

Total No. of Pages 1

SECOND SEMESTER

Roll No.

B.E. (BT)

MID SEM EXAMINATION

March 2007

BT-111 INTRODUCTION TO BIOTECHNOLOGY

Time: 1 Hour 30 Minutes

Max. Marks : 20

Note : Answer **ALL** questions.

Assume suitable missing data, if any.

- 1 Write the complementary sequence of the following sequence of DNA.
5'-AACGTACGCATACGA-3' 1
- 2 If a fragment of DNA containing the sequence 5'-AACGATTGCA-3' serve as a template for transcription, what will be the sequence of RNA produced? 1
- 3 Discuss the Watson-Crick model of DNA. 2
- 4 Draw a neat and clean diagram of bacterial cell and also discuss in brief its procaryotic nature. 3
- 5 What do you understand by cell theory? Who modified it? 3
- 6 Name the power house of the cell and justify it. 3
- 7 Write a short note on plastids. 3
- 8 Distinguish between nucleosides and nucleotides. 1
- 9 Write down all the bases present in nucleic acids. 1
- 10 Draw a neat and clean diagram of eukaryotic cell. 2

SECOND SEMESTER**B.E. (BT)****MID SEM EXAMINATION****March 2007****BT-112 PHYSICS-II****Time: 1 Hour 30 Minutes****Max. Marks : 20****Note : Answer ALL questions.****Assume suitable missing data, if any.**

- 1[a] Define critical magnetic field and hence differentiate between type-I and type-II superconductors. **1.5**
- [b] Differentiate between DC and AC Josephson effects. **1**
- [c] Explain any three important applications of superconductors. **1.5**
- [d] Find the critical magnetic field of a superconduct at 2K if $T_c = 3.722\text{K}$ and critical field at 0K = 0.0305 T. **1**
- 2[a] Differentiate between ferromagnetic, antiferromagnetic and ferrimagnetic materials. Give at least one example of each. **1.5**
- [b] What are hard and soft magnetic materials? Explain. For what kind of applications they are suitable? **2**
- [c] Giving suitable energy band diagrams explain how doping improves the conductivity of a semiconductor. **1.5**
- 3[a] A particle constrained to move along x-axis in the region $0 \leq x \leq a$ has a wave function $\Psi(x) = N \sin\left(\frac{n\pi x}{a}\right)$ where n is an integer. Normalize the wave function. **1.5**
- [b] State Heisenberg uncertainty principle and use this principle to rule out the existence of electron inside atomic nucleus. Size of a typical atomic nucleus is about 5×10^{-15} m in radius and energy of a β -particle emitted from a nucleus is at most of the order of 1 MeV. **1.5**
- [c] Establish Schrodinger time-independent equation for a particle. **2**
- 4[a] Show that the average energy of an electron gas is $\frac{3}{5} \epsilon_F$ where ϵ_F is Fermi energy. **2**
- [b] The fermi energy for lithium is 4.72 eV at absolute zero. Calculate the number of conduction electrons per unit volume in lithium. ($h = 6.63 \times 10^{-34}$ Js, $m = 9.11 \times 10^{-31}$ kg). **1.5**
- [c] Write five important physical properties of metals. What do you mean by magnetoresistance? **1.5**

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SECOND SEMESTER

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B.E. (BT)

MID SEM EXAMINATION

March

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BT-113 CHEMISTRY-II

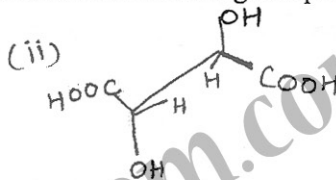
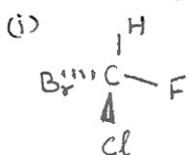
Time: 1 Hour 30 Minutes

Max. Marks : 20

Note : Answer ALL questions.

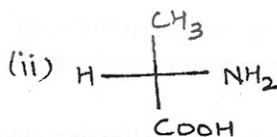
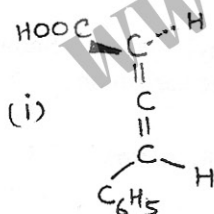
Assume suitable missing data, if any.

1[a] Draw Fischer projection formula of the following compounds. 3

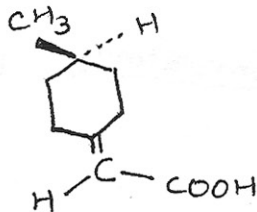


(iii) S-(2) Bromobutane

[b] Assign absolute configuration to the following compounds 3

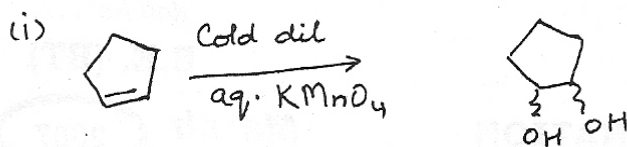


(iii)

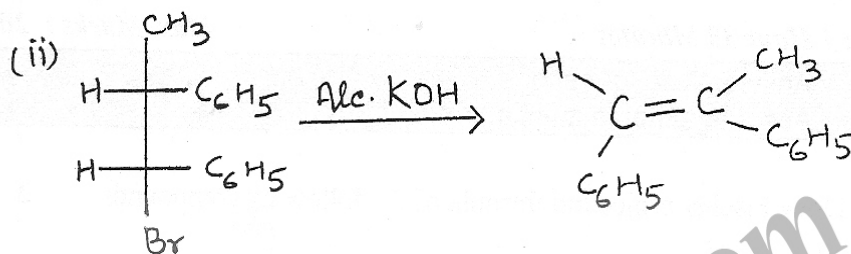


[c] Draw all the geometric isomers possible for 2, 5-heptadiene. 2

2[a] Discuss stereochemical aspect of the following reactions-



3



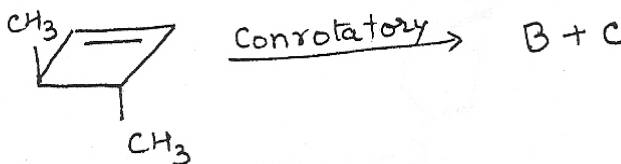
[b] How will you account for the following-

(i) Iodide ion is a strong nucleophile as well as a good leaving group. 1

(ii) Bridgehead halides are unreactive toward nucleophilic substitution reactions (Give suitable example) 2

3[a] Sketch the π molecular orbitals of 2, 4 pentadienyl system. Show electron occupancy in its carbocation, free radical and carbanion. 3

[b] Identify B and C in the following electrocyclic transformation. 3



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SECOND SEMESTER

B.E. (BT)

MID SEM EXAMINATION

March

2007

BT-114 MECHANICAL SCIENCES

Time: 1 Hour 30 Minutes

Max. Marks : 20

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

Part-A

- 1 Define the following :
 - i. Thermodynamic equilibrium
 - ii. First law of thermodynamics
 - iii. Clausius statement of second law of thermodynamics
 - iv. Throttling process.

2
- 2 Prove that $PV^\gamma = C$ holds good for a reversible adiabatic process.

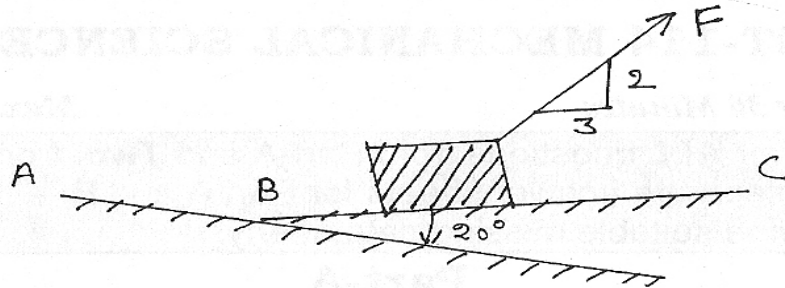
2
- 3 Write steady state steady flow energy equation. 10 kg/s of chilled water for air conditioning enters a tall building with a velocity of 50 m/s at an elevation of 30 m from the ground. The water leaves the system with a velocity of 12 m/s at an elevation of 58 m. The enthalpies of water entering in and leaving out are 21 KJ/kg and 43 KJ/kg respectively. The rate of work done by a pump in line is 35 kW. Calculate the rate at which heat is removed from the building.

2.5
- 4 0.5 kg of air is compressed according to the law $pV^{1.3} = C$ from 80 kPa, 60°C to 0.4 MPa and is then expanded at constant pressure to the original volume. Computer the heat transfer and work transfer for the whole path. Sketch these processes on the p-v plane. Take for air $R = 0.287$ KJ/kg-K and $c_v = 0.718$ KJ/kg-K

3.5

Part-B

- 1[a] Resolve the force F , as shown in Fig.(1), into a component perpendicular to AB and a component parallel to BC . 2



FIG(1)

- [b] Determine the moment of the 100N force F , shown in Fig.(2), about point A and B, respectively. 3

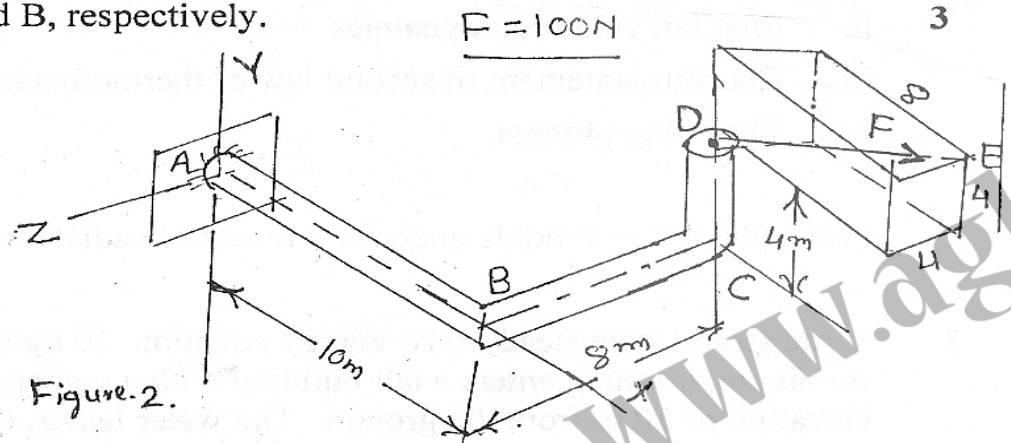
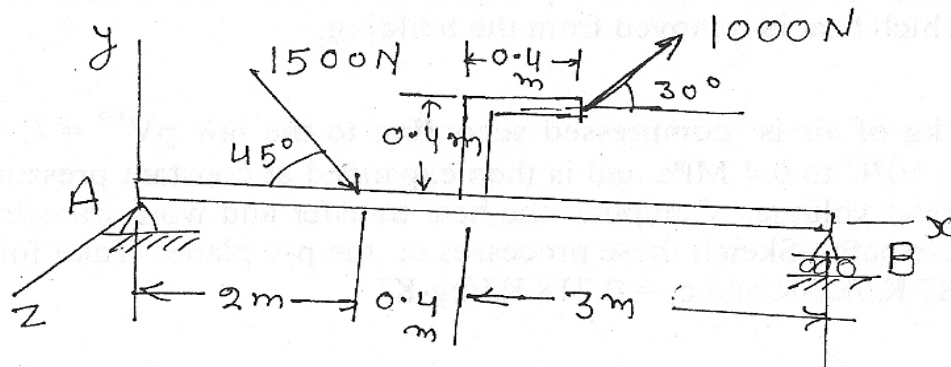


Figure-2.

- 2[a] Find the moment of the two forces shown in Fig.(3) first about A and then about B. 2



FIG(3)

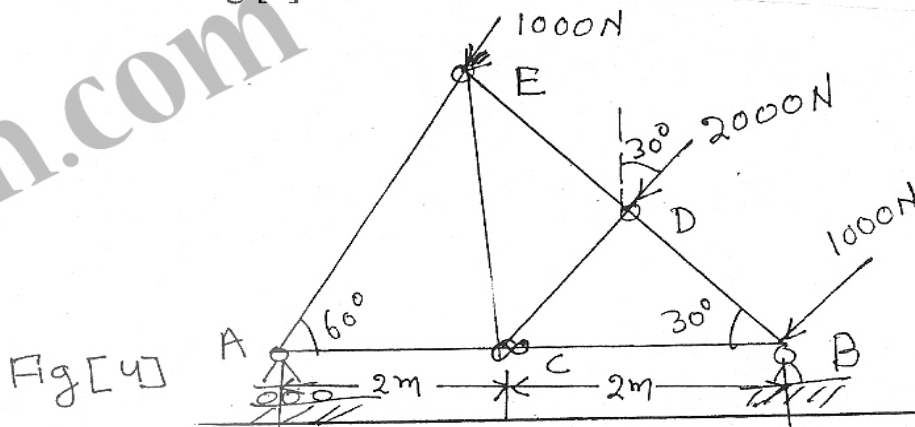
[b] Explain the following with neat diagrams.

- i. Two force body
- ii. Three force body
- iii. Limiting friction
- iv. Principle of transmissibility of force.
- v. Free body diagram
- vi. internal force and external force.

3

- 3 Determine the forces in the members of a truss loaded and supported as shown in Fig.[4]

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SECOND SEMESTER**B.E. (BT)****MID SEM EXAMINATION****March 2007****BT-115 ENGINEERING MATHEMATICS****Time: 1 Hour 30 Minutes****Max. Marks : 20****Note :** Answer **ALL** questions, by selecting any **TWO** parts from each question.

Assume suitable missing data, if any.

1[a] Solve $\frac{d^2 y}{dx^2} + 2y = x^3 + x^2 + e^{-2x} + \cos 3x$

[b] Solve $\frac{dx}{dt} = 3x + 8y$

$$\frac{dy}{dt} = -x - 3y$$

with $x(0) = 6, y(0) = -2$.

[c] Find the general solution of

$$8x^2 \frac{d^2 y}{dx^2} + 10x \frac{dy}{dx} - (1+x)y = 0$$

6

2[a] Find the Fourier series of

$$f(x) = \begin{cases} 0, & \text{when } -\pi \leq x \leq 0 \\ x^2, & \text{when } 0 \leq x \leq \pi \end{cases}$$

in the interval $(-\pi, \pi)$ [b] Represent $f(x) = \sin \frac{\pi x}{l}$ in $0 < x < l$ by a Fourier cosine series.Graph the corresponding periodic continuation of $f(x)$.

[c] Find the direct current part and amplitude of the first harmonic from the following table consisting of the variations of periodic current

T(sec):	0	$T/6$	$T/3$	$T/2$	$2T/3$	$5T/6$	T
A(amp.):	1.98	1.30	1.05	1.30	-0.88	-0.25	1.98

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3[a] State and prove convolution theorem.

[b] Using Laplace transform solve the differential equation

$$\frac{d^2 y}{dx^2} + 2 \frac{dy}{dx} + 5y = e^{-t} \sin t$$

given that $y(0) = 0, y'(0) = 1$.

[c] Find Laplace transform of the following :

(i) $(3t^5 - 2t^4 + 4e^{-5t} - 3 \sin 6t + 4 \cos 4t)e^{2t}$

(ii) $(t^2 - 3t + 2) \sin 3t$

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