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SECOND SEMESTER

Roll No.

B.E. (CE)

MID SEM EXAMINATION

March 2007

**CE-111 ENGINEERING ECONOMICS &
ACCOUNTANCY**

Time: 1 Hour 30 Minutes

Max. Marks : 20

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

- 1 Fill up the blanks
[a] Demand for a product and its price are.....related.
[b] Income tax is.....tax.
[c] Labour getsfor its contribution in production.
[d]is Deputy Chairman of planning commission of India.
[e] Price elasticity of demand for coca cola will be.....than one.
[f] In.....,there is only one producer. 3

- 2 Differentiate between :
[a] Monopoly and Oligopoly
[b] Actual cost and Opportunity cost
[c] Commercial bank and Central Bank. 9

- 3 What is money? 2

- 4 What do you mean by tax? 2

- 5 Discuss factors of production? 2

- 6 How perfect competition is a hypothetical situation? 2

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Roll No.

SECOND SEMESTER

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2007

CE-112 MATHEMATICS-II

Time: 1 Hour 30 Minutes

Max. Marks : 20

Note : Answer **ALL** questions, selecting any **TWO** from each question.

Assume suitable missing data, if any.

1[a] If $\frac{x^2}{a^2+u} + \frac{y^2}{b^2+u} + \frac{z^2}{c^2+u} = 1$, prove that

$$\left(\frac{\partial u}{\partial x}\right)^2 + \left(\frac{\partial u}{\partial y}\right)^2 + \left(\frac{\partial u}{\partial z}\right)^2 = 2\left(x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} + z\frac{\partial u}{\partial z}\right)$$

[b] Prove that $\frac{\partial^2 z}{\partial u^2} + \frac{\partial^2 z}{\partial v^2} = \frac{\partial^2 z}{\partial x^2} + \frac{\partial^2 z}{\partial y^2}$, where
 $x = u \cos \alpha - v \sin \alpha$ and $y = u \sin \alpha + v \cos \alpha$

[c] If $f(x, y) = \tan^{-1}(xy)$, compute $f(0.9, -1.2)$ approximately
Taylor's series. 6

2[a] The height of a tower is determined by observing the elevation θ and ϕ of its summit from two points in a direct line with the foot of the tower and at a distance 'a' apart. Show that the error in the calculated height due to small errors $d\theta$ and $d\phi$ is approximately

$$a(\sin^2 \theta d\phi - \sin^2 \phi d\theta) \operatorname{cosec}^2(\theta - \phi).$$

[b] Using the Lagrange's method to find the shortest distance from the point (1, 2, 2) to the sphere $x^2 + y^2 + z^2 = 36$.

- [c] Evaluate the integral $\iiint_v z dx dy dz$, by changing to the spherical coordinates, where v is the hemisphere $x^2 + y^2 + z^2 = a^2, z \geq 0$.

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- 3[a] Find the smaller of the area bounded by the ellipse $4x^2 + 9y^2 = 36$ and the straight line $2x + 3y = 6$.

- [b] Find the volume common to the sphere $x^2 + y^2 + z^2 = a^2$ and the cylinder $x^2 + y^2 = ax$.

- [c] Change the order of integration in

$$\int_0^a \int_0^x \frac{f'(y) dx dy}{\sqrt{(a-x)(x-y)}}$$

and hence evaluate it.

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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[a] Write the Maxwell-Boltzmann energy distribution for the molecules of an ideal gas. Hence get the Maxwell-Boltzmann speed distribution. Also get the expressions for (i) Average molecular energy (ii) most probable energy (iii) Average speed (iv) most probable speed. **6**
- [b] Find the rms (root mean square) speed of oxygen molecules at 0°C. ($k = 1.38 \times 10^{-23} \text{ J/K}$) **2**
- [c] What is the mean free path (λ) for oxygen molecules at temperature $T = 300 \text{ K}$ and pressure $p = 1.0 \text{ atm}$? Assume that the molecular diameter $d = 290 \text{ pm}$ and the gas is ideal. **2**
- 2[a] Define binding energy of a nucleus. Find the energies needed to remove a neutron from ${}^4_2\text{He}$, then to remove a proton and finally to separate the remaining neutron and proton. Compare the total energy with the binding energy of ${}^4_2\text{He}$. **3**
- [b] A reactor is developing nuclear energy at a rate of 32,000 kilowatts. How many atoms of U^{235} undergo fission per second? How many kg of U^{235} would be used up in 1000 hours of operation? Assume an average energy of 200 MeV released per fission. **2**
- [c] For spherical symmetric charge distribution

$$\rho = \rho_0 \left(1 - \frac{r^2}{a^2} \right) \quad \text{for } r < a$$

$$\rho = 0 \quad \text{for } r > a$$

Calculate the electric field at the points for which (i) $r < a$ (ii) $r > a$.

Also show that electric field is maximum at $r = \frac{\sqrt{5}}{3}a$. **5**

Atomic masses

$$n = 1.008665 \text{ u}$$

$${}^1\text{H} = 1.007825 \text{ u}$$

$${}^2\text{H} = 2.014102 \text{ u}$$

$${}^3\text{He} = 3.016029 \text{ u}$$

$${}^4\text{He} = 4.002603 \text{ u}$$

$$\text{Also } \int_0^{\infty} x^{3/2} e^{-ax} dx = \frac{3}{4a^2} \sqrt{\pi/a}$$

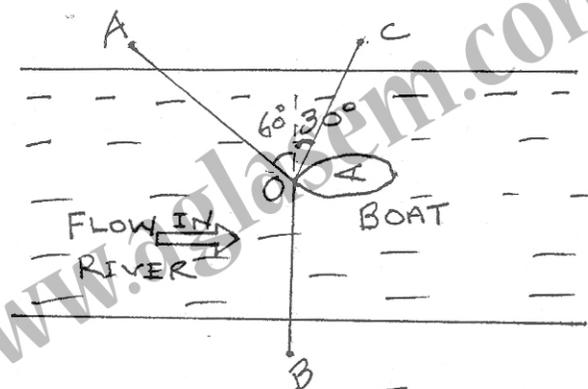
$$\int_0^{\infty} x^3 e^{-ax^2} dx = \frac{1}{2a^2}$$

Time: 1 Hour 30 Minutes

Max. Marks : 20

Note : Answer any **FOUR** questions.
 Draw diagram wherever necessary.
 Assume suitable missing data, if any.

- 1 With clear examples show the support reactions offered by the supports and thereby clearly mark the difference pictorially, statically determinate and indeterminate beams. 5
- 2 A small boat is held static in a river by means of three inextensible taut ropes OA, OB, and OC. The water in the river exerts a force on the boat in the direction of the flow. If the tensions in OA and OB are 1 KN and 0.6 N respectively as shown in Fig.1, determine the force exerted by the flow on the boat and the tension in rope OC. 5



- 3 What is second moment of area? How it differ from translatory (or) linear, analog of area. 5
- 4 State and prove Varignons principle of moments. 5
- 5 Find the centre of gravity of a channel section 100 x 50 x 15 mm. 5

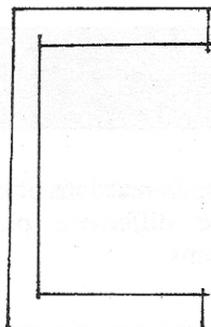


Fig 2