

**Course Title: 15B11CI412**

**Course Code: Operating System and System Programming**

**Maximum Time: 1 Hour**

**Maximum Marks: 20**

CO1	Explain the fundamental concepts along with the various components of operating system and system programming
CO2	Apply various OS scheduling techniques and algorithm for processes and threads.
CO3	Elaborate the various resource management techniques of operating systems and their performance
CO4	Omit the concept of IPC and describe various process synchronization techniques in OS
CO5	Compare various desk scheduling algorithms and utilize I/O management techniques
CO6	Analyze the appropriate OS design choices when building real world systems

**Note : Attempt all questions in order**

**Q.1 a)** Consider the following CPU instructions, which can be found in modern CPU architectures such as x86. For each instruction, indicate whether you believe it is privileged or unprivileged, and defend your answer. If your response is "privileged", for example, provide a one sentence example of what might go wrong if this command were executed in an unprivileged environment. If you answered "unprivileged", explain in one sentence why it is safe/necessary to execute the instruction in unprivileged mode.

i) Write instruction to the interrupt descriptor table register.

ii) Write instruction to a general purpose CPU register.

**b)** Consider a process P that executes the fork system call twice. That is, it runs code like this:

```
int ret1=fork();
int ret2=fork();
```

How many direct children of P (i.e., processes whose parent is P) and how many other descendants of P (i.e., processes who are not direct children of P, but whose grandparent or great grandparent or some such ancestor is P) are created by the above lines of code? You may assume that all fork system calls succeed.

[CO1 (Remember), 6 marks]

**Q.2** Consider a parent process that has forked a child in the code snippet below.

```
int count =0;
ret = fork();
if(ret ==0)
{ printf("count in child=%d\n", count); }
else
{ count=1; }
```

The parent executes the statement "count=1" before the child executed for the first time. Now, what is the value of count printed by the code above?

[CO1 (Remember), 3 marks]

**Q.3** Consider a computer system that employs a multilevel feedback queue scheduling algorithm. The system has three queues in order of priority: Q1, Q2 and Q3. The characteristics of each queue are as follow:

Q1: Round-Robin scheduling with a time quantum of 10ms.

Q2: Shortest Job First scheduling.

Q3: FCFS scheduling.

Processes with their burst times(in milliseconds): P1(15 ms), P2(5 ms), P3(20 ms), P4(8 ms), P5(12 ms) arrive in the same order. Assume that the context switches between queues take 1 ms.

a) Illustrate the execution of these processes through a Gantt Chart, clearly showing the transition between different queues.

b) Calculate the turnaround time and waiting time for the each process.

[CO2 (Apply), 5 marks]

**Q.4 a)** What output do the following program produce and why?

```
#include<stdio.h>
#include<pthread.h>
int counter=0;
static void *thread_func(void *_tn)
{
    int i;
    for(i=0;i<100000; i++)
        counter++;
    return NULL;
}
int main()
{
int i, N=5;
pthread_t t[N];
for(i=0; i<N; i++)
pthread_create(&t[i], NULL, thread_func, NULL);
for(i=0; i<N; i++)
pthread_join(t[i], NULL);
printf("%d\n", counter);
return 0;
}
```

**b)** Suppose there are two threads executing simultaneously. One is printing number from 1 to 1000000 and another is printing strings with numbers as characters from 1 to 1000000. Which thread is going to complete its execution first.

[CO2 (Apply), 6 marks]

**Jaypee Institute of Information Technology, Noida**  
**Term-1 Examination, 2023**  
**B.Tech 5<sup>th</sup> Semester**

**Course Title: Computer Networks and Security**  
**Course Code: 18B11CS212**

**Maximum Time: 1 Hr**  
**Maximum Marks: 20**

**CO1** Build an understanding of the fundamental concepts of computer networking and security.

**CO2** Utilize data link layer protocols for multiple access communication, error detection and correction.

**CO3** Apply the knowledge of number theory in cryptographic techniques by understanding the principles and theories of cryptography.

**CO4** Examine various transport protocols along with its performance enhancing mechanisms and security solutions.

**CO5** Appraise, configure, and secure network infrastructure utilizing the understanding of IP protocol, fragmentation, addressing, routing, and IPSec architecture.

**Q1. [3 Marks, CO1]** What are the merits and demerits of combining the session, presentation, and application layers of the OSI model into a singular application layer within the Internet model (TCP/IP)?

**Q2. [2 Marks, CO1]** Datagram and Virtual-circuit switching, need a routing or switching table to find the output port from which the information belonging to a destination should be sent out, but a circuit switched network has no need for such a table. Give reasons?

**Q3. [2 Marks, CO1]** What are the primary security challenges associated with HTTP communication? Describe how HTTPS addresses these security concerns.

**Q4. [1+4 Marks, CO4]** Describe the primary functions of the transport layer, emphasizing the difference between TCP and UDP. Provide examples of scenarios where TCP or UDP would be the preferred choice, and explain the trade-offs involved in selecting one over the other for specific application or services.

**Q5. [1+2+2 Marks, CO4]** A system uses the Go-back-N ARQ Protocol with a window size of 15. If each packet carries 1000 bits of data, the distance between the sender and receiver is 5000 Km and the propagation speed is  $2 \times 10^8$  m/s. Ignore waiting and processing delays. The data rate is 1 Mbps. How long does it take to send 1 million bits of data if?

- No data or ack is lost or damaged.
- Consider that 12<sup>th</sup> packet was lost.
- Consider that 12<sup>th</sup> packet was lost and the system uses Selective-Repeat ARQ with window size of 8.

**Q6. [1.5 + 1.5 Marks, CO4]** Describe the key mechanisms involved in TCP congestion control. Discuss the roles of TCP congestion window (cwnd). Provide an overview of SSL (Secure Sockets Layer) and distinctions between the concepts of 'session' and 'connection' within the SSL framework.

# Jaypee Institute of Information Technology, Noida

Test -1 Examination, 2023 B.Tech.,

V Semester

Course Title: LASER TECHNOLOGY AND APPLICATIONS

Course Code: 16B1NPH533

Maximum Time: 1Hr

Maximum Marks: 20

CO1	Defining the properties and principle of lasers
CO2	Understanding of various applications of lasers
CO3	Ability to apply the concepts of standard techniques for the pulsed operation of laser and stability of laser resonator
CO4	Analysis of types of lasers

Note: Attempt all the questions

**Q1. (a)** The wavelength of emission is 600nm and the lifetime is  $1\mu\text{s}$ . Determine Einstein's  $A$  and  $B$  coefficients.

**(b)** The sun rays subtend an angle of about 32 minutes on earth and fall at double slit arrangement with wavelength 500nm by using appropriate filter. What should be the separation between the two slits in order to obtain good contrast fringes on the screen?

**(c)** An orange line of wavelength 605nm has a coherence length of 20cm. Calculate the monochromaticity of the light.

**(d)** (i) Is two-level laser system possible? Justify your answer. →  
(ii) What is the role of the factor  $h\nu/kT$  in spontaneous emission and stimulated emission?  
[CO1 (Remembering), 8 Marks]

**Q2. (a)** A laser beam with a diameter of 5mm, a power of 7W falls on a convex lens of diameter 15mm and focal length 10mm. If the wavelength of laser is 600nm, calculate the intensity and the electric field amplitude at the focused spot.

**(b)** Neglecting scattering and the other cavity losses, estimate the threshold gain coefficient and the cavity lifetime for He-Ne laser having typical parameters: refractive index of cavity  $\sim 1$ , length of cavity = 20cm and the reflectivity of each mirror = 0.98.

**(c)** Define the brightness of a diffraction-limited beam. The brightness of probably the brightest lamp so far available (PEK Labs type 107/109, excited by 100 W of electrical power) is about  $95\text{W/cm}^2\text{sr}$  in its most intense green line (wavelength = 546nm). Compare this brightness with that of a 1 W Argon ion laser (Wavelength = 514.5nm), which can be assumed to be diffraction-limited.

**(d)** Write all possible laser rate equations for a three-level laser system, by explaining all symbols used.

[CO3 (Applying), 12 Marks]

**Jaypee Institute of Information Technology, Noida**  
**T1- Examination, Odd Semester -2023\_**  
**B.Tech Semester: V<sup>th</sup>**

Course Goal: After completing the course student will be able to,

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CO1: Demonstrate an understanding about the early Indian traditional political thought and the constitutional design by knowing about the structure of government in place.

CO2: Demonstrate an understanding of the role Indian president, prime minister, governor, other members of the legislature in their mutual interaction and local governance as representatives of common masses.

CO3: Analyse the working of Indian federalism with reference to centre state relations.

**CO3:** Analyse the working of Indian federalism. [With notes]  
**CO4:** Analyse the impact of contemporary challenges such as caste and gender in the working of Indian democracy.

**Q1.** Describe any four writs mentioned in the articles 32 and 226 of the Indian constitution which are an effective method of enforcing the rights of the people and to compel the authorities and fulfil the duties which they are bound to perform under the law.

[CO1, (Understanding), 4Marks]

**Q2.** Briefly discuss the historical underpinnings of the Indian constitution.

[CO1, (Understanding), 4Marks]

**Q3.** "It has been held that the fundamental rights and the directive principles are the two wheels of the chariot, as an aid to make social and economic democracy a truism".

In light of the above statement examine how Directive Principles of State Policy (DPSP) differ from the fundamental rights enshrined in Part III of the Indian constitution.

[CO1, (Understanding), 3Marks]

**Q4.** Prime Minister Narendra Modi has announced that the next 25 years of Indian independence leading up to 100<sup>th</sup> anniversary would be renamed as 'Kartavya Kaal', focussing on the idea of duty and devotion. The PM reinstated the importance of duties of every citizen, stating "duty is not an option for us, but a resolution".

Do you agree with the above statement in context of fundamental duties as enshrined in the Constitution of India? [CO1, (Understanding), 4Marks]

Q5. Examine the ordinance making power of the Indian president. Do you think that the English monarch and the Indian president represent the rubber stamp position in the parliamentary system of governance? [CO2, (Understanding), 5Marks]

**Course Title: Financial Management****Maximum Time: 1 Hr****Course Code: 16B1NHS433****Maximum Marks: 20**

- C303-3.1 Understand the fundamental concepts of Financial Management and its various dimensions  
 C303-3.2 Apply the knowledge of the time value of money, capital budgeting techniques, cost of capital and in taking long term investment techniques.  
 C303-3.3 Analyze the leverage capacity of a business and apply it in the selection of long term sources of finance.  
 C303-3.4 Analyze the financial performance of a business through financial statements.

**Note: Attempt all the questions:****Q.1.** Briefly answer these questions:

- a. According to which concept, tangible fixed assets are depreciated on the basis of acquisition cost rather than on the basis of market value.
- b. Which financial decisions are aimed at selecting the most productive and investment opportunities?
- c. What is the goal of a financial manager?

**[CO1(Understanding), 3 Marks]****Q.2.** Show the following transactions through the Accounting Equation:

01 August 23	Goods sold on credit to Snow White & Co. for Rs 12,50,000
05 August 23	Payment received from Snow White & Co. for Rs 12,00,000 by cheque
06 August 23	Paid for salaries Rs 1,80,000 & Rent Rs 78,000
08 August 23	Electricity bill of owner's house paid Rs 1,20,000
08 August 23	Received interest on Bank deposits Rs 2800
09 August 23	Purchased goods from Hamid & Co on credit for Rs 45,000

**[CO1(Understanding), 3 Marks]**

**Q.3.** Assume you want to deposit a certain amount today in your bank account so that you can withdraw Rs 2,00,000 after three years and Rs 7,00,000 after six years from now. The bank will pay an interest of 10% p.a. on your deposit. Calculate the amount to be deposited today.

**[CO2(Applying), 3 Marks]**

**Q.4.** A company has taken a 10 year loan of Rs 20 lacs from SBI Bank for its plant expansion. The loan is to be repaid in 10 equal annual installments. Calculate the amount of installment if the rate of interest is 10% p.a. After payment of the 1st installment, the company observes that the market rate of interest has decreased and the ICICI Bank is offering a loan at 9% p.a. However, if the company repays the remaining loan to the SBI Bank now, SBI will charge a penalty of Rs 1,00,000. If the company switches the loan to ICICI Bank by borrowing the remaining amount of the loan plus the penalty for the remaining duration, what will be the amount of the annual installment? Should the company switch the loan to ICICI Bank or not?

**[CO2(Applying), 3 Marks]**

**Q.5.** a. You have been hired as a Financial analyst for the Bank of Noida and your team is working on independent assessment of Delicious Pvt Ltd. This company specializes in the production of Chocolates. Your colleague has provided you with the following data for your reference:

Ratios	2022	Industry Average
Inventory Turnover	42.42	53.25
Debt Collection Period( in Days)	98	130.25
Debt to Equity	0.85	0.88
Net Profit Margin	0.07	0.075
Total Asset turnover	0.65	0.40
Quick Ratio	1.03	1.031
Current Ratio	1.21	1.25
Times Interest Earned	4.375	4.65
Return on Equity	14.6	17.54

Using the above information analyze the Liquidity, Profitability, Leverage and Efficiency position of the company.

b. Gross Profit ratio of XYZ company was 25%. Credit sales were Rs 18,00,000 & its cash sales were 10% of the total sales. If the operating expenses of XYZ company were Rs 50,000 calculate its net profit ratio.

**[CO4(Analyzing), 4+3 Marks]**

**Jaypee Institute of Information Technology, Noida**  
**T1 Examination, 2023**  
**B.Tech V Semester**

**Course Title:** Fundamental of Computer security

**Maximum Time:** 1 Hr

**Course Code:** 20B12CS332

**Maximum Marks:** 20

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After Completion this course students will be able to

1	Explain the Fundamental Concepts of computer security, malicious code and its effects
2	Describe various authentication and access control paradigms
3	Apply various preventive measures and techniques used to obtain secure system
4	Examine various security parameters from the perspective of legal and ethical issues.

Note: Attempt all the questions.

**Q1.** Consider following scenario and identify what type of problem is and what are the countermeasures to overcome this type of problem.

a) A programmer has written this program snippet:

```
char sample[10] or char sample[i]
```

```
for(i=0;i<=9;i++)
```

```
    sample[i]='A';
```

```
    sample[10]='B';
```

b) Consider following URL:

[http://www.somesite.com/subpage/userinput&parm1=\(808\)555-1212&parm2=1800Feb30](http://www.somesite.com/subpage/userinput&parm1=(808)555-1212&parm2=1800Feb30)

The two parameters are telephone number and a date that are taken as input by client's (user's) web browser in their specified format for easy processing on the server's side.

c) Consider a person that is buying a sculpture that costs \$100. The buyer removes five \$20 bills from a wallet, carefully counts them in front of the seller, and lays them on the table. Then the seller turns around to write a receipt. While the seller's back is turned, the buyer takes back one \$20 bill. When the seller turns around, the buyer hands over the stack of bills, takes the receipts. And leaves with the sculpture.

d) A programmer writes a program in C where the result of some arithmetic operation is larger than the size (data type) assigned to the variable. [CO1 (Understanding), 4 marks]

**Q2.** Given a network-based virus. Classify and differentiate viruses based on Concealment. Construct compression virus structure (in pseudocode form). [CO1 (Understanding), 3 marks]

**Q3.** Consider an automated teller machine (ATM) in which users provide a personal identification number (PIN) and a card for account access. Give example of confidentiality, integrity, and availability requirement associated with the system and, in each case, indicate the degree of importance of the requirement. [CO2 (Understanding), 3 marks]

**Q4.** If someone steals your car, you may suffer financial loss, inconvenience (by losing your mode of transportation), and emotional upset (because of invasion of your personal property and space).

- a. List three kinds of harm a company might experience from theft of computer equipment.
- b. List at least three kinds of harm a company could experience from electronic espionage or unauthorized viewing of confidential company materials.
- c. List of least three kinds of damage a company could suffer when the integrity of a program or company data is compromised.

**[CO2 (Understanding), 3 marks]**

**Q5.** “A person shall be liable to pay damages by way of compensation to the person so affected if she/he access his property (computer, computer system, or computer network) without permission of the owner or any other person who is in charge of it”. Explain.

**[CO4 (Analyse), 3 marks]**

**Q6.** Perform Encryption and show all steps.

- a. Encrypt the secret message “SWARAJ IS MY BIRTH RIGHT” using play fair cipher and the keyword MONARCHY. Use X in place of blank space.
- b. Apply Encryption technique Vigenere Cipher on Plaintext “ALL IS WELL” using Key “CAKE”

**[CO3 (Apply), 2+2 marks]**