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Roll No.

SECOND SEMESTER

B.E. (CE)

MID SEM EXAMINATION

March

2006

CE-111 ENGINEERING ECONOMICS & ACCOUNTANCY

Time: 1 Hour 30 Minutes

Max. Marks : 20

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

- 1 Write True or False
 - [a] Microeconomics focuses attention on the behaviour of the economy as a whole.
 - [b] There are many producers in the case of oligopoly.
 - [c] In case of giffen goods, demand increases with decrease in income.
 - [d] Marginal cost is same for all units.
 - [e] Cost accounting is a branch of financial accounting.
 - [f] Tenth five year plan is in progress in India.3
- 2 Differentiate between following.
 - [a] Subsidy and Tax
 - [b] Actual Cost and Opportunity Cost
 - [c] Micro economics and Macroeconomics9
- 3 Write short note on Cost Centre? 2
- 4 What do you mean by Bank? 2
- 5 Discuss Efficiency in production? 2
- 6 Discuss the concept of Cross Elasticity of Demand? 2

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SECOND SEMESTER

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CE-112 MATHEMATICS-II

Time: 1 Hour 30 Minutes

Max. Marks : 20

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

1[a] If $u = \sin^{-1} \left[\frac{x+y}{\sqrt{x} + \sqrt{y}} \right]$

prove that $x^2 u_{xx} + 2xy u_{xy} + y^2 u_{yy} = \frac{-\sin u \cos 2u}{4 \cos^2 u}$

[b] If $f(x,y) = \tan^{-1}(xy)$, compute an approximate value of $f(0.9, -1.2)$

[c] Show that the rectangular solid of maximum volume that can be inscribed in a sphere is a cube.

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2[a] Find the volume of the torus generated by revolving the circle $x^2 + y^2 = 4$ about the line $x=3$.

[b] Find by triple integration the volume of a solid bounded by the sphere $x^2 + y^2 + z^2 = 4$ and the paraboloid $x^2 + y^2 = 3z$

- [c] Find the area of that part of the surface of the paraboloid $y^2 + z^2 = 2ax$ which lies between the cylinder $y^2 = ax$ and the plane $x = a$.

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- 3[a] A function $f(x,y)$ is rewritten in terms of new variables
 $u = e^x \cos y, \quad v = e^x \sin y$

show that : $\frac{\partial^2 f}{\partial x^2} + \frac{\partial^2 f}{\partial y^2} = (u^2 + v^2) \left(\frac{\partial^2 f}{\partial u^2} + \frac{\partial^2 f}{\partial v^2} \right)$

- [b] Find the inverse of the matrix using Gauss-Jordan method :

$$A = \begin{bmatrix} 1 & -1 & 1 \\ 4 & 1 & 0 \\ 8 & 1 & 1 \end{bmatrix}$$

- [c] Express the following system of equations in matrix form and solve them by the elimination method due to Gauss.

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

$$6x_1 - 6x_2 + x_3 + 12x_4 = 36$$

$$4x_1 + 3x_2 + 3x_3 - 3x_4 = -1$$

$$2x_1 + 2x_2 - x_3 + x_4 = 10$$

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SECOND SEMESTER

B.E. (CE)

MID SEM EXAMINATION

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CE-113 PHYSICS-II

Time: 1 Hour 30 Minutes

Max. Marks : 20

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

1 Choose the correct answers in the parts (a) & (b) and write them in your answer script.

[a] If n denotes the number of particles per unit volume of a gas satisfying Maxwellian distribution of velocities, then the number of particles striking a unit area per unit time from all directions and with velocities from zero to infinity, is given by:

(i) $\frac{n \bar{c}}{4},$

(ii) $\frac{n \bar{c}}{6},$

(iii) $\frac{n \bar{c}}{3},$

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[b] A gas satisfies the following equation of state:

$$pV = A + B p^2 + \dots$$

where the higher order virial co-efficients are of negligible value. At the Boyle temperature, the virial co-efficient(s)

(i) A is zero,

(ii) B is zero,

(iii) A & B both are zero.

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[c] An inventor claims to have developed an engine that takes in 10 million calories of heat at a temperature of 300°C, rejects 4 million calories of heat at a temperature of 100°C and delivers 7 KWh of

mechanical work. Would you advise investing money to put this engine on the market? Give reasons for your answer. 3

- 2 A vessel of volume V contains gas molecules each of mass m that is kept at a constant temperature T . The gas slowly leaks out of a small hole of area A . The outside pressure is so low that no molecules leak back. If p_0 is the initial pressure in the vessel, find an expression for the pressure in the vessel after a time t . 5

- 3 Calculate the critical constants of a gas obeying the equation of state

$$p e^{a/RTV} (V - b) = RT,$$

where the symbols have their usual meaning. 5

- 4 A mass m of water at a temperature T_1 is isobarically and adiabatically mixed with an equal mass of water at a temperature T_2 . Show that the entropy change of the total mass is given by

$$2m C_p \ln \left[\frac{(T_1 + T_2 / 2)}{\sqrt{T_1 T_2}} \right]$$

where C_p is the specific heat of water per unit mass. 5

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CE-114 ENGINEERING STATICS

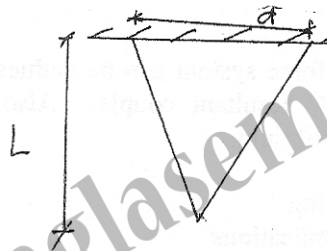
Time: 1 Hour 30 Minutes

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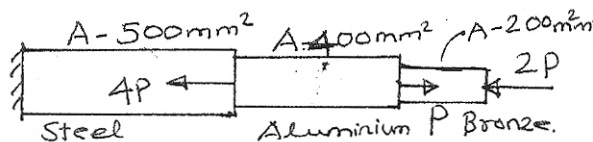
Note : Answer ALL questions.

Assume suitable missing data, if any.

- 1 Determine the elongation of the conical bar shown in Fig.1, due to its self weight. 5



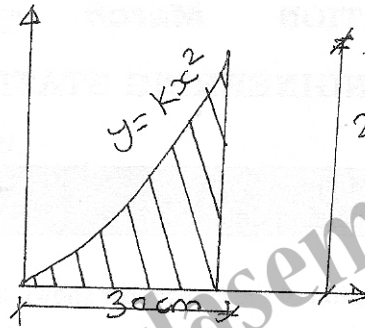
- 2 An aluminum rod is rigidly attached between a steel rod and a bronze rod as shown in Fig.(2). Axial loads are applied at the positions indicated. Find the maximum value of P that will not exceed a stress in steel of 140 Mpa in aluminum of 90 Mpa or bronze of 100 Mpa. 5



- 3 Explain the following (a) parallel axis theorem (b) radius of gyration. $3\frac{1}{2} + 1\frac{1}{2}$

- 4 Locate the centroid of the shaded area shown in Fig.3.

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- 5 Explain how any force system can be deduced to a single resultant force and a single resultant couple. Also obtain the necessary conditions for equilibrium. 5
- 6 Discuss the following
- | | | |
|-----|-----------------------------|----|
| [a] | Moment and its applications | 3½ |
| [b] | Couple | 1½ |