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SECOND SEMESTER

B.E. (IT)

MID SEMESTER EXAMINATION **MARCH** 2005

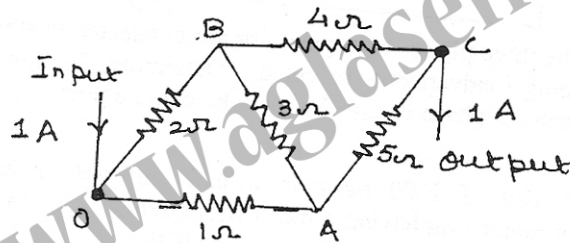
IT-111 PRINCIPLES OF ELECTRICAL ENGINEERING

Time: 1 Hour 30 Minutes

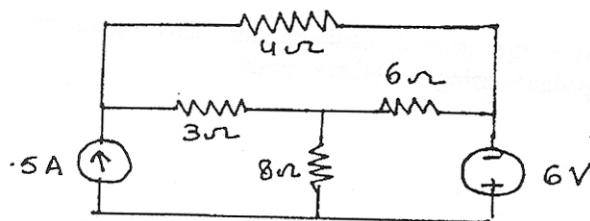
Max. Marks : 20

Note : Answer any questions.
Assume suitable missing data, if any.

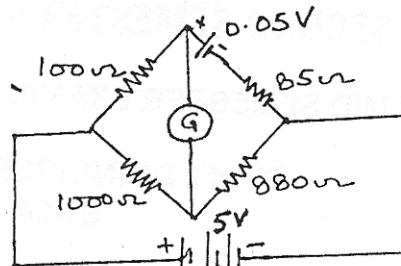
- 1 An insulating material has an insulation resistance of 100% at 0°C . For each rise in temperature of 5°C , its resistance is reduced by 10%. At what temperature is the insulation resistance halved. 3
- 2 Find the current distribution in the network shown below. 2



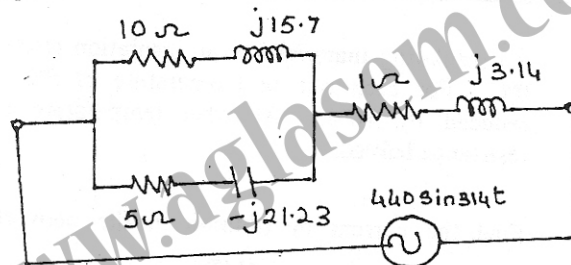
- 3 Find the mesh currents in the circuit. 2



- 4 Determine the current in the galvanometer branch of the bridge network shown using thevenin's Theorem. The resistance of galvanometer is 1000Ω . 3



- 5 A voltage of $440 \sin 314 t$ is applied to the circuit shown. Determine the rms current in each branch, the total power and the power factor of the circuit. Also draw the phasor diagram. 4



- 6 The three phases of a generator are connected in star, one phase being inadvertently reversed. Determine the line voltages in terms of phase voltage V_{ph} and the phase angles. 2

- 7 A coil of 2000 turns is wound uniformly over a bakelite insulator ring having a mean circumference of 1 m and uniform cross-sectional area of 0.05 cm^2 . If the current through the coil is 1 A, calculate (a) the mmf of the circuit (b) the magnetic field intensity (c) the flux density (d) total flux. 2

- 8 Derive the general equation for determining an unknown impedance using a.c. bridge circuit. 2

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SECOND SEMESTER

B.E. (IT)

MID SEMESTER EXAMINATION **MARCH 2005**

IT-112 MECHANICAL ENGINEERING SCIENCE

Time: 1 Hour 30 Minutes

Max. Marks : 20

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

- 1[a] Distinguish between extensive and intensive properties with the help of an example of property. (2)
- [b] Define heat and work, which of the following characteristics are true for heat and work. (2)
- (i) It is a path function
 - (ii) It is not a property of the system
 - (iii) Its differential is not exact.
- 2[a] A mass of 2.5 kg of air at 2 Bar and 26°C in a closed system executes a constant pressure process with heat absorption of 65 kJ. Calculate (i) the final temperature (ii) change in enthalpy (iii) the work done. (3)
- [b] Write the general form equation of the first law of thermodynamics for an open system. State the conditions for steady state steady flow and write the SSSF energy equation in the differential form. (2)
- OR
- 2[a] Show that internal energy is a property of the system. (2)
- [b] Air passes through a gas turbine system at the rate of 4.5 kg/sec. It enters the turbine with a velocity of 90 m/sec and leaves with a velocity of 171.71 m/sec. In its passage through the turbine system the specific enthalpy is reduced by 200 kJ/kg and there is heat transfer loss of 40 kJ/kg. Determine the power developed by the turbine system (3)

- 3[a] Define heat engine and give two examples of heat engine. (1)
- [b] It is proposed to design a cold storage for maintaining certain vegetables under frozen conditions at -20°C . The ambient temperature is 37°C . The estimated energy transfer through doors, walls and roof is 3 kJ/sec . Calculate the minimum power required to operate a refrigeration plant for maintaining the cold storage. (3)
- 4[a] Calculate the entropy change if 1 kg of air is changed from 1 Bar , 27°C to 10 Bar and 227°C . (2)
- [b] Define relative humidity. Calculate humidity Ratio and wet bulb temperature of air at 40°C Dry bulb temperature and 20°C Dew point temperature. (2)
- [c] Calculate the internal energy of steam at 10 Bar and 0.8 Dry. The steam is heated at constant pressure to 300°C . Calculate the amount of heat required. Show the process on the $h-s$ diagram. (3)

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B.E. (IT)

MID SEMESTER EXAMINATION **MARCH** 2005

IT-113 ENGINEERING MATHEMATICS-I

Time: 1 Hour 30 Minutes

Max. Marks : 20

Note : Attempt **ALL** questions. Selecting any **TWO** parts from each question.
Assume suitable missing data, if any.

1[a] If $v = (x^2 + y^2 + z^2)^{\frac{m}{2}}$, find the value of m ($m \neq 0$) which will make $\frac{\partial^2 v}{\partial x^2} + \frac{\partial^2 v}{\partial y^2} + \frac{\partial^2 v}{\partial z^2} = 0$ 3

[b] If $u = \tan^{-1}(y^2/x)$, prove that $x^2 \frac{\partial^2 u}{\partial x^2} + 2xy \frac{\partial^2 u}{\partial x \partial y} + y^2 \frac{\partial^2 u}{\partial y^2} = -\sin^2 u \sin 2u$ 3

[c] Expand $f(x, y) = x^2 y + \sin y + e^x$ about the point $(1, \pi)$ upto the second degree terms using Taylor's series. 3

2[a] Find the minimum value of $x^2 + y^2 + z^2$, subject to conditions $lx + my + nz = 1$ and $l'x + m'y + n'z = 1$. $3\frac{1}{2}$

[b] The radius of the base and the altitude of a can in the shape of a right circular cone are measured correct to 1%. Find the maximum possible percentage error in the volume of the cone. $3\frac{1}{2}$

[c] Solve the differential equation

$$\frac{d^3 y}{dx^3} + 2 \frac{d^2 y}{dx^2} + \frac{dy}{dx} = x^2 e^{2x} + \sin^2 x \quad 3\frac{1}{2}$$

3[a] Solve, by the method of variation of parameters, the differential equation

$$\frac{d^3 y}{dx^3} - 2 \frac{dy}{dx} + y = e^x \log x \quad 3\frac{1}{2}$$

[b] Evaluate $\iint_R y^2 dx dy$, where R is the area outside the circle

$$x^2 + y^2 = ax \text{ and inside the circle } x^2 + y^2 = 2ax \quad 3\frac{1}{2}$$

[c] Change the order of integration and hence evaluate

$$\int_0^a \int_{x/a}^{\sqrt{x/a}} (x^2 + y^2) dy dx \quad 3\frac{1}{2}$$

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SECOND SEMESTER

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MID SEMESTER EXAMINATION **MARCH 2005**

IT-114 INTRODUCTION TO PROGRAMMING

Time: 1 Hour 30 Minutes

Max. Marks : 20

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

- 1[a] $(2319.67)_{10} = (\quad)_2$
[b] What is nested if statement
[c] Difference between equality and assignment operator
[d] $(43713)_8 = (\quad)_{16}$
[e] What are the functions of an Operating System.
[f] Name few Input (exclusive), Output (exclusive) and Storage devices
[g] What are bit, byte, character set and WORD.
[h] Define Digital Computer and Analog computer. (8)
- 2 Write a program to find the factorial of a number. (2)
- 3 Explain the following, support with examples, if any
[a] Constants in C
[b] printf statement
[c] Track, Capacity, Cylinder, Seek time, Latency, Access time with respect to Magnetic Disk.
[d] Computer languages and their uses.
[e] MICR, OCR, OMR, EPROM, ANSI.

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SECOND SEMESTER

B.E. (IT)

MID SEMESTER EXAMINATION **MARCH 2005**

IT-115 DISCRETE STRUCTURES

Time: 1 Hour 30 Minutes

Max. Marks : 20

Note : Question No.1 is compulsory

Answer any **TWO** questions from the remaining.

- 1 Determine which of the following systems are groups. Give reasons why the remaining systems are not groups. (8)
- [a] The set $G = \{m, n\} : m, n \text{ integers such that either } m \neq 0 \text{ or } n \neq 0\}$ under the binary composition $*$ defined on G by $(a, b) * (c, d) = (ac - bd, ad + bc)$
- [b] The set of all even integers under the binary operation $*$ defined by $a * b = 2a + 2b$
- [c] The set $G = \{(a, b) : a, b \in \mathbb{R}, a \neq 0\}$ under the binary operation θ defined by $(a, b) \theta (c, d) = (ac, bc + d)$
- [d] The set of integers \mathbb{Z} under the binary operation θ defined by $a \theta b = 0 \quad \forall a, b \in \mathbb{Z}$. (6)
- 2 A group G is isomorphic to a group G' if there exists an isomorphism of G onto G' (symbolically $G \cong G'$). Let S be any family of groups. Then show that the relation "is isomorphic to" is an equivalence relation of S . (6)
- 3 Give examples of relations R on $A = \{1, 2, 3\}$ having the stated property.
- [a] R is both symmetric and anti symmetric.
- [b] R is neither symmetric nor anti symmetric.
- [c] R is transitive but $R \cup R^{-1}$ is not transitive. (6)

- 4 Let f be an isomorphism of the ring A onto the ring A' , show that
- [a] for each sub ring S of A , $f(S)$ is a sub ring of A'
 - [b] for each sub ring S' of A' , $f^{-1}(S')$ is a sub ring of A .

(6)