

MID SEMESTER THEORY EXAMINATION, March 2013

SECOND SEMESTER

B.E. (COE/ECE/ICE)

COE/ECE/ICE-112: Applied Mechanics

Time: 1:30 Hrs.

Max. Marks: 20

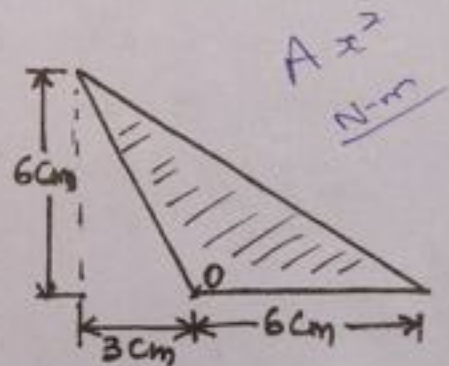
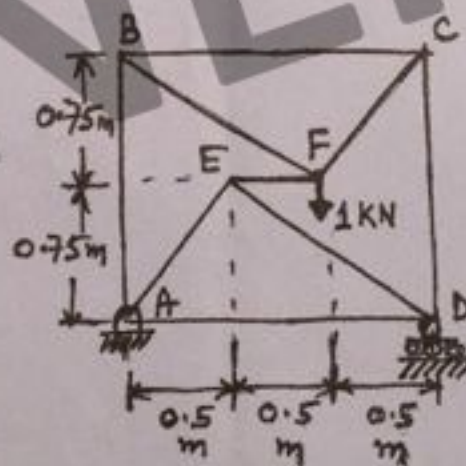
Note: All questions carry equal marks. Assume suitable missing data, if any.

Q.1. A cylinder of weight W and radius r is supported by a vertical wall and a bar AB of length l and of negligible weight. The bar is hinged at A and supported by a horizontal string at B. Find the angle θ , for which tension in the rope is minimum. Assume frictionless conditions.

Q.2. A truss is loaded and supported as shown in figure. Find the forces in all members.

Q.3. A uniform ladder of weight 800 N and length 7 m rests on a horizontal ground and leans against a smooth vertical wall. The angle made by the ladder with the horizontal is 60° . When a man of weight 600 N stands on the ladder at a distance of 4 m from the top of the ladder, the ladder is at the point of sliding. Determine the coefficient of friction between the ladder and the floor.

Q.4. Determine centroid of shaded area and calculate moment of inertia about centroidal x and y axis.



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Part B

Total no. of pages: 1

Second semester

Roll no: 194/EC
BE(ECE) 12

Mid semester Examination, March 2013

ECE/EEM-115 Electrical Engineering materials, Part B Chemistry

Max. marks: 10

Note: All questions are compulsory.

Q1 Write short notes (any five):

- a) Caustic embrittlement or permutit process
- b) Lime and soda process
- c) Reverse osmosis
- d) R.U.L. or Thermal spalling
- e) Glass wool or borosilicate glass
- f) Gaseous insulators
- g) Pyrometric cone test

(5)

Q2 A water sample on analysis gave the following data

Ca^{2+} : 30 mg/L, Mg^{2+} : 24 mg/L, CO_2 : 24mg/L, HCl = 50 mg/L, K^+ = 10mg/L

Calculate the quantities of lime (90% pure) and soda (94% pure) required to soften one million ltrs. Of water sample.

(3)

Q3 What are the various types of insulators? Explain with examples.

(2)

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Part A

Total No. of Pages: 2

Roll No. 194/EC/12

MID SEMESTER THEORY EXAMINATION

SECOND SEMESTER

BE(ECE)

ECE-115: ELECTRICAL ENGINEERING MATERIALS(PART-A)

Time: 1:30 Hrs.

Max. Marks: 10

Note: All questions carry equal marks

Attempt any four questions.

Assume suitable missing data, if any

Q1 (a) What are Miller indices & Miller planes? A lattice plane makes intercepts of length a , $2b$ & $-3c/2$. Find the indices of the planes.

(b) Describe the structure of diamond cubic. Discuss its properties & application.

Q2 (a) What is binding energy & dissociation energy for a molecule & lattice? Explain using interaction energy.

(b) The potential energy of a diatomic molecule in terms of interatomic distance ' r ' is given by $v(r) = -A/r^2 + B/r^{10}$. Compute the equilibrium spacing & dissociation energy. Given $A = 1.44 \times 10^{-39} \text{ Jm}^2$ & $B = 2.19 \times 10^{-115} \text{ Jm}^{10}$.

Q3 a) Explain Drude's model of free electron theory & derive $J = \sigma E$.

b) Define density of state function $D(E)$. Show that $D(E)$ is proportional to \sqrt{E} .

Q4. What is Fermi distribution? Define Fermi level & Fermi energy. Give a plot of $N(E)$ where $N(E)dE = D(E)f(E)dE$.

Q5. Write notes on any two:-

a) Madelung constant.

b) Atomic Packing Factor.

c) Wiedmann-Franz law.

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SECOND SEMESTER, BE (EC/CO/IC)
MID SEMESTER EXAMINATION, MARCH - 2013
EC/CO/IC - 113: Mathematics - II

Time: 1:30 hrs.

Max. Marks: 20

Attempt any Five questions. All Questions carry equal marks.

1. (i) State and prove Euler's theorem on homogeneous function of degree n .
 (ii) Evaluate $x \frac{\partial f}{\partial x} + y \frac{\partial f}{\partial y}$, where $f(x, y) = \sqrt{x^2 + y^2} \sin^{-1}(x/y) + \frac{x^2 - y^2}{\sqrt{x^2 + y^2}}$.
2. Find the first six non zero terms of the expansion of the function $e^x \log(1 + y)$ in a Taylor series in the neighbourhood of the point $(0, 0)$.

3. Define rank of a matrix and find the value of α for which the matrix

$$A = \begin{pmatrix} 1 & 5 & 4 \\ 0 & 3 & 2 \\ \alpha & 13 & 10 \end{pmatrix}$$

has rank 2.

4. (i) State and prove Cayley Hamilton theorem.
 (ii) Using the Cayley Hamilton theorem find the inverse of the matrix

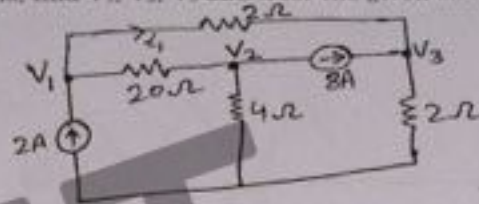
$$A = \begin{pmatrix} 1 & -2 & -3 \\ 0 & 2 & 0 \\ 0 & 0 & 3 \end{pmatrix}.$$

5. Evaluate $\int_0^2 \int_0^{\sqrt{2x-x^2}} \frac{x}{\sqrt{x^2 + y^2}} dx dy$, by changing to polar coordinates.

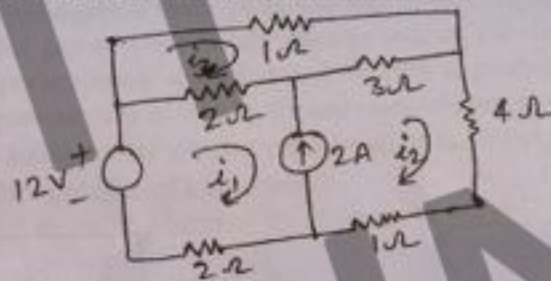
6. Evaluate $\int_0^b \int_0^{\frac{a}{b} \sqrt{b^2 - y^2}} xy dx dy$, by changing the order of integration.

Note: Attempt any five questions. All questions carry equal marks. Assume any missing data suitable.

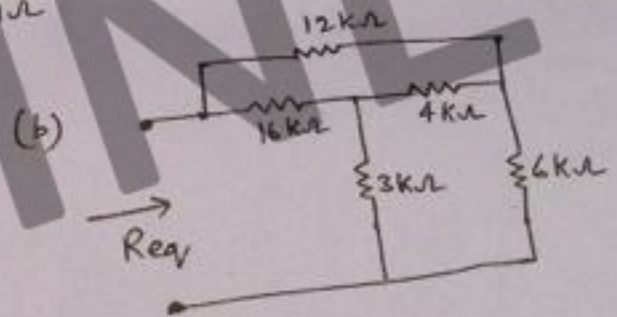
1. Using node analysis, find V_1 , V_2 , V_3 and i_1 for the given circuit.



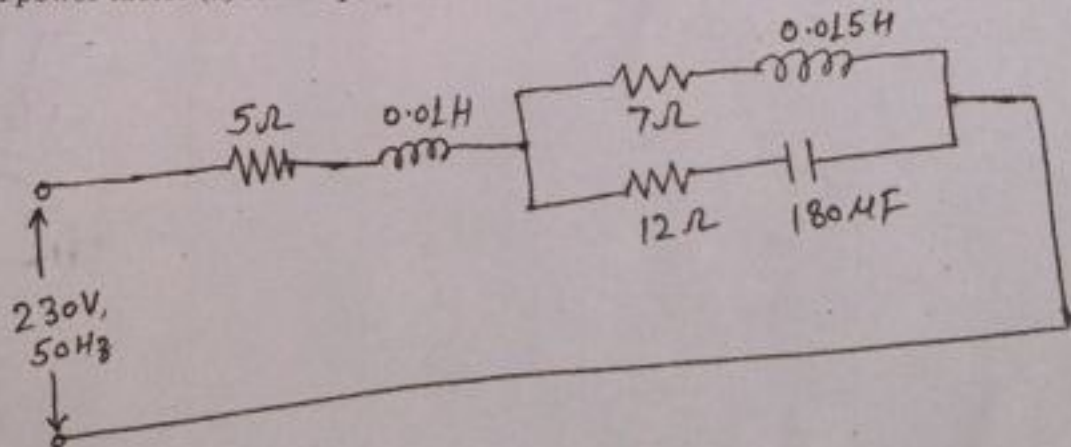
2. Using mesh analysis find i_1 , i_2 and i_3 for given circuit.



3. Find R_{eq} for given circuit.



4. (a) Define Q factor of series resonance circuit.
 (b) What are the factors effecting the resistance of the conductor. Explain with suitable mathematical relations.
5. In the network shown below, determine: (a) Total Impedance (b) Current in each branch
 (c) Over all power factor (d) Active power



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