POSSESION OF MOBILES IN EXAM IS UFM PRACTICE.

Name: Smriti

Enrollment No.: 2210217 8

Jaypee Institute of Information Technology, Noida

T2 Examination, Even Sem 2025

B.Tech. VI Semester

Course Title: Applied Statistical Mechanics
Course Code: 16B1NPH634

Maximum Time: 1 Hr
Maximum Marks: 20

CO1	Define the fundamental parameters of Thermodynamics and Statistical Mechanics.
CO2	Explain the Thermodynamic potentials, Maxwell's equations and Heat equations.
CO3	Apply the concepts of thermodynamics and statistical ensembles to understand the phase space and distribution functions.
CO4	Determine the distribution functions in case of various types of physical and chemical ensembles.
CO5	Evaluate the ideas of Entropy with respect to Probability and information Theory; and conclude Liouville's equation.

Answer all the questions sequentially. Notations used are standard.

Q1. a) What is grand canonical ensemble? Explain.
b) Write down two differences between the classical and quantum statistics.
c) What are the differences between bosons and fermions? Give one example of each.
d) What is Bose Einstein condensation? **[CO3 (Applying), 1 + 1 + (1+1) + 1 = 5 Marks]**

Q2. a) Compute the thermodynamics probability of Fermi Dirac statistics with proper explanation.
b) According to Maxwell's energy distribution law, the number of molecules having energy between E and E + dE is given by: $N(E)dE = \frac{2\pi N}{(\pi kT)^{3/2}} E^{1/2} e^{-E/kT} dE$, where N, E and T are the number of molecules, energy and temperature of the system and k is the Boltzmann constant. Following this, derive Maxwell's momentum distribution law in one dimension.
[CO3 (Applying), 2 + 3 = 5 Marks]

Q3. a) Write down the Fermi Dirac distribution function. At which limit it is reduced to Maxwell Boltzmann distribution?
b) 5 particles are distributed in 3 energy states (having same energy) according to Bose Einstein statistics. Calculate the thermodynamic probability.
c) What is the impact of Pauli's exclusion principle in distributing the particles in the energy states? **[CO4 (Analyzing), 2 + 2 + 1 = 5 Marks]**

Q4. What is Gibb's paradox? Explain Mathematically. How is it resolved?
[CO4 (Analyzing), 5 Marks]

Name:

Jaypee Institute of Information Technology, Noida
Test-2 Examination, Even Semester 2025
B. Tech. VI Semester

Course Title: Control Systems **Maximum Time: 1 Hr**
Course Code: 15B11EC613 **Maximum Marks : 20**

CO1	Recall the concept of Laplace transform. Define open-loop and closed-loop systems.
CO2	Relate physical systems to transfer function and state-variable models.
CO3	Solve for the time domain response of first-order and second-order systems.
CO4	Analyze the stability of control systems in time and frequency domain.

Note: Attempt all the questions. Assume suitable data, if necessary.

Q1. Derive time response of a first order control system with unity feedback subjected to unit ramp input. Also plot the response.

[CO3 (Applying), 3 Marks]

Q2. The closed loop transfer function of second order unity feedback control system is given as

$$\frac{C(s)}{R(s)} = \frac{2}{s^2 + 2s + 1}$$

Determine the type of damping in the system. **[CO3 (Applying), 2 Marks]**

Q3. A unity feedback system is characterized by an open loop transfer function

$$G(s) = \frac{k}{s(s+10)}$$

Determine the gain '*k*' so that the system will give a damping ratio of 0.5. For this value of '*k*', determine the setting time, peak overshoot for a unit step input.

[CO3 (Applying), 4 Marks]

Q4. The open loop transfer function of a system with unity feedback is

$$G(s) = \frac{10}{s(0.1s+1)}.$$

Determine the static error coefficients (k_p, k_v and k_a). Obtain the steady state error (e_{ss}) of the system when subject to an input by the polynomial $r(t) = a_0 + a_1 t + \frac{a_2}{2} t^2$.

[CO3 (Applying), 4 Marks]

Q5. Using Routh's Criterion, determine the stability of a system having characteristic equation as

$$s^5 + s^4 + 3s^3 + 3s^2 + 2s + 5 = 0$$

[CO4 (Analyzing), 3 Marks]

Q6. Determine the range of values of k ($k > 0$) such that the following characteristic equation has roots more negative than $s = -1$.

$$s^3 + 3(k+1)s^2 + (7k+5)s + (4k+7) = 0$$

[CO4 (Analyzing), 4 Marks]

THIS EXAM IS UFM PRACTICE

Name.....Sumit..... Enrollment No....22105278

Jaypee Institute of Information Technology, Noida
Test-2 Examination, Even Semester 2025
B. Tech. VI Semester

Course Title: International Trade & Finance **Maximum Time: 1 Hr**
Course Code: 19B12HS613 **Maximum Marks: 20**

After pursuing this course, the students will be able to:

CO1	Understand the foundations of international trade and finance in the era of globalization.
CO2	Apply the major models and theories of international trade.
CO3	Analyze the impact of trade barriers and dynamics on macroeconomic equilibrium.
CO4	Evaluate the role of regional blocs and international organizations in economic integration.

Note: Attempt all the questions.

Q1. A country is considering two different trade restrictions to protect its domestic industry: A Voluntary Export Restraints and an Import Quota. Both policies limit the quantity of imported goods, but they have different economic effects. Analyze how a Voluntary Export Restraints and an Import Quota would impact the importing country in terms of:

a. Domestic consumers and producers - how do prices and quantities change?

b. Government revenue and foreign exporters – who benefits and who loses under each policy?

Explain your answer with suitable examples and illustrations.

[CO3 (Analyzing), 5 Marks]

Q2. Examine the Marshall-Lerner Condition in the context of currency devaluation. How does this condition determine the effectiveness of devaluation in improving a country's trade balance?

[CO3 (Analyzing), 4 Marks]

Q3. A large country imposes a tariff on imported goods. Analyze how this affects consumer surplus, producer surplus, and overall welfare in a partial equilibrium framework. Discuss the economic implications of the tariff using graphical representation.

[CO3 (Analyzing), 5 Marks]

Q4. Suppose there are only two counties in the world (Home and Rest of the World) which produce and consume wheat. The price of wheat in Rest of the world is equal to 2. Home is a small country with the following demand and supply functions for wheat:

D_H=50-10P

S_H=30+10P

a. Compute and graph the equilibrium in absence of trade. What would be the consumer and producer surplus?

b. Now allow Home and Rest of the world to trade, assuming zero transportation cost. Find and graph the equilibrium under free trade. What would be consumer and producer surplus changes?

c. Suppose Home country imposes a tariff of 20% on wheat exports. Determine the effects of the tariff on: i) the price of wheat in each country; ii) the quantity of wheat supplied and demanded in Home.

[CO3 (Analyzing), 6 Marks]

Jaypee Institute of Information Technology, Noida

Test-2 Examination, 2025

B.Tech. VI Semester

Course Title: Telecommunication Networks **Maximum Time: 1 Hr**

Course Code: 15B11EC611 **Maximum Marks: 20**

CO1	**To understand the basic concepts of Telecommunication network model, Traffic engineering and switching technology. Also, to understand various mechanisms involved in OSI model, TCP/IP and LAN access protocols, ATM and ISDN.**	**Understanding Level (C2)**
CO2	**To apply the concepts of traffic engineering, switching technologies and various network protocols for serving network related problems.**	**Applying Level (C3)**
CO3	**To analyze the link utilization and data packet generated after incorporation of data link error control and flow control mechanisms.**	**Analyzing Level (C4)**
CO4	**To apply the concept of subnetting for creating and assigning address blocks in a network. Applying various routing algorithms to create routing table for communication between two nodes.**	**Evaluating Level (C5)**

NOTE – Attempt all the questions.

Q.1. (a) Derive the utilization factor for Stop-and-Wait ARQ. Demonstrate it with diagram. **[3]**

[CO4 - Analyzing Level]

(b) A channel has a data rate of 3 Kbps and propagation delay of 10 msec. For what range of frame sizes does Stop-and-Wait give an efficiency of at least 70%. **[3]** [CO4 - Analyzing Level]

Q.2. Explain the methods of flow control with appropriate diagrams. **[3]** [CO4 - Analyzing Level]

Q.3. The following character encoding is used in a data link protocol:

A : 01100111

B : 11100010

FLAG : 01111110

ESC : 11100001

Show the bit sequence transmitted (in binary after bit stuffing for the four characters frame:A B ESC FLAG. **[3]**

[CO4 - Analyzing Level]

Q.4. Given the data word *1010111011* and the divisor *1001*:

(a) Show the generation of the code word at the sender's side.

(b) Show how to determine an error at the receiver's side (if error is introduced in the 2nd bit from LSB of the transmitted code). **[2.5 + 2.5]**

[CO4 - Analyzing Level]

Q.5. State differences between Virtual circuits and Datagram networks. **[3]** [CO3 - Applying Level]

POSSESSION OF MOBILES IN EXAM IS UFM PRACTICE

Name _____ Enrolment No. _____

Jaypee Institute of Information Technology, Noida

Test-2 Examination, Even Semester-2024-25

B.Tech VI Semester

Course Title: VLSI DESIGN **Max.Time: 1 Hrs**

Course Code: 18B11EC315 **Max. Marks: 20**

CO1	Understand VLSI design flow, VLSI design styles, digital systems modeling using Verilog-HDL
CO2	Apply MOSFET models for circuits simulation and its effect on scaling.
CO3	Analyze the concepts of static and dynamic characteristic of MOS inverters, combinational and sequential circuits.
CO4	Explain and evaluate dynamic logic circuits, stick diagram, layout and different types of semiconductor memories.

Q1. Consider a resistive-load inverter circuit with VDD=5 V, $\mu_n C_{ox}$=20 $\mu A/V^2$, Vt0,n= 1V, R_L=200KΩ, and W/L=2. Compute V_{OL}, V_{IL} and Noise Margin (NM_L). [CO3 (Analyzing), Marks 5]

Q2. (a) Drive the expression for CMOS inverter threshold voltage (V_{TH}).

(b) Find V_{TH} of CMOS inverter if the ratio of (W/L)p/(W/L)n =1.392, and mobility are related as μ_n=2.2μ_p. Assume that Vton=0.6 V, Vtop= - 0.6 V, and power supply V_{DD} is 3 V.

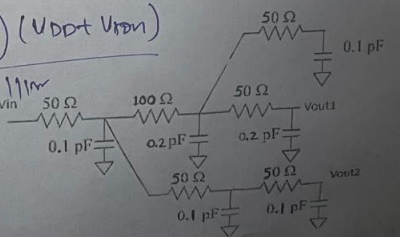
(c) If CMOS inverter discussed in part(b) is symmetrical, then find the ratio of (W/L)p and (W/L)n. [CO3 (Analyzing), Marks 2+2+1]

Q3. For a CMOS inverter assume that VDD =2.5 V, $\mu_n C_{ox}$= 115 $\mu A/V^2$, L_n=L_p=0.25 µm, $V_{t0,n}$=0.4V, $V_{t0,p}$= -0.5V, and $\mu_p C_{ox}$= 30$\mu A/V^2$. Find the ratio of W_p/W_n such that τ_{PHL}=τ_{PLH}. Assume differential equation method is used to compute the value of τ_{PHL} and τ_{PLH}.

[CO3 (Analyzing), Marks 5]

Q4 (a) Discuss Elmore delay for RC tree network.

(b) Calculate the Elmore delay from vin to vout1 and vin to vout2. [CO3 (Analyzing), Marks 2+3]



Jaypee Institute of Information Technology, Noida

Test-2, Examination, EVEN 2025

B.Tech, VI Semester

Course Title: Machine Learning for signal processing
Course Code: 18B13EC314

Maximum Time: 1 Hr
Maximum Marks: 20

CO1	Illustrate various Machine Learning approaches.
CO2	Experiment with different techniques for feature extraction and feature selection
CO3	Apply and analyze various classifier models for typical machine learning applications.
CO4	Make use of deep Learning Techniques in real life problems

Note: Attempt all the questions. Calculators are allowed

Q1. Plot the hyper plane of the following points (4,1),(4,-1)and (6,0) belong to class positive and points (1,0),(0,1) and (0,-1) belongs to negative class Draw and optimal hyper plane to classify the points using SVM. **[CO1 (Understanding), 5Marks]**

Q2. Consider the Given training data set for vehicle allocation mechanism to organize holiday trip based on Passengers availability, Weather score and Road traffic condition score. Compute what will be decision for the given Test set { 4, 4, 3} Using K-NN Algorithm **[CO2(Applying),5 Marks]**

S.No	Passengers availability	Weather score	Road traffic condition score	Vehicle to be
1	6	6	5	Allocated
2	8	6	4	Allocated
3	2	2	2	Not Allocated
4	1	0	3	Not Allocated
5	5	4	1	Allocated

Q3. A Mutual fund company wants to take decision about buying and selling a particular company shares in their portfolio based on few widely used parameters given below Training data set, Design a Naïve Bayes algorithm to take necessary decision on Test share data {90,No,Yes}. **[CO2 (Applying), 5Marks]**

S.No	Share Price	Relative strength above 80	Relative Strength below 30	Action to be taken
1	55	YES	NO	SELL
2	60	NO	YES	BUY
3	63	NO	YES	BUY
4	70	NO	YES	BUY
5	75	YES	NO	SELL

Q4.Employee performance has to be evaluated for promoting next level in the organization, data samples collected for this task is given below table, construct decision tree and take decision on the test data set T={3,Yes,No,No}. Use Information Gain approach. **[CO3 (Analyzing), 5Marks]**

S.No	Punctuality score	On time Delivery of Committed work	Innovation in skills	Promoted to next level
1	5	YES	NO	YES
2	5	YES	NO	YES
3	4	NO	YES	NO
4	0	YES	YES	NO
5	2	NO	NO	YES