

Total No. of Pages 2

Roll No.

SECOND SEMESTER

B.E. (EE/EC/COE)

MID SEM EXAMINATION

March.

2006

EE/EC/COE-111 PRINCIPLES OF ELECTRICAL ENGINEERING

Time: 1 Hour 30 Minutes

Max. Marks : 20

Note : Answer **ALL** questions.

Assume suitable missing data, if any.

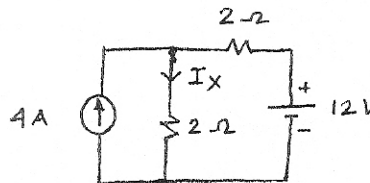
- 1[a] Taking the resistance temperature co-efficient to be $(1/234.5)$ per $^{\circ}\text{C}$ at 0°C , prove that the resistance R_1 of a circuit of copper wire at a temperature $t_1^{\circ}\text{C}$ is related to the resistance R_2 at $t_2^{\circ}\text{C}$ by the expression

$$\frac{R_1}{R_2} = \frac{234.5 + t_1}{234.5 + t_2} \quad 2$$

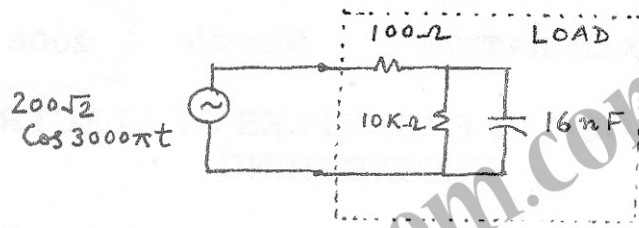
- [b] Find the current flowing at the instant of switching on a 100 W metal filament lamp on to a 220 V circuit. The incandescent filament temperature is 2000°C and the resistance temperature coefficient at room temperature of 20°C is 0.005. 3

- 2[a] Derive formulae for star to delta and delta to star transformations for three unequal resistances. 2

- b] In the circuit given below, compute the current I_x by superposition theorem. 3



- 3[a] Explain the terms apparent power, active power and reactive power. How are they related to complex power? What are their units? 2
- [b] In the circuit given below, compute the complex, average, reactive and apparent power absorbed by the load. 3



- 4[a] Elucidate the significance of power factor in electric circuits. 2
- [b] Two circuits having the same numerical value of impedance in ohms are joined in parallel. The power factor of one circuit is 0.8 and the other is 0.6. Compute the power factor of the combination. 3

Total No. of Pages 2

Roll No.

SECOND SEMESTER

B.E. (COE/EC/EE)

MID SEM EXAMINATION

March 2006

COE/EC/EE-112 APPLIED MECHANICS

Time: 1 Hour 30 Minutes

Max. Marks : 20

Note : Answer **ALL** questions.

Assume suitable missing data, if any.

- 1[a] A $1.80\text{m} \times 3.50\text{m}$ rectangular plate is subjected to a system of four coplaner forces as shown in Figure 1. Determine the value and location of a single force resulting in equivalent action. 4

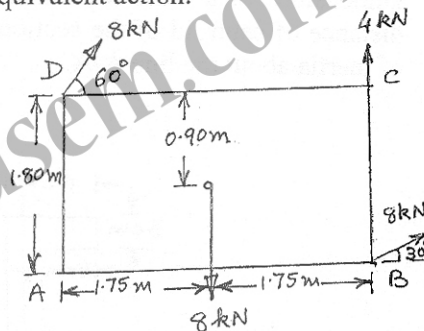


Figure 1

- [b] Explain varignons theorem. 1
- 2[a] Explain point of contraflexure. 1
- [b] A beam ABCDE, 12m long, cantilevered over the portion AB = 4m long, supported at point B and E, BE = 8m long carries a concentrated load of 20 kN at end A, 30 kN at C, 2m from B and 40 kN at D, 2m from E. In addition it carries a uniformly distributed load of 10 kN/m run over the portion CD. Draw SF and BM diagrams of the beam. Determine the position of the point of contraflexure if any. 5

- 3[a] Explain cone of friction. 1
- [b] Figure 2 shows the block B, weighing 1.2 kN. A force P, applied to the wedge C, is used to just raise the block. Assuming the wedge to be weightless, obtain the force P. Take $\mu = 0.3$ for all surfaces of contact.

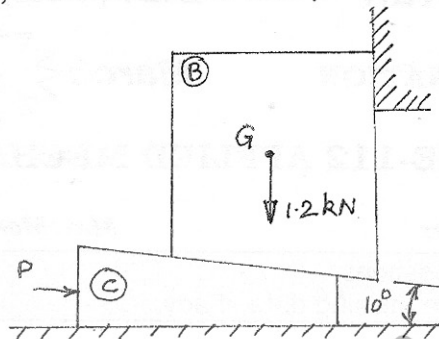


Figure 2.

- 4 Dimensions of a cross-section are shown in Figure 3. Calculate the distance of centroid of the section from line A-A and its area moment of inertia about the line A-A. 4

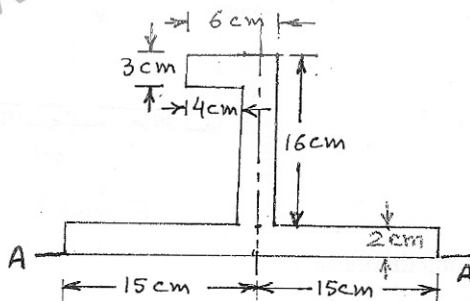


Figure 3

Total No. of Pages 2

Roll No.

SECOND SEMESTER

B.E. (COE/EC/EE)

MID SEM EXAMINATION

March

2006

COE/EC/EE-113 MATHEMATICS-II

Time: 1 Hour 30 Minutes

Max. Marks : 20

Note : Answer **ALL** questions by selecting **TWO** parts from each question.

Assume suitable missing data, if any.

1[a] Find $\frac{dy}{dx}$ if $y^x + x^y = C$.

[b] If $x = r \cos \theta$, $y = r \sin \theta$, prove that

$$\frac{\partial^2 \theta}{\partial x^2} + \frac{\partial^2 \theta}{\partial y^2} = 0$$

[c] If $\frac{3}{x} + \frac{4}{y} + \frac{5}{z} = 6$ find the values of x, y, z which make $x + y + z$ minimum.

2[a] Evaluate the integral by changing the order of integration

$$\int_0^1 \int_{2y}^2 e^{x^2} dx dy$$

[b] Evaluate the value bounded above by the sphere $x^2 + y^2 + z^2 = 2a^2$ and below by the paraboloid $az = x^2 + y^2$

[c] Integrate $r \sin \theta$ over the area of the cardioid $r = a(1 + \cos \theta)$ above the initial line.

3[a] Find the inverse of the following matrix

$$\begin{bmatrix} 3 & -1 & 1 \\ -15 & 6 & -5 \\ 5 & -2 & 2 \end{bmatrix}$$

[b] Determine the rank of the matrix.

$$\begin{bmatrix} 0 & 1 & -3 & -1 \\ 1 & 0 & 1 & 1 \\ 3 & 1 & 0 & 2 \\ 1 & 1 & -2 & 0 \end{bmatrix}$$

[c] If consistent then solve the system of equations

$$2x_1 + x_2 + x_3 + x_4 = 2$$

$$3x_1 - x_2 + x_3 - x_4 = 2$$

$$x_1 + 2x_2 - x_3 + x_4 = 1$$

$$6x_1 + 2x_2 + x_3 + x_4 = 5$$

Total No. of Pages 1

SECOND SEMESTER

Roll No.

B.E. (COE)

MID SEM EXAMINATION

March

2006

COE-114 INTRODUCTION TO PROGRAMMING

Time: 1 Hour 30 Minutes

Max. Marks : 20

Note : Answer ALL questions.

Assume suitable missing data, if any.

- 1 Draw a block diagram to illustrate the basic organization of a computer system and explain the functions of the various units. 3
- 2 Carry out the following conversions:
i $(125)_6 = ?_4$
ii $ABC_{16} = ?_8$ 2
- 3 Describe the use of the conditional operator to form conditional expressions. 2
- 4 Compare the use of the switch statement with the use of nested if.....else statements. Which is more convenient? 2
- 5 What do you understand by structured programming? Explain. 2
- 6 What is the purpose of the continue statement? Compare with the break statement. 2
- 7 When passing an argument to a function, what is the difference between passing by value and passing by reference? Explain with coding. 3
- 8 Write a 'c' program to compute and display the roots of the quadratic equation
 $ax^2 + bx + c = 0$ 4

Total No. of Pages 2

Roll No.

SECOND SEMESTER

B.E. (COE)

MID SEM EXAMINATION

March

2006

COE-115 PHYSICS OF MATERIALS

Time: 1 Hour 30 Minutes

Max. Marks : 20

Note : Answer ALL questions.

Assume suitable missing data, if any.

- 1 What are primitive cell and unit cell? Which of simple cubic, body centered cubic and face centered cubic is/are primitive cell? **1**
- 2 Obtain the Miller indices of the plane which intercepts at $\frac{a}{2}$, $\frac{b}{2}$, $2c$ in a simple cubic unit cell. Draw a neat diagram showing the plane. **2**
- 3 A beam of X-ray incident on a NaCl crystal of lattice spacing 0.282 nm. The first order reflection is observed at glancing angle $8^{\circ} 35'$. At what angles the second and third order reflection occur? Given wavelength of X-ray is 0.071 nm. **2**
- 4 Explain the terms : Density of energy states and Fermi-Dirac distribution function. Draw their variation with energy and hence define Fermi energy. **2**
- 5 Calculate the average random velocity of an electron if its Fermi energy at absolute zero is 5.6 eV. **1**
- 6 The band gap of GaAs is 1.42 eV. Calculate the wavelength of radiation that is emitted when electron and hole recombine. What is the colour of the radiation? **2**
- 7 The electrical conductivity and mobility of electron in aluminium are $3.8 \times 10^7 (\Omega\text{m})^{-1}$ and $0.012 \text{ m}^2\text{V}^{-1}\text{s}^{-1}$ respectively. Calculate the Hall voltage for an Al sample of thickness 15 mm for a current of 25 A and magnetic field 0.6 tesla applied perpendicular to the direction of current. **2**

- 8 Define diffusion co-efficient for electrons. Give its dimensions. 1
- 9 Distinguish between direct band gap and indirect band gap semiconductors. Give examples. 1
- 10 An electron is confined to infinite one dimensional potential well of dimension 25 \AA , in the ground state. What is the probability of finding the electron at the center? 2
- 11 Draw the probability distribution functions for lowest two states of a particle in a finite potential well. 2
- 12 Verify whether $\psi = Ae^{ikx}$ can be a wave function in a region $-a \leq x \leq a$, where a , k and A are positive constants. 2