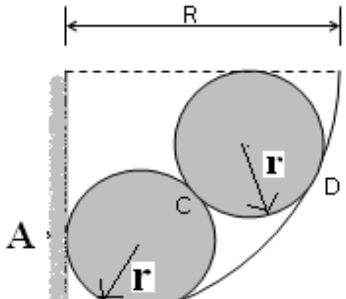
(vi) A stone is vertically upwards from the top of a building with a velocity of 20 m/s. If it reaches the ground after 5 seconds, determine the height of the building.

(vii) State the principle of angular momentum.

[4+2+4+4+3+3+2]

PART-B

2.(a) Two identical smooth cylinders each of weight **W** and radius **r** are placed in a quarter circular cross-sectional channel of radius R as shown in Fig. 1, such that they just fit in the channel. Determine the reactions at the contact surfaces A, B, C and D.



2.(b) A smooth tube AB in the form of a quarter circle of mean radius **r** is fixed in a vertical plane and contains a flexible chain of length $\pi r/2$ as shown in Fig. 2. The weight of the chain is ***w*** per unit length.Find the velocity of the chain with which it will move along the smooth horizontal plane BC after it emerges from the tube.

Fig.2

[8+8]

3. A boom AD supporting a load of 20 kN at the end D is held in a horizontal position by a ball and socket joint at A and by two cables BE and CF as shown in Fig. 3. Determine the tension in each cable and the reaction at A, neglecting the weight of the boom.

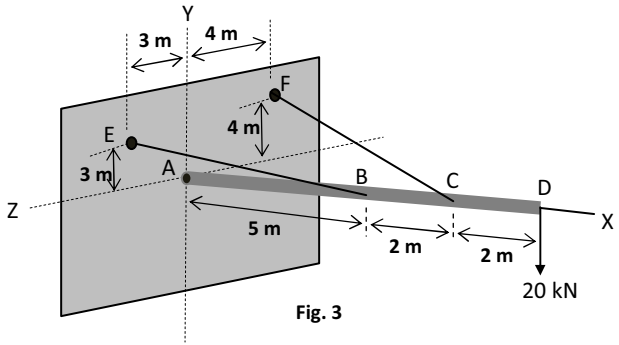
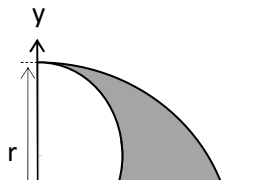


Fig. 3

[16]

4.(a) Find the centroid for the shaded area shown in Fig. 4.



4.(b) A uniform steel rod is bent into the shape of an isosceles triangle (OA=OB). Determine the mass moment of inertia about an axis through O perpendicular to the plane of the figure. The total mass of the rod is 12 kg. See Fig. 5.

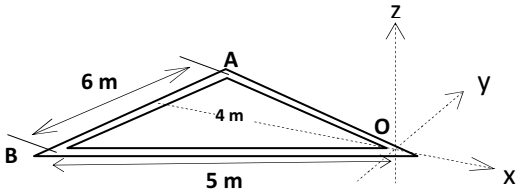


Fig. 5

[8+8]

5.(a) If the density of a hemisphere shown in Fig. 6 varies as the distance, y from the base plane, determine the distance of the center of gravity from the base plane.

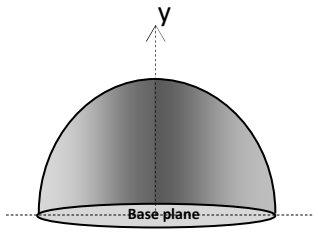


Fig. 6

(b) A block of mass m, initially at rest, begins to slide from the top most point of a hemispherical shell. Determine the position of the point on the hemisphere at which the block loses contact with the shell. See Fig. 7.

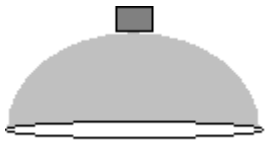


Fig.7

[8+8]

6.(a) A car of 2 ton mass powered by an engine of 50 kW capacity, start from rest and attains maximum speed in 30 seconds. If the frictional resistance to motion is 0.5 kN/ ton, determine the maximum speed it can attain. If after attaining the maximum speed, the engine is switched off, determine the distance it would travel before coming to rest.

(b) Determine the product of inertia for the quarter-circular area shown in Fig. 8 with respect

7.(a) A man of 80 kg mass jumps on to a cart from a bridge such that he lands on with a velocity of 6 m/s at an angle of 30^o to the horizontal direction. If the cart is free to move, determine the velocity of the cart after he has jumped in when the cart is moving with a velocity of 2 m/s towards the bridge. The mass of the cart is 150 kg. Also, determine the loss in kinetic energy of the system. Fig. 9

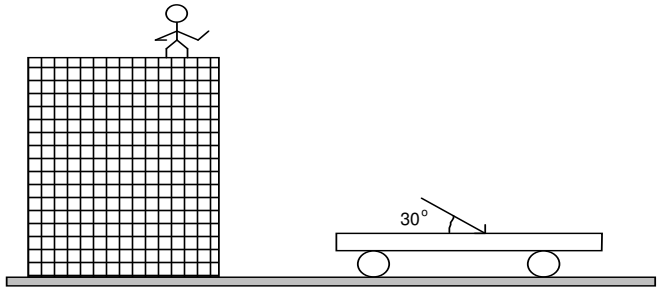


Fig. 9

(b) Block A of weight W rests on an inclined plane is prevented from moving downwards along the plane by a plank B of same of weight W placed as shown in Fig. 10. The plank is attached to the wall by the string CD parallel to the inclined plane. If the coefficient of friction is same for all contact surfaces, determine its value at which the motion is impending. Also, determine the tension in the string CD.

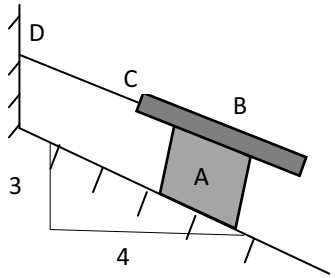


Fig. 10

[8+8]

Subject Code: R13210/R13 **Set No - 4**

I B. Tech II Semester Regular Examinations August - 2014

ENGINEERING MECHANICS

(Common to ECE, EEE, EIE, Bio-Tech, E Com.E, Agri. E)

Time: 3 hours **Max. Marks: 70**

Question Paper Consists of **Part-A** and **Part-B**
Answering the question in **Part-A** is Compulsory,
Three Questions should be answered from **Part-B**

*****

PART-A

1.(i) Show that the theorem of Varignon holds for parallel forces.

(ii) Write the equilibrium equations for a system of (a) couples in space (b) parallel forces in space.

(iii) Find the product of inertia of a rectangle of sides **a** and **b** with respect to the axes that lie along its two sides.

(iv) A particle of mass m moves rectilinearly under the action of a force $F = F_o \sin \omega t$. Determine the displacement-time equation, assuming initial displacement and velocity are zeros.

(v) The maximum range of a projectile is 2000 m. What should be the angle of elevation so as to obtain a range of 1400 m if the initial velocity remains unchanged?

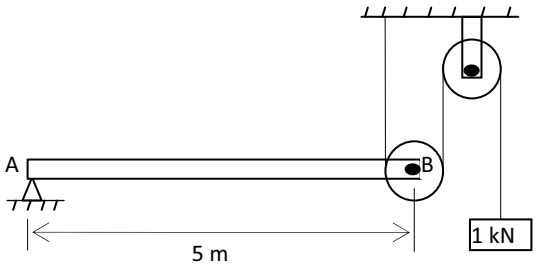
(vi) Define instantaneous center of rotation.

(vii) Write the equations of plane motion of a rigid body.

[3+4+4+3+4+2+2]

PART-B

2.(a) A beam hinged at A is supported in a horizontal position by a rope passing over a pulley arrangement as shown in Fig. 1. The free end of the rope supports a load of 1500 N. The weight of the beam is 2 kN and that of pulley hinged at B is 400 N. Determine the tension in the rope, assuming the pulleys to be frictionless, and the reaction at A.



3.(a) A force F of magnitude 300 N is directed from A (2, 3, 4) m to B (6, 5, 3) m. Determine (i) the moment of the force F about the point C(5,6, 7) and (ii) the moment of the force F about the axis passing through the origin and point C.

(b) A thin steel hoop of weight **W** and radius **r** starts from rest at A and rolls down on a cylindrical surface of radius **a** as shown in Fig. 2. Determine the angle θ defining the position of point B where the hoop will begin to slip if the coefficient of friction at the point of contact is 0.33.

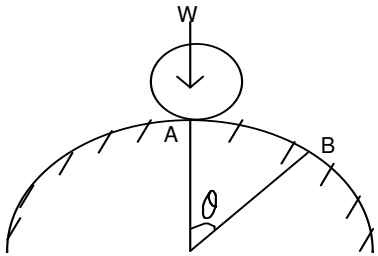


Fig. 2

[8+8]

4.(a) Find the reactions at the supports A and B of the beam that is loaded as shown in Fig. 3.

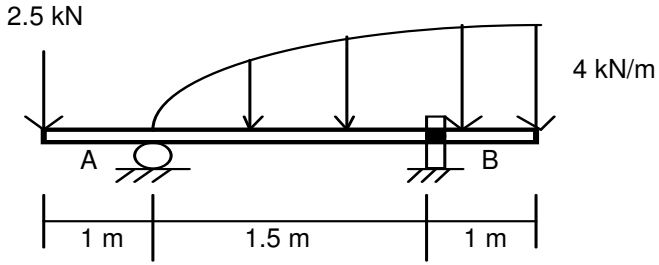
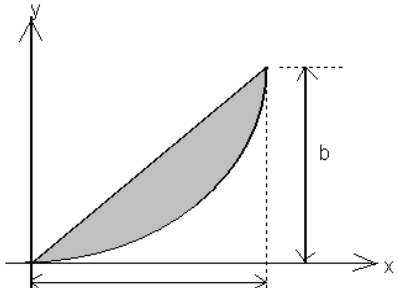


Fig. 3

(b) For the shaded area shown in Fig. 4, find the ratio a/b for which the x and y coordinates of the centroid are equal.



5.(b) Calculate the moment of inertia of the shaded area shown in Fig. 5 with respect to the x-axis.

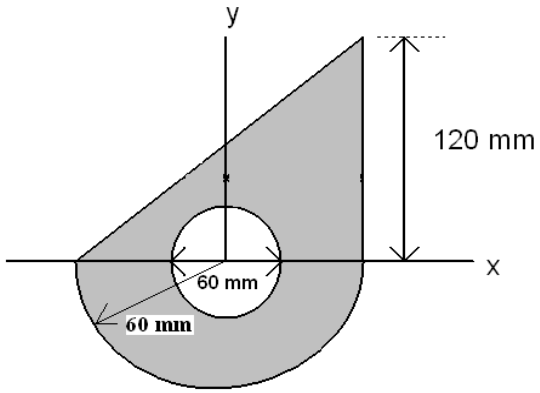


Fig. 5

[8+8]

6.(a) Determine the mass moment of inertia of a homogeneous sphere of radius **a** with respect to a diameter.

(b) A sphere of radius *r* and weight W is projected along a horizontal plane surface with initial linear velocity V_o and initial angular velocity ω_o such that $V_o > r\omega_o$. Determine the time elapsed for the velocity of the sphere along the plane to become constant. See Fig. 6.

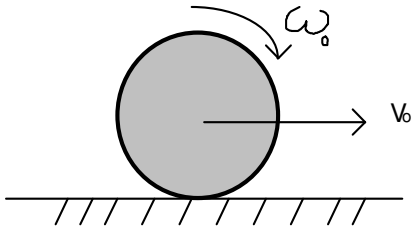
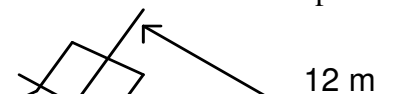


Fig. 6

[8+8]

7.(a) A small block of weight 50 N is given an initial velocity of 4 m/s down the inclined plane shown in Fig. 7. Determine the velocity of the block at B after it has travelled a distance of 12 m if, the coefficient of friction between the plane and the block is 0.2.



7.(b) A horizontal beam is hinged to a vertical wall at A and supported at the midpoint C by a tie rod CD as shown in Fig. 8. Find the tension in the rod and the reaction at A due to a vertical load P = 2 kN applied at B. Neglect the weight of the beam and tie rod.

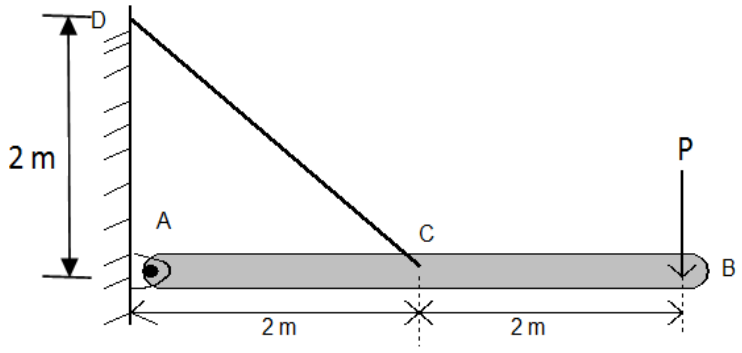


Fig. 8

[8+8]

Subject Code: R13202/R13 **Set No - 1**

I B. Tech II Semester Regular Examinations August - 2014

MATHEMATICS-III

(Common to All Branches)

Time: 3 hours **Max. Marks: 70**

Question Paper Consists of **Part-A** and **Part-B**
Answering the question in **Part-A** is Compulsory,
Three Questions should be answered from **Part-B**

*****

PART-A

1.(i) Write down the properties of orthogonal matrix.
(ii) Write the nature of $2y_1^2 + 4y_2^2 + 5y_3^2$.
(iii) If A and B are non-singular matrices of same order, show that AB and BA have same eigen values.
(iv) Find the area of loop of the curve $r^2 = a^2 \cos 2\theta$
(v) Find the moment of inertia of a circle A of radius R relative to the centre O.
(vi) Evaluate $\int_0^\infty \frac{x^6(1-x^{10})dx}{(1+x)^{24}}$
(vii) If $\boldsymbol{F}$ is a conservative vector field show that curl $\boldsymbol{F}$= 0.
(viii) Write down the physical interpretation of Green's theroem.

[3+3+3+3+3+2+3+2]

PART – B

2.(a) Reduce the matrix $\begin{bmatrix} 1 & 0 & -3 & 2 \\ 0 & 1 & 4 & 5 \\ 1 & 3 & 2 & 0 \\ 1 & 1 & -2 & 0 \end{bmatrix}$ to normal form and find its rank.

(b) Solve, by Gauss-Seidal method, the equations

$$9x - 2y + z - t = 50$$
$$x - 7y + 3z + t = 20$$
$$-2x + 2y + 7z + 2t = 22$$
$$x + y - 2z + 6t = 18 .$$

[8+8]

3. Diagonalise the matrix $A = \begin{bmatrix} 3 & -1 & 1 \\ -1 & 5 & -1 \\ 1 & -1 & 3 \end{bmatrix}$ and hence find A^4.

[16]

4.(a) Find the volume of solid generated by the revolution of the cardioid $r = a(1 + \cos\theta)$ about $\theta = 0$.

(b) Evaluate $\iint_R \left(\sqrt{xy} - y^2\right)dxdy$ where R is triangle with vertices at (0,0), (10,1), (1,1).

[8+8]

5.(a) Show that $\int_0^1 x^3 \left[log\left(\frac{1}{x}\right)\right]^4 dx = \frac{3}{128}$.

(b) Prove that $\int_0^4 \sqrt{x}(4-x)^{\frac{3}{2}}\, dx = 64\beta(\frac{3}{2}, \frac{5}{2})$.

[8+8]

Subject Code: R13202/R13 **Set No - 1**

6.(a) Find the angle between the surfaces $x^2 + y^2 + z^2 = 9$ and $z = x^2 + y^2 - 3$ at the point (2, -1, 2)

(b) Prove that $\nabla\left[\nabla.\frac{\vec{r}}{r}\right] = \frac{-2}{r^3}\vec{r}$

[8+8]

7.(a) Use Stokes theorem to evaluate the integral $\int_C \boldsymbol{A}.\boldsymbol{dr}$ where $\boldsymbol{A} = 2y^2 i + 3x^2 j - (2x + z)k$, and C is the boundary of the triangle whose vertices are (0, 0, 0), (2, 0, 0), (2, 2, 0)

(b) Find the workdone in moving a particle in the force field $\boldsymbol{F} = 3x^2 i + j + zk$ along the straight line from (0, 0, 0) to (2, 1, 3)

[8+8]

Subject Code: R13202/R13 **Set No - 2**

I B. Tech II Semester Regular Examinations August - 2014

MATHEMATICS-III

(Common to All Branches)

Time: 3 hours **Max. Marks: 70**

Question Paper Consists of **Part-A** and **Part-B**
Answering the question in **Part-A** is Compulsory,
Three Questions should be answered from **Part-B**

*****

PART-A

1.(i) Express $\begin{bmatrix} 3 & 7 \\ 4 & 5 \end{bmatrix}$ as sum of a symmetric and skew-symmetric matrices.

(ii) When does a non homogeneous system consistent?

(iii) Define the latent root and latent vector.

(iv) Find the volume of a sphere of radius 'a'.

(v) Find the moment of inertia of a hallow sphere about a diameter. Its external and internal radii being 5 meters and 4 meters.

(vi) Evaluate $\int_0^\infty \sqrt{xe^{-x^3}}\, dx$

(vii) If $\boldsymbol{A}$ is a vector function, find Div (Curl $\boldsymbol{A}$)

(viii) Write down the physical interpretation of Stoke's theroem.

[3+2+3+3+3+3+3+2]

PART - B

2.(a) Reduce the matrix $\begin{bmatrix} 3 & 1 & 4 & 6 \\ 2 & 1 & 2 & 4 \\ 4 & 2 & 5 & 8 \\ 1 & 1 & 2 & 2 \end{bmatrix}$ to Echelon form and find its rank.

(b) Solve, by LU Decomposition method, the equations

$$x + 2y + 3z = 10$$
$$3x + y + 2z = 13$$
$$2x + 3y + z = 13.$$

[8+8]

3. Verify Cayley-Hamiltion theorem for $A = \begin{bmatrix} 2 & -1 & 0 \\ 3 & 1 & -1 \\ 2 & 0 & 3 \end{bmatrix}$ and hence find A^{-1}.

[16]

4.(a) Find the length of the loop of the curve $3ay^2 = x(x-a)^2$

(b) Find the volume of the solid generated by the revolution of the cardioid

Subject Code: R13202/R13 **Set No - 2**

6. (a) Find the work done in moving a particle in the force field $\boldsymbol{F} = 2x^2i + (2yz - x)j + yk$ along the space curve $x = 3t^2, y = t,\ z = 3t^2 - t$ from *t=0 to t=1.*

(b) Prove that $curl\ (a \times b) = a\ div\ b - b\ div\ a + \left(\vec{b}\ .\nabla\right)a - (a\ .\nabla)b$

7.(a) Verify the divergence theorem for $\boldsymbol{F} = 4\mathrm{xy}i - \mathrm{y}^2j + xzk$, over the cube bounded by *x = 0, x = 1, y = 0, y = 1, z=0 and z = 1.*

(b) Evaluate $\iint_S \boldsymbol{A}.\boldsymbol{n}\ ds$ where ***A***=*yzi + zxj + xyk* and S is the part of the sphere $x^2 + y^2 + z^2 = 9$ which lies in the first octant.

[8+8]

Subject Code: R13202/R13 **Set No - 3**

I B. Tech II Semester Regular Examinations August - 2014

MATHEMATICS-III

(Common to All Branches)

Time: 3 hours **Max. Marks: 70**

Question Paper Consists of **Part-A** and **Part-B**
Answering the question in **Part-A** is Compulsory,
Three Questions should be answered from **Part-B**

*****

PART-A

1.(i) Define rank of a matrix.
(ii) Write the nature of $-3y_1^2 - 2y_2^2 - y_3^2$
(iii) Find the matrix of the quadratic form $q = x^2 - 6xy + 3y^2$.
(iv) Find the length of the arc $ay^2 = x^3$ from the vertex to the ordinate $x=5a$.
(v) Find the moment of inertia of a circle A of radius R relative to the centre O.
(vi) Define β and Γ functions and write the relation between them.
(vii) Show that $V= 3y^4z^2i + 4x^3z^2j + 6x^2y^3k$ is solenoidal.
(viii) Write down the physical interpretation of Gauss's divergence theorem.

[3+3+3+3+3+2+3+2]

PART – B

2.(a) Find the inverse of a matrix $\begin{bmatrix} -1 & -3 & 3 & -1 \\ 1 & 1 & -1 & 0 \\ 2 & -5 & 2 & -3 \\ -1 & 1 & 0 & 1 \end{bmatrix}$, using elementary operations.

(b) If consistent, solve the system of equations

$x + y + z + t = 4$
$x - z + 2t = 2$
$y + z - 3t = -1$
$x + 2y - z + t = 3.$

[8+8]

3.(a) Find the latent values and latent roots of the matrix $A = \begin{bmatrix} 2 & 1 & 1 \\ 2 & 3 & 4 \\ -1 & -1 & -2 \end{bmatrix}$.

(b) Verify Cayley-Hamilton theorem and hence find A^{-1} if $A = \begin{bmatrix} 3 & 1 & 1 \\ -1 & 5 & -1 \\ 1 & -1 & 3 \end{bmatrix}$.

Subject Code: R13202/R13 **Set No - 3**

6. (a) Find the directional derivative of $\emptyset(x, y, z) = xy^2 + yz^2$ at the point (2, -1, 1) in the direction of $i + 2j + 2k$

(b) Prove that $Div(A \times B) = B.curl\ A - A.curl\ B$

[8+8]

7.(a) Evaluate using the divergence theorem $\iint_S (\boldsymbol{F}.\boldsymbol{n})\boldsymbol{ds}$ where S is the surface of the sphere $x^2 + y^2 + z^2 = b^2$in the first octant and $\boldsymbol{F} = \mathrm{y}i + \mathrm{z}j + xk$

(b) If $\boldsymbol{A} = (3\mathrm{xy} - 2\mathrm{y}^2)i + (x - y)j$, evaluate $\int_C \boldsymbol{A}.\boldsymbol{dr}$ along the curve C in xy –plane given by $y = x^3$ from the point (0, 0) to (2, 8)

[8+8]

Set No - 4

Subject Code: R13202/R13

I B. Tech II Semester Regular Examinations August - 2014

MATHEMATICS-III

(Common to All Branches)

Time: 3 hours **Max. Marks: 70**

Question Paper Consists of **Part-A** and **Part-B**
Answering the question in **Part-A** is Compulsory,
Three Questions should be answered from **Part-B**

*****

PART-A

1.(i) Show that $\begin{bmatrix} -1 & 1 & -1 \\ 3 & -3 & 3 \\ 5 & -5 & 5 \end{bmatrix}$ is idempotent.

(ii) When does the non homogeneous system consistent?

(iii) Define positive definite, negative definite and indefinite.

(iv) Find the volume of a sphere of radius 'a'.

(v) Find the surface area of the solid generated by the revolution about the x-axis of the area bounded by the curves $y = f(x)$, the x-axis the ordinates $x = a$, $x = b$.

(vi) Define Gamma function and Beta function and write the relation between them.

(vii) Find the normal to the surface $x^2 + y^2 + 2z^2 = 26$ at the point (2, 2, 3)

(viii) Write the statement of Green's theroem.

[3+3+3+3+3+2+3+2]

PART - B

2.(a) If $A = \begin{bmatrix} 1 & -1 & -1 & 2 \\ 4 & 2 & 2 & -1 \\ 2 & 2 & 0 & -2 \end{bmatrix}$, find two non-singular matrices P and Q such that PAQ is in the normal form.

(b) Test for consistency and solve

$$5x + 3y + 7z = 4$$
$$3x + 26y + 2z = 9$$
$$7x + 2y + 10z = 5.$$

[8+8]

3. Reduce the quadratic form $q = x_1^2 + 2x_2^2 + 3x_3^2 + 4x_1x_2 - 2x_2x_3 + 6x_3x_1$ into a canonical form by diagonalising the matrix of the quadratic form.

[16]

4.(a) Trace the curve $y = \frac{x^2+2x}{x+1}$.

(b) Find the volume of the solid generated by the revolution of the curve

Subject Code: R13202/R13 **Set No - 4**

6. (a) Show that the vector $[(x^2 - yz)i + (y^2 - zx)j + (z^2 - xy)k]$ is irrotational and find the scalar potential.

(b) Find the acute angle between the surface $xy^2z = 2$ and $x^2 + y^2 + z^2 = 6$ at the point (2, 1, 1). [8+8]

7.(a) Verify the divergence theorem for $\boldsymbol{F} = 4xyi - y^2j + xzk$, over the cube bounded by $x = 0$, $x = 1$, $y = 0$, $y = 1$, $z=0$ and $z = 1$.

(b) Evaluate $\iint_S (\boldsymbol{curl}\ \boldsymbol{A}).\boldsymbol{n}\ ds$ where $\boldsymbol{A}=yi +(x - 2z)j - xyk$ and S is the surface of the sphere $x^2 + y^2 + z^2 = 4$ above the *xy-plane.*

[8+8]

3.(b) A 100 mm long line is parallel to and 40 mm above the HP. Its two ends are 25mm and 50mm in front of the VP respectively. Draw its projections and find its inclination with the VP?

[8+8]

4. A straight line AB of 75mm long has the end Aon VP and the end B on HP .The line is inclined at 30^0 to the VP and its front view makes an angle of 45^0 with xy. Draw the projections of the line and add the left side view and locate the traces?

[16]

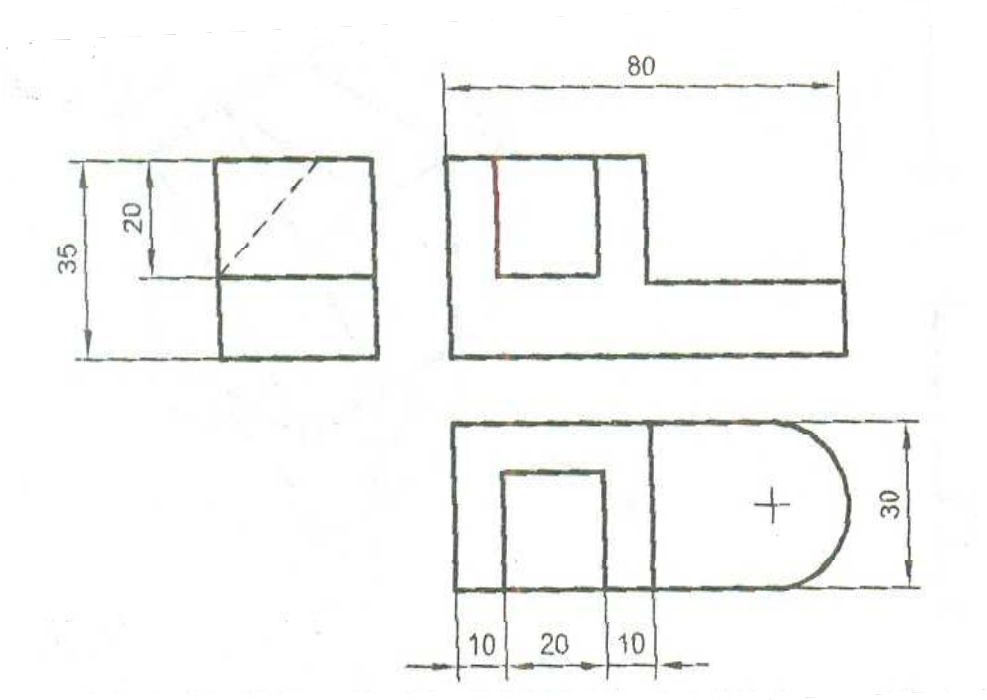
5. A thin 45^0 set-square has its longest edge 250 mm long is on the VP and inclined at 30^0 to HP. Its surface makes an angle of 45^0 with VP. Draw its projections.

[16]

6. Draw the projections of a pentagonal prism, base 25mm side and axis 50mm long, resting on one of its rectangular faces on the HP, with the axis inclined at 45^0 to the VP.

[16]

7. Draw the isometric view of the following orthographic views?



[16]

Subject Code: R13211/R13 **Set No - 1**

I B. Tech II Semester Regular Examinations August - 2014

NETWORK ANALYSIS

(Common to ECE, EIE, E Com.E Branches)

Time: 3 hours **Max. Marks: 70**

Question Paper Consists of **Part-A** and **Part-B**
Answering the question in **Part-A** is Compulsory,
Three Questions should be answered from **Part-B**

*****

PART-A

1.(i) Define electric potential, electric current and electric energy.

(ii) A certain inductive coil takes 15 A when the supply voltage is 230 V, 50 Hz. If the frequency is changed to 40 Hz, the current increases to 17.2 A. Calculate resistance and inductance of the coil.

(iii) Write the differences between series and parallel resonance.

(iv) State compensation theorem.

(v) Write the Z-parameters of the following network (Figure:1):

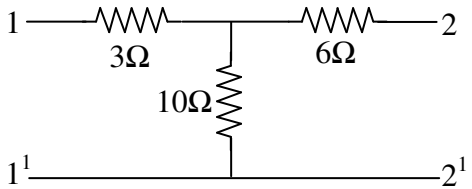


Figure:1

(vi) What is time constant? What are the time constant of series R-L and R-C circuit?

(vii) A series R-L circuit has R=20 ohms and L=8 H. The circuit is connected across a DC voltage source of 120 V at t=0. Calculate the time at which the voltage drops across R and L are the same.

[2+4+3+2+4+3+4]

PART-B

2.(a) State and explain Kirchhoff's voltage and current law with an example.

(b) Find the voltage V(t) in the network shown in figure:2 using nodal technique. All impedances are in ohms.

Subject Code: R13211/R13 **Set No - 1**

3.(a) A sinusoidal 50 Hz voltage of 200 V supplies three parallel circuits as shown in figure:3. Find the current in each circuit and the total current. Draw the vector diagram. Assume supply voltage V=200V, 50 Hz.

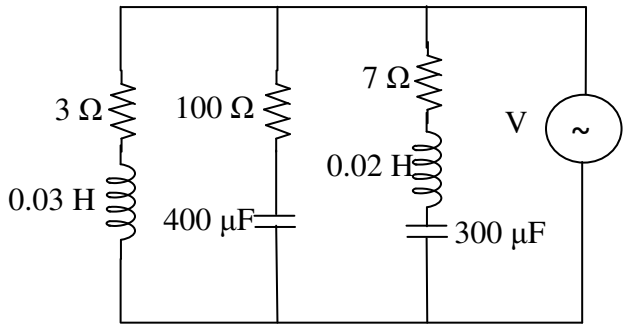


Figure:3

(b) The impedances of a parallel circuit are Z_1=(6 + j8) ohms and Z_2 = (8 - j6) ohms. If the applied voltage is 120V, find (i) current and power factor of each branch (ii) overall current and power factor of the combination (iii) power consumed by each impedance. Draw a phasor diagram.

[8+8]

4.(a) Obtain an expression for coefficient of coupling.

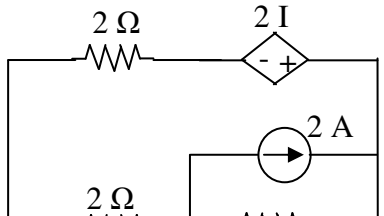
(b) Two similar coils connected in series gave a total inductance of 600 mH and when one of the coil is reversed, the total inductance is 300 mH. Determine the mutual inductance between the coils and coefficient of coupling.

(c) State and explain Maximum power transfer theorem.

[5+5+6]

5.(a) For a series resonant circuit with constant voltage and variable frequency, obtain the frequency at which voltage across the inductor is maximum. Calculate this maximum voltage when R=50 ohms, L=0.05H, C=20 micro farad and V=100 volts.

(b) Determine the current through R_L=10 Ω resistor as shown in figure:4 using Thevenin's theorem. Verify the same with Norton's theorem.



Subject Code: R13211/R13 **Set No - 1**

6.(a) Derive the symmetry and reciprocity conditions for ABCD parameters and h-parameters.

(b) Determine the Y- parameters of the network shown in figure:5.

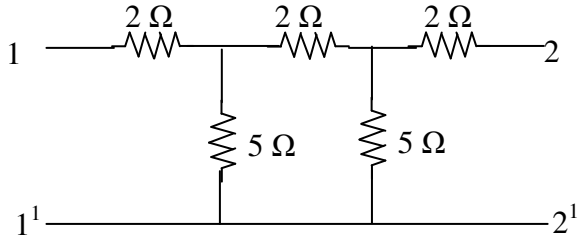


Figure:5

[8+8]

7. A series R-C circuit with R=10 ohms and C= 2F has a sinusoidal voltage source $200\sin(500t+\phi)$ applied at time when $\phi = 0$. (i) Find the expression for current (ii) At what value of ϕ must the switch be closed so that the current directly enter steady state.

[16]

Subject Code: R13211/R13 **Set No - 2**

I B. Tech II Semester Regular Examinations August - 2014

NETWORK ANALYSIS

(Common to ECE, EIE, E Com.E Branches)

Time: 3 hours **Max. Marks: 70**

Question Paper Consists of **Part-A** and **Part-B**
Answering the question in **Part-A** is Compulsory,
Three Questions should be answered from **Part-B**

*****

PART-A

1.(i) Define average value, RMS value and form factor for an alternating quantity.

(ii) Determine the source voltage and phase angle, if the voltage across the resistance is 70 V and across an inductive reactance is 20 V, in an R-L series circuit.

(iii) For the circuit shown in figure:1, determine the value of capacitive reactance, impedance and current at resonance.

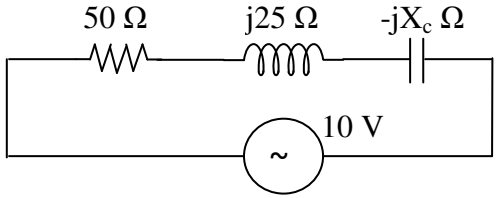


Figure:1

(iv) State maximum power transfer theorem.

(v) Write condition of symmetry and reciprocity for transmission, inverse transmission and inverse h-parameters.

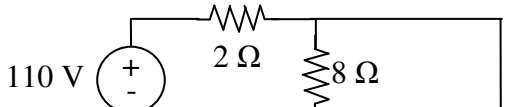
(vi) What is meant by natural and forced response?

(vii) In a series R-L circuit, the application of DC voltage results in a current of 0.741 times the final steady state value of current after one second. However, after the current has reached its final value, the source is short-circuited. What would be the value of the current after one second?

[3+3+3+2+4+3+4]

PART-B

2.(a) For the circuit shown in figure:2, find all the branch currents using nodal analysis. Also show that total power delivered is equal to total power dissipated.



2.(b) A current of 5 A flows through a non inductive resistance in series with a chocking coil when supplied at 250 V, 50 Hz. If the voltage across the non inductive resistance is 125V and that across the coil 200V, calculate Impedance, Reactance and Resistance of the coil, and power absorbed by the coil. Also draw the phasor diagram.

[8+8]

3.(a) Define incidence matrix. For the graph shown in figure:3, find the complete incidence matrix.

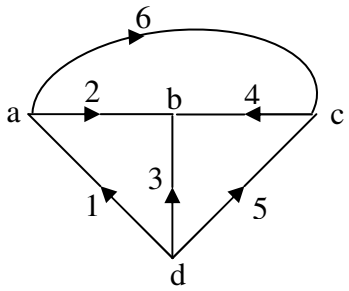


Figure:3

(b) Two impedances Z_1=10+j31.4 ohms and Z_1=(10+R)+j(31.4-X_c) ohms are connected in parallel across a single phase AC supply. The current taken by the two impedance branches are equal in magnitude and the phase angle between them is 90^0. Calculate the value of R and X_C and phase difference of the branch currents with respect to the applied voltage.

[8+8]

4.(a) State and explain the Tellegen's theorem.

(b) For the network shown in the figure:4, determine (i) Resonance frequency (ii) input admittance at resonance (iii) quality factor (iv) band width.

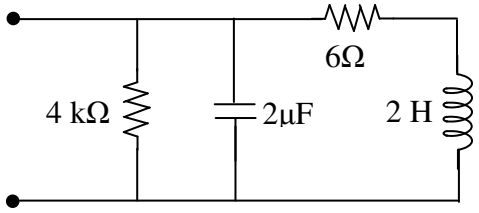


Figure:4

[7+9]

5.(a) Two coils A and B having turns 100 and 1000 respectively are wound side by side on closed circuit coil of X-section 8 cm^2 and mean length 80 cm. The relative permeability of iron is 900. Calculate the mutual inductance between the coils.

5.(b) Determine the current through load resistance R_L=5 Ω for the circuit shown in figure:5 using Thevenin's theorem. Also find the maximum power transfer to the resistance R_L.

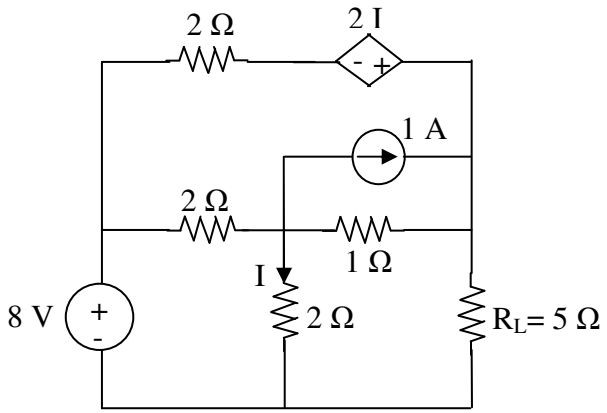


Figure:5

[7+9]

6.(a) Express Y-parameters in terms of ABCD and Z-parameters.

(b) Determine the h-parameters of the following network as shown in figure:6.

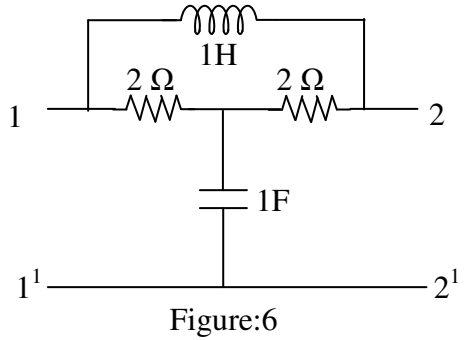


Figure:6

[7+9]

7. In a series RLC circuit, R=6 ohms, L=1 H, C=1 F. A DC voltage of 40 V is applied at t=0. Obtain the expression for *i(t)* using differential equation approach.
Explain the procedure to evaluate conditions.

[16]

Subject Code: R13211/R13 **Set No - 3**

I B. Tech II Semester Regular Examinations August - 2014

NETWORK ANALYSIS

(Common to ECE, EIE, E Com.E Branches)

Time: 3 hours **Max. Marks: 70**

Question Paper Consists of **Part-A** and **Part-B**
Answering the question in **Part-A** is Compulsory,
Three Questions should be answered from **Part-B**

*****

PART-A

1.(i) Give the statements of Kirchhoff's voltage and current law. Write applications also.

(ii) Write the expression for total impedance of the circuit having (i) only resistance (ii) pure inductor (iii) Pure capacitor (iv) R-L parameters (v) R-C parameters (vi) R-L-C parameters. Write the expression for phase difference in all the above cases.

(iii) Define self, mutual inductance and coefficient of coupling.

(iv) State superposition theorem.

(v) Write the condition of symmetry and reciprocity for Z, Y and h-parameters.

(vi) A resistance R and a 3 μF capacitor are connected in series across a 240 V DC supply. A voltmeter is connected across the capacitor. Calculate R so that the voltmeter reads 160 Vat 5.5 seconds after closing the switch.

(vii) Write the expression for total inductance of the three series connected coupled coils connected between A and B as shown in figure:1.

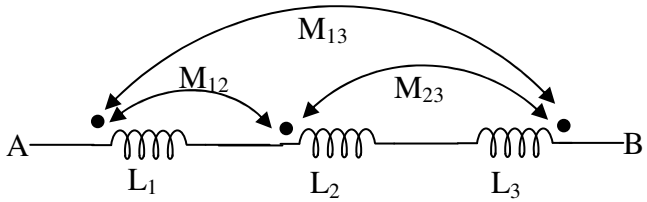
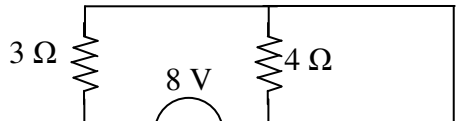


Figure:1 [3+4+3+2+3+3+4]

PART-B

2.(a) Determine the voltage V in the circuit shown in figure:2.



Subject Code: R13211/R13 **Set No - 3**

2.(b) An inductive load connected to a 230 V, 50 Hz source takes a current of 15 A and dissipates 2000 W. Determine the power factor of the load. Also determine the parallel capacitance required to improve power factor to 0.9 lagging. What would be the total current taken from the supply.

[8+8]

3.(a) Find i_1 in circuit shown in figure:3, using nodal analysis. Assume the supply voltage V(t)=20 cos(4t) volts.

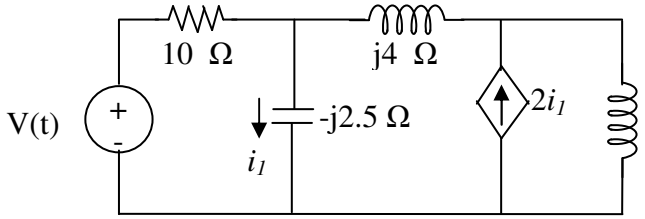


Figure:3

(b) A coil having a resistance of 50 ohms and an inductance of 0.02 H is connected in parallel with a capacitor of 25 μF, across a 200 V, 50 Hz supply. Find the current in the coil and the capacitor. Also find the total current taken from the supply, the overall power factor and total power consumed. Draw the phasor diagram.

[8+8]

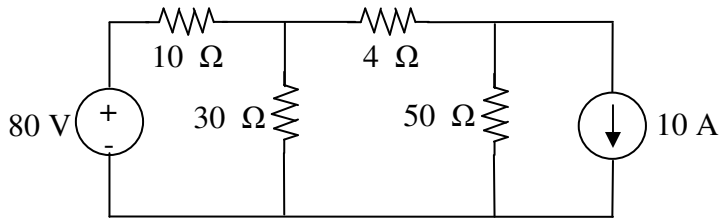
4.(a) In a series RLC circuit with variable capacitance, the current is at maximum value with capacitance of 20 μF and the current reduces to 0.707 times the maximum value with a capacitance of 30 μF. Find the values of R and L. What is the bandwidth of the circuit if supply voltage is V(t)=20 sin(6280t) volts?

(b) State and explain Reciprocity and Compensation theorems.

[8+8]

5.(a) Show that the resonant frequency ω_0 of an RLC series circuit is the geometric mean of ω_1 and ω_2, the lower and upper half-power frequencies respectively.

(b) Verify the Tellegen's theorem for the circuit shown in Figures:4.



Subject Code: R13211/R13 **Set No - 3**

6.(a) Express *z*-parameters in terms of *h*-parameters and *ABCD*-parameters.

(b) Determine the Z-parameters for the network shown in fig:5.

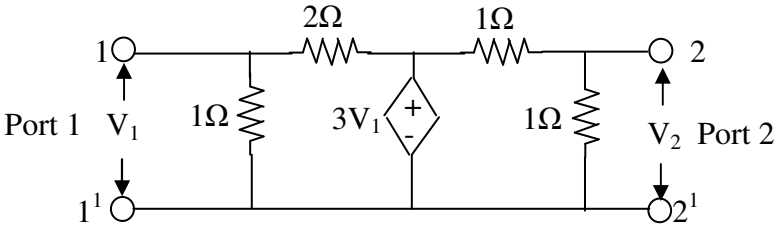


Figure:5

[8+8]

7. For an R-L series circuit, a sinusoidal voltage $v(t) = V_m \sin(\omega t + \phi)$ is applied at t=0. Find the expression for transient current.

[16]

Subject Code: R13211/R13 **Set No - 4**

I B. Tech II Semester Regular Examinations August - 2014

NETWORK ANALYSIS

(Common to ECE, EIE, E Com.E Branches)

Time: 3 hours **Max. Marks: 70**

Question Paper Consists of **Part-A** and **Part-B**
Answering the question in **Part-A** is Compulsory,
Three Questions should be answered from **Part-B**

*****

PART-A

1.(i) Define Tie-set, Cut-set and incidence matrix

(ii) Explain why current leads the voltage by 90^0 in case of ideal capacitor and current lags the voltage by 90^0 in case of ideal inductor.

(iii) Two coupled coils with L_1=0.01 H and L_2=0.04 H and K=0.6 are connected in four different ways. Find the equivalent inductance if coils are connected in
(a) series aiding (b) series opposing (c) parallel aiding (iv) parallel opposing.

(iv) State substitution theorem.

(v) Construct circuits that realize the following Z-parameters: $\boldsymbol{Z} = \begin{bmatrix} 12 & 4 \\ 4 & 8 \end{bmatrix}$

(vi) Why current in the inductor and voltage across the capacitor does not change instantaneously.

(vii) How the R-L-C circuit behaves for the frequencies above and below the resonant frequencies.

[3+4+4+2+3+3+3]

PART-B

2.(a) Define average value, RMS value, form factor and peak factor and calculate the same for the following periodic waveform shown in figure:1.

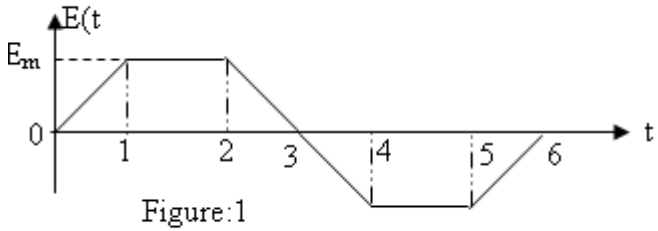


Figure:1

Subject Code: R13211/R13 **Set No - 4**

3.(a) Find the total power delivered in the circuit using mesh analysis for the circuit shown in figure:2.

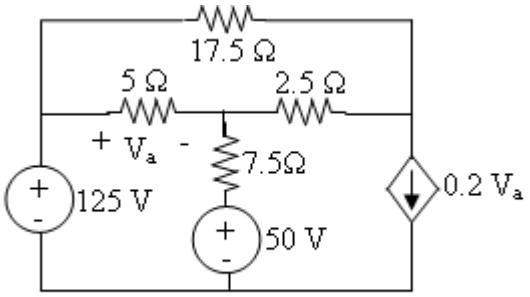


Figure:2

(b) A series RLC circuit with R = 10 ohms, L = 0.4 H and C = 50 μF has applied voltage of 200V with variable frequency. Calculate the resonant frequency, current at resonance, voltage across R, L and C. Also calculate the Q-factor, upper and lower half power frequencies and bandwidth.

[8+8]

4.(a) A series combination of R and C is in parallel with a 25 ohms resistor. A 50 Hz source results in a total current of 6.5 A, a current of 5 A through 25 ohms resistance and a current of 2.3 A in the R-C branch. (i) Draw the phasor diagram of the circuit and find values of R and C (ii) Find apparent, active, reactive power and power factor of the circuit.

(b) Determine voltage V across a 15 ohms resistor in the magnetically coupled circuit shown in Figure:3. Take $\boldsymbol{V}_s = 30\angle 40^0$.

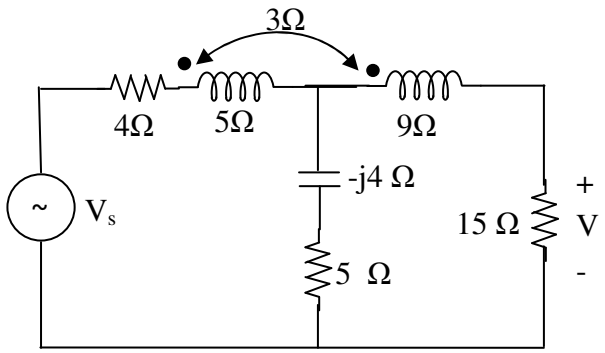


Figure:3

[8+8]

Subject Code: R13211/R13 **Set No - 4**

5.(b) Find the voltage across -j20 Ω capacitor using superposition theorem in below Figure:4. All impedance values are in ohms.

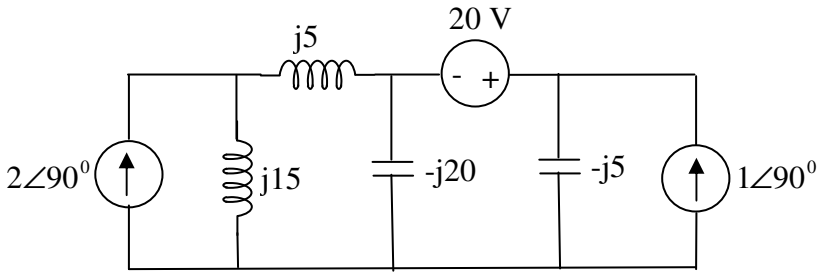


Figure:4

[7+9]

6.(a) Prove that the power transfer to the load becomes maximum when the load impedance is equal to the complex conjugate of the Thevenin's impedance.

(b) Determine the ABCD parameters of the network shown in figure:5.

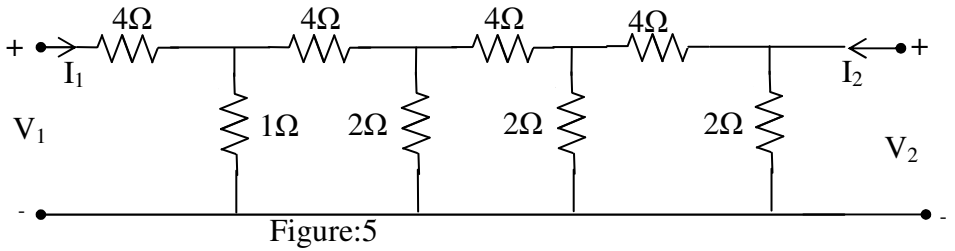


Figure:5

[7+9]

7. For an RC series circuit, a sinusoidal voltage $v(t) = V_m \sin \omega t$ is applied at t=0. Find the expression for transient current using both differential equation approach and Laplace transform approach.

[16]