

Total No. of Pages 2

Roll No.

SECOND SEMESTER

B.E. (COE/EC/EE)

MID SEMESTER EXAMINATION **MARCH** 2005

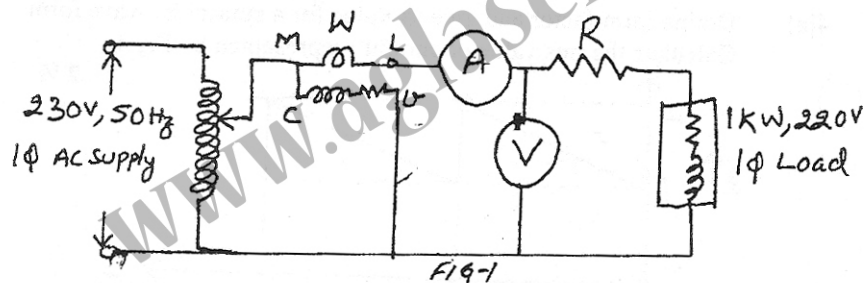
COE/EC/EE-111 PRINCIPLES OF ELECTRICAL ENGINEERING

Time: 1 Hour 30 Minutes

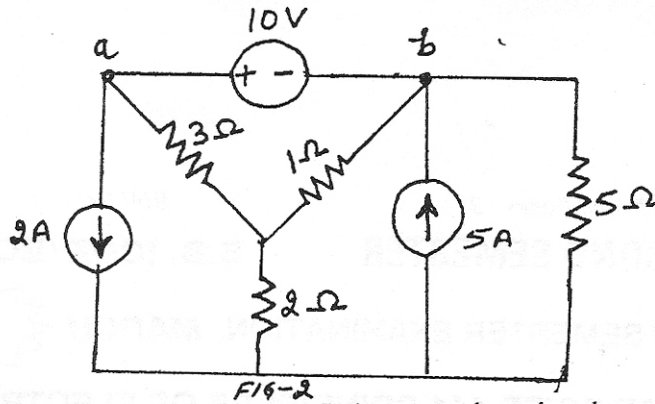
Max. Marks : 20

Note : Attempt ALL questions.
Assume suitable missing data, if any.

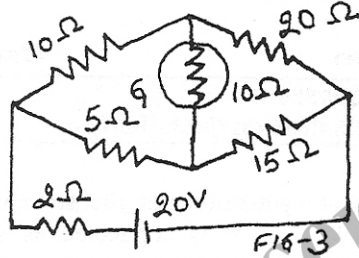
- 1[a] Define the rating of a potentiometer, rheostat and variac.
A load of 1 kW, 220 V is connected as shown in Fig 1.
design/select the rheostat, variac, ammeter, voltmeter and
wattmeter to measure the power and power factor of the load.
Also draw the phasor diagram of the circuit. 3



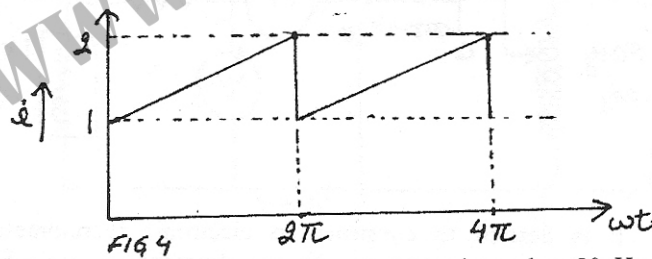
- [b] It is desired to construct an electronic thermometer using negative temperature co-efficient electronic device. Suggest a suitable alternative to mercury thermometer for measuring the temperature. 2
- 2[a] State and prove maximum power transfer theorem. 2
- [b] Find the power delivered by the 5A current source in the circuit shown in Fig.2 by using the nodal analysis. 3



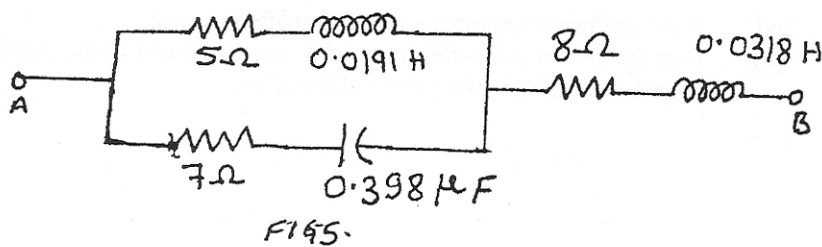
- 3[a] Using Thevenin's theorem find current through galvanometer connected in the circuit shown in Fig. 3. 3



- [b] A 100 ohm resistor, 20 μ F capacitor and a 2H inductor are connected in series. At what frequency is the phase angle is 45°? 2
- 4[a] Define form factor and give its value for a sinusoidal wave form. Calculate the rms value of current i represented by Fig.4 2 1/2



- [b] In the circuit shown in Fig.5, determine what 50 Hz voltage must be applied across AB in order to that a current of 10A may flow in the capacitor. 2 1/2



Total No. of Pages 2

Roll No.

SECOND SEMESTER

B.E. (COE/EC/EE)

MID SEMESTER EXAMINATION **MARCH** 2005

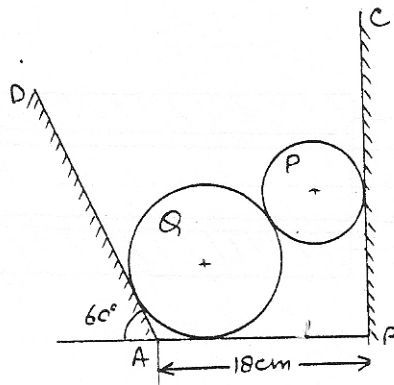
COE/EC/EE-112 APPLIED MECHANICS

Time: 1 Hour 30 Minutes

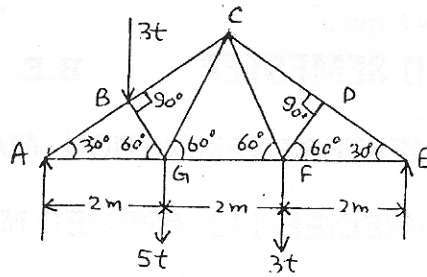
Max. Marks : 20

Note : Attempt **ALL** questions.
Assume suitable missing data, if any.

- 1[a] If at a point in a two dimensional system, the normal stress on two mutually perpendicular planes are p and p' (both alike) and the shear stress is q . Show that one of the Principal stresses is zero if $q^2 = pp'$ 2
- [b] Establish relationship between Modulus of elasticity, Modulus of rigidity and Bulk Modulus (with poisson's ratio) 3
- [c] Two cylinders P and Q rest in a box as shown below. The cylinder P has diameter of 10 cm and weighs 20 kg while the cylinder Q has diameter 18 cm and weighs 50 kg. The channel is 18 cm wide at the bottom with one side vertical and the other inclined at 60° as shown. Find the pressures at all four points of contact. 3



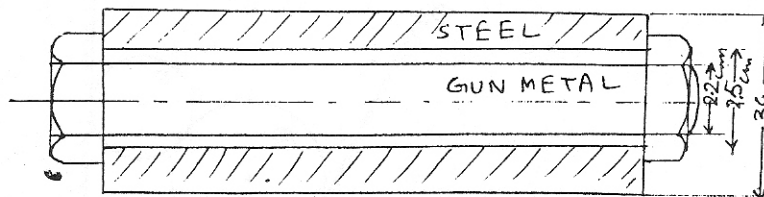
2[a] An inclined truss as shown below is loaded as shown. 4



Determine the nature and magnitude of the forces in all the members of the truss.

3. The mean diameter of a square threaded screw jack is 5 cm. The pitch of the thread is 1 cm. The coefficient of friction is 0.15. What force must be applied at the end of a 70 cm long lever which is perpendicular to the longitudinal axis of the screw (i) to raise a load of 2 tones, and (ii) to lower it. 4

4. A gunmetal rod screwed at the ends passes through a steel tube. The assembly heated to 300°F and the nuts on the rod are screwed tightly home on the ends of the tube. Diameter of the rod is 2.2 cm. The internal and external diameter of steel are 2.5 and 3 cm respectively. Find the intensity of stress in the rod and the tube when the common temperature has fallen to 60°F
 coefficient of linear expansion of steel = 6×10^{-6} per °F
 coefficient of linear expansion of copper = 10×10^{-6} per °F
 $E_{\text{steel}} = 2.05 \times 10^6 \text{ kg/cm}^2$ $E_{\text{gunmetal}} = .915 \times 10^6 \text{ kg/cm}^2$



Total No. of Pages 2

Roll No.

SECOND SEMESTER

B.E. (COE/EC/EE)

MID SEMESTER EXAMINATION **MARCH**

2005

COE/EC/EE-113 MATHEMATICS-II

Time: 1 Hour 30 Minutes

Max. Marks : 20

Note : Attempt **ALL** questions. Selecting **TWO** parts from each questions.

Assume suitable missing data, if any.

1[a] Find $\frac{du}{dx}$ if $u = \sin(x^2 + y^2)$, where $a^2x^2 + b^2y^2 = c^2$. 6

[b] At a distance of 50 meter N_s from the foot of a tower the elevation of its top is 30° . If the possible errors in measuring the distance and elevation are 2 cm and 0.05 degree respectively find the approximate error in the calculated height.

[c] Find stationery values of $x^2 + y^2 + z^2$ subject to $ax^2 + by^2 + cz^2 = 1$ and $lx + my + nz = 0$

2[a] Solve $x Dy + y = xy^3$ 7

[b] Solve $D^4y + 2a^2 D^2y + a^4y = \sin ax$

[c] Solve $\frac{d^3y}{dx^3} - \frac{d^2y}{dx^2} - \frac{dy}{dx} + y = 7 - 6x - 3x^2 + e^x$

3[a] Change the order of integration and hence evaluate the integral

$$\int_0^1 \int_x^{2-x} \frac{x}{y} dy dx \quad 7$$

- [b] Find the total area bounded by the lemniscates

$$r^2 = a^2 \cos 2\theta$$

- [c] Find the volume of the region in space bounded above by the surface $z = 1 - (x^2 + y^2)$ on the sides by the planes $x = 0$, $y = 0$, $x + y = 1$, and below by the plane $z = 0$.

www.aglasem.com

Total No. of Pages 2

Roll No.

SECOND SEMESTER

B.E. (COE)

MID SEMESTER EXAMINATION **MARCH** 2005

COE-114 INTRODUCTION TO PROGRAMMING

Time: 1 Hour 30 Minutes

Max. Marks : 20

Note : Attempt **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 function of the various units. 4
- 2[a] $545_6 = ?_4$ 1+1+2
[b] Find the decimal equivalent of the octal number 127.54.
[c] Perform the following subtractions and check the result by converting the binary numbers to decimal.
(i) $1100.01 - 1001.11$ (ii) $1011.1 - 100.11$
3. What will be output of the following program: 2
main ()
{
 int i = 4, j = -1, k = 0, y, z;
 y = i + 5 & & j + 1 | k + 2;
 z = i + 5 | j + 1 & & k + 2;
 printf ("\\n y = %d z = %d", y, z);
}

4. What do you understand by array of structures? Explain with the help of an example. 2
5. Distinguish between nested if-else statement and switch statement with the help of computer program. 3
6. Write a program in 'C' to print the roots of the quadratic equation $ax^2 + bx + c = 0$. 5

OR

Write a program in 'C' to print all prime number from 1 to 200.

Total No. of Pages 2

Roll No.

SECOND SEMESTER

B.E. (COE)

MID SEMESTER EXAMINATION **MARCH 2005**

COE-115 PHYSICS OF MATERIALS

Time: 1 Hour 30 Minutes

Max. Marks : 20

Note : Answer **ALL** questions.

Assume suitable missing data, if any.

You may use mass of electron $m = 9.1 \times 10^{-31}$ kg,

Planck's constant $h = 6.63 \times 10^{-34}$ J.S.

- 1[a] A particle is moving in a one dimensional potential box (of infinite height) of width 25 \AA , calculate the probability of finding the particle within an interval of 5 \AA at the center of the box when the particle is in its state of least energy. (2½)
- [b] Derive the London equations for super conductors and explain how its solution explain Meissner Effect. (2½)
- 2[a] Determine the Miller Indices of a plane that makes an intercept of 2 \AA , 3 \AA and 4 \AA on the coordinate axis of an orthorhombic crystal with $a:b:c = 4:3:2$. (2)
- [b] Calculate the density of states of one cubic meter of Cu at Fermi level. Fermi Energy E_F of Cu = 7 eV. (2)
- [c] Write down the major assumptions and the drawback of free electron theory of metals. (1)
- 3[a] The penetration depth λ of Hg at 3.5K is 750 \AA . Estimate the values of (i) λ and (ii) super conducting electron density n_s as $T \rightarrow 0\text{K}$. (2½)
- [b] What is the uncertainty in the location of a photon of wavelength 3000 \AA if this wavelength is measured by an optical spectrum analyzer to an accuracy of one part in a million (=10 Lakh). (1½)

- [c] Metallic iron changes from BCC to FCC at 920°C. At this temperature, the atomic radii of iron atom in the two structures are 0.1258 nm and 0.1292 nm respectively. Calculate the volume change in percentage during this structural change. (1)

- 4[a] The interaction energy between two atoms is given by the expression

$$U(r) = -\frac{a}{r^2} + \frac{b}{r^{10}}$$

and the two atoms form a stable molecule with inter nuclear distance of 0.3 nm and dissociation energy of 4 eV. Calculate 'a' and 'b' (3)

- [b] Write down an expression for transmission coefficient of a particle with energy E incident on a finite potential well defined as

$$V(x) = 0 \text{ for } x < 0$$

$$V(x) = -V_0 \text{ for } 0 < x < L$$

$$= 0 \text{ for } x > L$$

and hence point out the values of 'L' for maximum transmission coefficient. (2)