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Roll No.

SECOND SEMESTER

B.E. (ME/PE)

MID SEM EXAMINATION

March.

2006

ME/PE-111 ENGINEERING ECONOMICS & ACCOUNTANCY

Time: 1 Hour 30 Minutes

Max. Marks : 20

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

- 1 Fill in the blanks :
 - [a] Fixed cost per unit increases when production volume.....
 - [b] Financial and cost accounting are written up with.....basic documents.
 - [c] If value of export of any country is.....then value of import, than the country has adverse balance of payment.
 - [d] Price elasticity of demand for cocacola is.....than one.
 - [e] Tea and coffee aregoods.
 - [f] Sand near construction site is.....good. 3
- 2 Differentiate between following :
 - [a] Commercial bank and Central bank
 - [b] Perfect competition and Monopolistic competition.
 - [c] Fixed Cost and Variable cost 9
- 3 Why concept of Sunk Cost is not relevant for engineers? 2
- 4 What is the significance of Management Accounting? 2
- 5 What do you mean by Production Function? 2
- 6 What do you understand by the concept of Inflation? 2

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SECOND SEMESTER

B.E. (ME/PE)

MID SEM EXAMINATION

March 2006

ME/PE-112 MATHEMATICS-II

Time: 1 Hour 30 Minutes

Max. Marks : 20

Note : Question No. 1 is compulsory.
Answer any **TWO** from the remaining questions.
Assume suitable missing data, if any.

1[a] Find the value of n so that the equation $V = r^n (3 \cos^2 \theta - 1)$ satisfies the relation

$$\frac{\partial}{\partial r} \left(r^2 \frac{\partial V}{\partial r} \right) + \frac{1}{\sin \theta} \frac{\partial}{\partial \theta} \left(\sin \theta \frac{\partial V}{\partial \theta} \right) = 0 \quad 3$$

[b] If $ax^2 + by^2 + cz^2 = 1$ and $lx + my + mz = 0$, find $\frac{dy}{dx}$ and $\frac{dz}{dx}$ by using partial derivatives. 3

2[a] Find the points on the surface $z^2 = xy + 1$ nearest to origin. 3½

[b] Evaluate $\iint \frac{r dr d\theta}{\sqrt{a^2 + r^2}}$ over one loop of the lemniscate $r^2 = a^2 \cos 2\theta$ 3½

3[a] Change the order of integration and evaluate it

$$\int_0^{a/\sqrt{2}} \int_y^{\sqrt{a^2 - y^2}} \log(x^2 + y^2) dx dy, (a > 0) \quad 3½$$

[b] Evaluate $\iiint_V z(x^2 + y^2 + z^2) dx dy dz$ through the volume of cylinder $x^2 + y^2 = a^2$ intercepted by the planes $z = 0$ and $z = h$. 3½

4[a] Find the dimensions of the rectangular box, open at top, of maximum capacity where surface is 432 sq.cm. 3½

[b] Find the volume of the solid surrounded by the surface

$$\left(\frac{x}{a}\right)^{2/3} + \left(\frac{y}{6}\right)^{2/3} + \left(\frac{z}{c}\right)^{2/3} = 1 \quad \text{3½}$$

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SECOND SEMESTER

B.E. (ME/PE)

MID SEM EXAMINATION

March 2006

ME/PE-113 PHYSICS-II

Time: 1 Hour 30 Minutes

Max. Marks : 20

Note : Answer ALL questions.

Assume suitable missing data, if any.

- 1[a] What are hadrons? Write the Quark structures of nucleons. 1
- [b] In the meson theory of nuclear forces, neutrons and protons are never found with masses other than their usual masses. Why? 1
- [c] Why are accelerators required in nuclear physics. 1
- [d] How does β -spectrum differ from α -spectrum. Give the reason for the difference. 1
- 2[a] Explain the principle of Breeder Reactor. Why are these reactors so important in India's perspective? 1½
- [b] For the d-t fusion reaction ${}^3_1\text{H} + (d, n) {}^4_2\text{He}$, Calculate (i) the Q-value of the reaction (ii) the rate at which deuterium and tritium are consumed to produce 1MW. (Assume all energy from the fusion reaction is available). 2
- [c] What is a laser? Explain the terms: (i) Absorption (ii) spontaneous emission (iii) Stimulated emission. Give the expressions for Einstein's transition probabilities for above three transitions. $\frac{1}{2} + 1\frac{1}{2} + \frac{1}{2}$
- 3[a] Write the expression for Maxwell-Boltzmann speed distribution for the molecules of an ideal gas. Hence obtain

the expression for Maxwell-Boltzmann energy distribution and also plot it. 3

[b] Obtain the expressions for most probable energy and most probable speed of an ideal gas molecule. 3

[c] What is Joule-Thomson effect? Obtain an expression for temperature of inversion. Calculate the inversion temp of nitrogen for which van-der-waals constants are: $a = 1.390 \text{ atm. lit}^2 \text{ mol}^{-2}$ and $b = 0.0391 \text{ lit mol}^{-1}$ ($R = 0.0821 \text{ atm lit mol}^{-1} \text{ K}^{-1}$). 1+1+1

[d] Calculate the temperature in Kelvin, at which the average speed of H_2 molecules will be same as that of N_2 molecules at 35°C . 1

Atomic masses:-

n : 1.008665 u

^1H : 1.007825 u

^2H : 2.014102 u

^3H : 3.016050 u

^4He : 4.002603 u

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SECOND SEMESTER

Roll No.

B.E. (PE)

MID SEM EXAMINATION

March

2006

**PE-114 ENGINEERING MATERIALS AND
METALLURGY**

Time: 1 Hour 30 Minutes

Max. Marks : 20

Note : Answer any **TWO** questions from Part A & **ALL** from Part B.
Use separate answer sheets for Part A & Part B.
Assume suitable missing data, if any.

PART-A

- 1[a] What are the requisites of good refractory? 2
[b] What is the effect of porosity on other properties of refractory? 1
[c] Write preparation and uses of silicon carbide abrasive. 2
- 2[a] Write a note of soft abrasives. 2
[b] What is refractoriness? How softening temperature of refractory material is determined. 3
- 3[a] what is the function of drying during manufacture of refractories? Name any two driers which are usually employed for drying. 2
[b] Give a Moho's scale of hardness. 2
[c] Write the uses of diamond as an abrasive. 1

PART-B

- 1 Discuss the difference between atomic structure and crystal structural. Why does a deformed metal want to recrystallize. Define the term polymorphism with particular reference to titanium. How could one of the manifestations of polymorphism in iron be determined in the laboratory? Distinguish between toughness and hardness. 5
- 2 Draw typical fatigue behaviour curves for copper alloys at various temperatures and define endurance limit. Show the influence of stress and temperature on creep behaviour and define activation energy for creep. Discuss slip system in FCC and HCP metals and write about resolved shear stress. Compare ductile and brittle fracture and discuss DBTT for austenitic and ferritic steels. 5

