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Roll No.

SECOND SEMESTER

B.E. (BT)

MID SEM EXAMINATION

March

2006

BT-111 INTRODUCTION TO BIOTECHNOLOGY

Time: 1 Hour 30 Minutes

Max. Marks : 20

Note : Answer *All* Questions.

Assume suitable missing data, if any.

1. What do you understand by the term "biotechnology"?
Discuss the different areas that have been identified to receive
emphasis in this new science? 1+4=5
2. Write a note on the cell is a unit of living matter? 3
3. Give an account on bacterial cell with diagram? 4
4. What is difference between prokaryotic and Eukaryotic cell? 4
5. Give difference between plant and animal cell? 2
6. What are different organelles of the cell give short
description? 2

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SECOND SEMESTER

B.E. (BT)

MID SEM EXAMINATION

March 2006

BT-112 PHYSICS-II

Time: 1 Hour 30 Minutes

Max. Marks : 20

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

- 1[a] Differentiate between Type-I and Type-II superconductors. 1½
- [b] Give the composition of one conventional low T_c superconductor and one high T_c superconductor and mention their respective T_c . 1½
- [c] A superconducting sample has a critical temperature of 4.1K in zero magnetic field and a critical field of 0.0505 T at 0K. Find the critical magnetic field at 2K. 1½
- [d] How can a magnetized piece of iron be demagnetized? Explain. 1
- 2[a] What do you mean by dielectric strength? Explain different types of dielectric breakdown. 2
- [b] What are piezoelectric and ferroelectric crystals? Mention few applications of both types of materials. 2
- [c] How the susceptibility of a paramagnetic material vary with temp.? Explain. 1
- 3[a] The wave function of an object of energy E and momentum p is given by
- $$\psi(x,t) = Ae^{i(px-Et)/\hbar}$$
- (i) does ψ represent a bound state? 2½
- (ii) Is wave function normalisable?
- [b] Discuss why quantization is not noticed for macroscopic objects? ½
- [c] The radius of an atomic nucleus is typically 5×10^{-15} m. What is the lower limit of the energy that an electron must have to be in atomic nucleus? 2
- 4[a] Write down the major assumptions and drawbacks of free electron theory of metal. ½
- [b] Calculate the probability that the speed of oxygen molecules lies between 99.5 to 100.5 m/sec at 200 K temperature. 2½
- [c] Calculate the fermi temperature for electron in a white dwarf star using density $\rho = 10^{17}$ gm cm⁻³. 2

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SECOND SEMESTER

B.E. (BT)

MID SEM EXAMINATION

March 2006

BT-113 CHEMISTRY-II

Time: 1 Hour 30 Minutes

Max. Marks : 20

Note : Answer **ALL** questions.

Assume suitable missing data, if any.

1[a] Write informative note on (*any two*):

(i) Specific rotation

(ii) Stereo specific reactions

(iii) Acyloin Synthesis

2x3

[b] How will you obtain the following:

(i) Cyclopentane from diester of adipic acid.

(ii) Cyclohexane from 1,6 dibromo hexane.

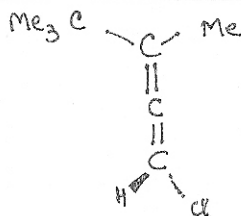
2x2

2[a] Write sawhorse and Newman formula for meso-2,3 dibromobutane. 2

[b] What will be the preferred conformation for t-Butylcyclohexane and why? 1

[c] Draw Fischer projection formula of (R) 2-butanol. 1

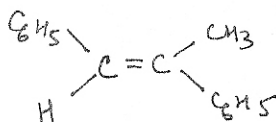
[d] Assign E-Z/R-S configuration to the following compounds. 4x1½



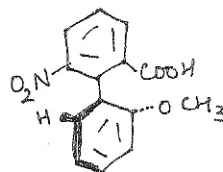
(i)



(ii)



(iii)



(iv)

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MID SEM EXAMINATION

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B.E. (BT)

2006

BT-114 MECHNICAL SCIENCES

Time: 1 Hour 30 Minutes

Max. Marks : 20

Note : Answer ALL questions.

Assume suitable missing data, if any.

1[a] What do you mean by :

- i. Bulk Modulus
- ii. Point of contraflexure
- iii. Meta Centre
- iv. Poisson's Ratio

$\frac{1}{2} \times 4 = 2$

[b] Differentiate between :

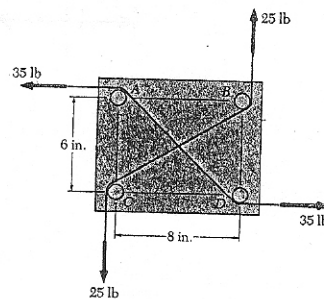
- i. Steady and Uniform flow
- ii. Centre of gravity and Centre of pressure
- iii. Newtonian and Real Fluids.

1x3

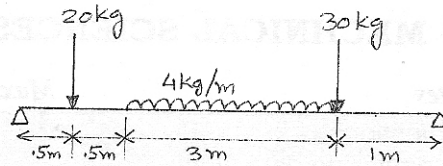
2[a] What is 'Varignon's theorem? **1**

[b] Four pegs of the same diameter are attached to a board as shown in the figure. Two strings are passed around the pegs and pulled with the forces indicated. Determine the diameter of the pegs. Knowing that the resultant couple applied to the board is 485 lb in counter clockwise.

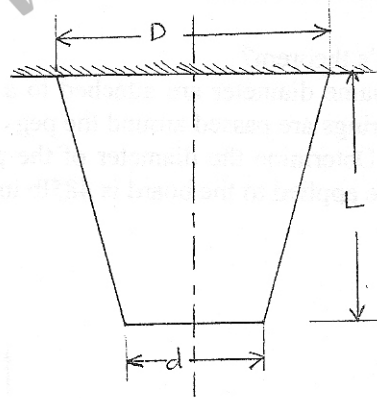
4



- 3 Draw shear force and bending moment diagram for the following beam under loading. 5



- 4[a] Establish relationship between Modulus of elasticity and Bulk modulus. 2
- [b] What will be axial extension in the frustum of a cone hanging vertical as shown, because of its self weight. The density of material of the frustum of the cone is λ . 3



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SECOND SEMESTER

B.E. (BT)

MID SEM EXAMINATION

March

2006

BT-115 ENGINEERING MATHEMATICS

Time: 1 Hour 30 Minutes

Max. Marks : 20

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

1[a] Solve

$$\frac{d^2y}{dx^2} - 6\frac{dy}{dx} + 9y = 6e^{3x} + 7e^{-2x} - \log 2.$$

[b] Solve the system of equations :

$$\frac{dx}{dt} + y = \sin t,$$

$$\frac{dy}{dt} + x = \cos t,$$

given that $x=2, y=0$ when $t=0$.

[c] Find series solution of

$$x(x-1)\frac{d^2y}{dx^2} + (3x-1)\frac{dy}{dx} + y = 0,$$

using Frobenius method.

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2[a] Find the fourier series representing

$$f(x) = x, \quad 0 < x < 2\pi$$

and sketch its graph from $x = -4\pi$ to $x = 4\pi$

[b] Find the Fourier half-range cosine series of the function

$$f(x) = 2x, \quad 0 < x < 1$$
$$= 2(2-x), \quad 1 < x < 2$$

- [c] Obtain the Fourier series upto first harmonic for the function $f(x)$, given that

x	0	1	2	3	4	5
f(x)	9	18	24	28	26	20

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3[a] (i) Evaluate $\int_0^{\infty} t e^{-2t} \sin t \, dt$

- (ii) Define unit step function and find its Laplace transform.

(iii) Find Laplace transform of $\int_0^t \frac{\sin t}{t} \, dt$

- [b] Using Convolution theorem, evaluate

$$L^{-1} \left\{ \frac{s^2}{(s^2 + a^2)(s^2 + b^2)} \right\}$$

- [c] Solve the initial value problem

$$2y'' + 5y' + 2y = e^{-2t}, \quad y(0) = 1, \quad y'(0) = 1,$$

using Laplace transforms.

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