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SECOND SEMESTER

Roll No.

B.E. (IT)

MID SEM EXAMINATION

March 2007

IT-111 PRINCIPLE OF ELECTRICAL
ENGINEERING

Time: 1 Hour 30 Minutes

Max. Marks : 20

Note : Answer ALL questions.

Assume suitable missing data, if any.

1[a] Find the voltage across 20Ω resistance by using superposition theorem.

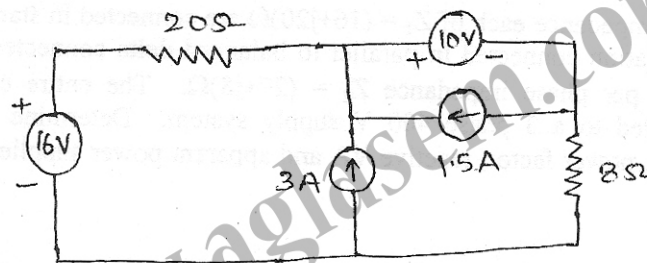


Fig. 1

[b] Find the current I in the circuit shown below

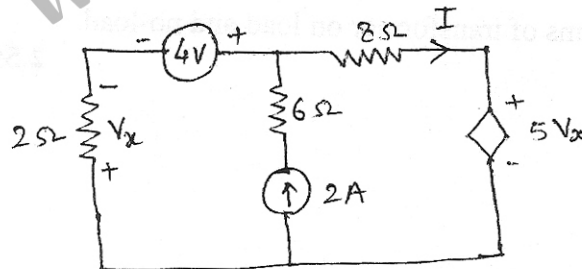


Fig. 2

2[a] Give the analogy between electric and magnetic circuits. What are the major points of difference between them.

2.5

- [b] For the network shown in Fig.3, Determine the voltage across capacitor. 2.5

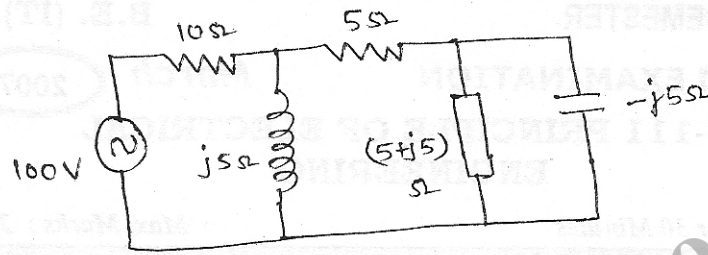


Fig. 3

- 3[a] Define the Q-factor for the series resonant circuit and express it in terms of the circuit parameters. 2
- [b] Three impedance each of $Z_1 = (16+j20)\Omega$ are connected in star and the combination connected in parallel to balanced delta connected circuit having per phase impedance $Z_2 = (27+j8)\Omega$. The entire circuit is connected to a 3 phase 400 V supply system. Determine the line current, power factor, reactive VA and apparent power supplied by the source. 3
- 4 Write short notes on any **TWO** of the following:
- [a] Measurement of power in 3 phase system.
 - [b] Various losses in a transformer.
 - [c] Phasor diagrams of transformer on load and no-load.

2.5x2

- 4 Determine reactions at A and B for the beam loaded as shown in Figure 3.

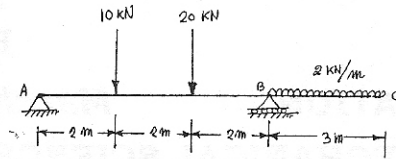


Figure.3

- 5 Locate the centroid (in Figure 4) of the shaded area.

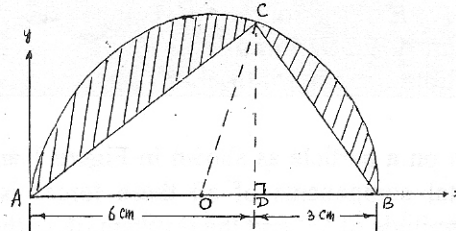


Figure 4

- 6 What is the least value of ' P ' required to cause the motion to impend for the system as shown in Figure 5. Assume co-efficient of friction on all contact surfaces as 0.2.



Figure -5

- 7 The space between two square flat parallel plates is filled with oil. Each side of the plate is 60 cm. The thickness of the oil film is 12.5 mm. The upper plate, which moves at 2.5 ms^{-1} requires a force of 98.1 N to maintain the speed. Determine:
- the dynamic viscosity of the oil in poise, and
 - the kinematic viscosity of the oil in stokes if the specific gravity of the oil is 0.95.
- 8 Draw the shear force and bending moment diagram for the beam loaded and supported as shown in Figure 6.

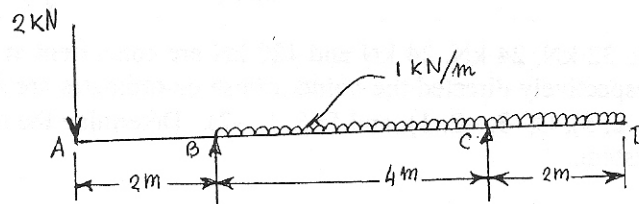


Figure.6.

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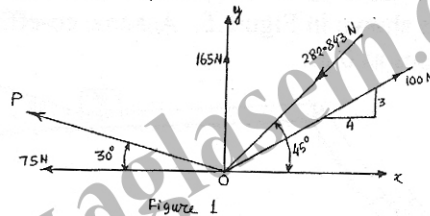
IT-112 MECHANICAL SCIENCES

Time: 1 Hour 30 Minutes

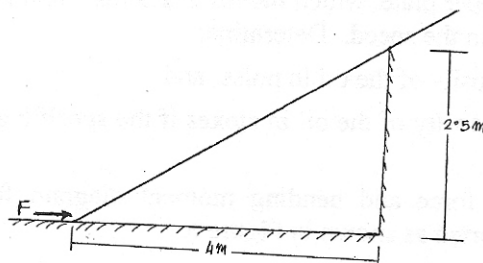
Max. Marks : 20

Note : Answer any **FIVE** of the following:
All question carry **EQUAL** marks.
Assume suitable missing data, if any.

- 1 If five forces act on a particle as shown in Figure 1 and the algebraic sum of horizontal components of all these forces is -324.904 kN, calculate the magnitude of ' P ' and the resultant of all the forces.



- 2 A 7 m ladder weighing 250 N is being pushed by force F as shown in Figure 2. What is the minimum force needed to get the ladder to move? The static coefficient of friction for all contact surfaces is 0.4.



- 3 Forces 32 kN, 24 kN, 24 kN and 120 kN are concurrent at origin and are respectively directed the points whose co-ordinates are A (2, 1, 6), B(4, -2, 5), C(-3, -2, 1), and D(5, 1, -2). Determine the resultant of the system.

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B.E. (IT)

MID SEM EXAMINATION

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IT-113 ENGINEERING MATHEMATICS-I

Time: 1 Hour 30 Minutes

Max. Marks : 20

Note : Answer any **THREE** questions.

All questions carry equal marks.

Assume suitable missing data, if any.

1[a] Obtain the Laplace Transform of the square wave function

$$f(t) = \begin{cases} 1 & 0 \leq t < c \\ -1 & c < t \leq 2c \end{cases} \quad \text{and} \quad f(t+2c) = f(t)$$

[b] Solve the d.e. using Laplace transform

$$(D^2 + 1)x = t \cos 2t, \quad x_0 = x_1 = 0$$

2[a] Evaluate by changing into polar coordinates

$$\int_0^1 \int_x^{\sqrt{2x-x^2}} x^2 + y^2 \, dy \, dx$$

[b] Find the volume in the positive octant of the ellipsoid

$$\frac{x^2}{a^2} + \frac{y^2}{b^2} + \frac{z^2}{c^2} = 1$$

3[a] If $u = f(r, s, t)$ and $r = x/y, s = y/z, t = z/x$ find the value of

$$x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} + z \frac{\partial u}{\partial z} = 0$$

[b] Use Lagranges method of undetermined multiplier to find the minimum value of $x^2 + y^2 + z^2$ subject to the conditions

$$x + y + z = 1, \quad xyz + 1 = 0$$

4[a] Solve the d.e.

$$\frac{d^2 y}{dx^2} - 2 \frac{dy}{dx} + 5y = e^{2x} \sin x$$

[b] Obtain the solution of the following d.e. in form of infinite series

$$3x \frac{d^2 y}{dx^2} + (1-x) \frac{dy}{dx} - y = 0$$

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SECOND SEMESTER

B.E. (IT)

MID SEM EXAMINATION

March 2007

IT-114 INTRODUCTION TO PROGRAMMING

Time: 1 Hour 30 Minutes

Max. Marks : 20

Note : Answer ALL questions.

Assume suitable missing data, if any.

- 1 Write a program which reads an array of 20 elements and then sends all negative elements of the array to the end without altering the original sequence. 2
- 2 Write a program to print the largest even and largest odd number from a list of numbers entered through keyboard. 2
- 3 Write one word having the closest meaning of the following phrases
 - i. Address of a variable
 - ii. Homogeneous data structure
 - iii. Logical AND
 - iv. Variables retain its values in successive calls. 2
- 4[a] Is it legal for a function f1 to call f2, which then calls f1? Justify your answer.
- [b] What are the advantages and disadvantages of recursion. 3
- 5 Explain the following
 - i. break and continue
 - ii. Data modifiers
 - iii. Storage devices
 - iv. scanf and printf

6 Differentiate the following:

- i. Call by value and call by reference
- ii. Data & Information
- iii. Local & global variable
- iv. Hardware & Software

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7[a] Explain with the help of example function definition, function prototype and function call for passing one int, one char type variables and one two dim. int array to a function.

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[b] What will be the output of the following program/ expression

```
main()  
{  
    int x = 0;  
    while ( x < 10)  
        for ( ; ; )  
            if ( ++x % 10 == 0)  
                break ;  
            printf ( "x = %d", x );  
}
```

(ii) b = ++c+++c; if c = 10

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SECOND SEMESTER

B.E. (IT)

MID SEM EXAMINATION

March

2007

IT-115 DISCRETE STRUCTURES

Time: 1 Hour 30 Minutes

Max. Marks : 20

Note : Answer **ALL** questions, by selecting any **TWO** from each question.
Assume suitable missing data, if any.

- 1[a] Let H be a subgroup of a group G . Then show that the relation $R = \{ (x, y) : x, y \in G, x^{-1}y \in H \}$ is an equivalence relation.
- [b] Give an example of a relation which is reflexive, symmetric, transitive and antisymmetric.
- [c] A woman has 11 close friends and she wants to invite five of them to dinner. In how many ways can she invite them if
- there is no restriction on the choice.
 - Two particular persons will not attend separately.
 - Two particular persons will not attend together.

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- 2[a] Rewrite the following argument using quantifiers, variables and predicate symbols. Prove the validity also:
- If a number is odd then its square is odd
 K is a particular number that is odd
 $\therefore k^2$ is odd.
 - All healthy people eat an apple a day.
 Ram does not eat apple a day.
 Ram is not a healthy person.

- [b] (i) By the method of indirect proof, show that $\sqrt{2}$ is irrational.
 (ii) Negate the following by rewriting the sentence using quantifiers
 "For all real number x , if x is greater than 3 then x^2 is greater than 9"
- [c] Define logical equivalence and show that the conditional statement is equivalent to its contrapositive.

6

- 3[a] If G is a group of even order. Prove that it has an element $a \neq e$ satisfying $a^2 = e$

- [b] Let $f : G \rightarrow H$ be a group homomorphism, then show that

$$(i) \quad f(e_G) = e_H \quad (ii) \quad [f(x)]^{-1} = f(x^{-1}), \quad x \in G.$$

where e_G and e_H are the identity element of G and H respectively.

- [c] Define an integral domain and prove that the cancellation law holds in a ring iff it is an integral domain.

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