Question
1. Attempt any two parts.
   (a) What are real time operating systems? Explain the scheduling requirements for a real time process.
   (b) Differentiate between layered and microkernel approach to operating system structure design. Specify the advantages and disadvantages of each.
   (c) What are the basic services provided by operating system? How these services are used by programmers? Explain.

2. Attempt any two parts.
   (a) Explain how Shortest Job First algorithm is implemented? Consider the following set of processes:

<table>
<thead>
<tr>
<th>Process</th>
<th>Arrival Time</th>
<th>CPU Burst Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1</td>
<td>0</td>
<td>25</td>
</tr>
<tr>
<td>P2</td>
<td>5</td>
<td>15</td>
</tr>
<tr>
<td>P3</td>
<td>10</td>
<td>5</td>
</tr>
<tr>
<td>P4</td>
<td>15</td>
<td>5</td>
</tr>
</tbody>
</table>

   Draw the Gantt chart for Shortest Job First (SJF) and Shortest Remaining Time First (SRTF) scheduling algorithms. Also find the average waiting time for each.
   (b) Briefly explain why context switching between processes is inherently more costly than switching between threads of a process. Also give two reasons why operating system designers often choose to make code in the kernel non-preemptive.
   (c) Differentiate between user level and kernel level threads, considering their advantages and disadvantages? Explain the following in context of threads:
      (i) Scheduler activation
      (ii) Signal handling

3. Attempt any two parts.
   (a) What are the various approaches to solving critical section problem? Explain the advantages and disadvantages of each.
   (b) What are monitors? Write a solution for sharing a similar resources among several process using monitor.
   (c) What is deadlock avoidance method for deadlock problem? Explain the safety algorithm using a suitable example.

   contd...
Attempt any two parts.

(a) Describe carefully how a 32-bit virtual address could be translated to a physical address during the execution of a memory reference instruction on a typical modern CPU that supports paged virtual memory. You should assume that the page size is 4096 bytes and that the system uses two-level paging with page tables at both levels holding 1024 entries. Explain using a suitable diagram.

(b) Outline the main differences between paging and segmentation, and show how a segmentation scheme can be implemented with reasonable efficiency in a system that supports paging.

(c) Explain any two LRU approximation algorithm in brief. Also explain what is thrashing. Which page replacement algorithm is best suited for preventing thrashing and why?

5(a) Explain various disk block allocation methods for disk files, considering their advantages and disadvantages.

5(b) What are various on-disk and in-memory data structures used for file system management. Explain the use of each using a suitable diagram.

5(c) Explain the Windows XP process scheduling method in brief.
2014-15
B.TECH. (AUTUMN SEMESTER) EXAMINATION
COMPUTER ENGINEERING
DIGITAL ELECTRONICS
CO-308

Maximum Marks: 60
Credits: 04
Duration: Three Hours

Answer all the questions.
Assume suitable data if missing.
Notations used have their usual meaning.

Q.No. Question M.M.

1(a) What is a MOSFET and how does it work? Implement a circuit in conventional [06]
CMOS technology that realizes the function \( F = A'B + AB' \). (A and B are input
variable)

1(b) Draw a NOR gate circuit in TTL technology. Describe the Totem-Pole arrangement [06]
in the circuit.

OR

1(b') What is the use of a transmission gate in digital devices? Explain with the help of a [06]
suitable diagram. How to increase the noise immunity of a logic circuit?

2(a) What should be the desirable properties of a ROM? Which kind of ROM is the best [06]
suited for our expectations and why?

2(b) Explain the read and write operation of EPROM? What are the drawbacks of [06]
EPROM?

OR

2(b') Briefly describe all the operations of a DRAM cell using suitable diagrams.

3(a) What are the basic differences between static logic circuits and dynamic logic [06]
circuits? What are the drawbacks of dynamic CMOS logic?

3(b) Write a technical note on CCD. Why is it called a sequential access memory? [06]

OR

Contd...... 2.
3(b') What is domino logic? Draw a circuit of a 4-to-1 column decoder.

4(a) Write a note on data acquisition process of a digital system.

4(b) Describe the basic operation of a digital ramp ADC? Explain quantization error?

OR

4(b') What is an alias signal? Explain with an example. What is the working procedure of a dual slope ADC?

5(a) Mention True/False for the following statements:

(i) GSI-chip is more complex than ULSI-chip.
(ii) BiCMOS technology has higher packing density than CMOS technology.
(iii) It is not possible to remove quantization error from ADC.
(iv) Flash ADC is not so popular because it does not use any clock.

5(b) What will be the output of the following circuit? Justify your answer.

5(c) An 8-bit input digital ramp ADC has the following parameters: clock frequency = 1 MHz; threshold voltage $V_T = 0.1 \, \text{mV}$; and its DAC has F.S. output voltage 5.11 V. What will be the digital output for the input 3.728 V? Also find the conversion time.
Answer all the questions.
Assume suitable data if missing.
Notations used have their usual meaning.

Q.No.  

1(a) Describe the 8085 microprocessor and its logic pin out. 
1(b) Write a program segment in 8085-assembly language to implement arithmetic shift right operation. Explain how the program segment can be used in implementing Booth's multiplication algorithm. What additional features would be needed in 8085 to implement the Booth's algorithm easily?

OR

1'(a) Five bytes of data are stored at locations starting at 2050H. Using DE as memory pointer, write a program to add all the data bytes and store the LSB of the sum at location 20F0H and MSB at 20F1H.
1'(b) Consider the following program segment:

\begin{verbatim}
2014 3E MVI A, 22H
2015 22
2016 D3 OUT F2H
2017 F2
\end{verbatim}

Explain what the above segment does, and draw the timing diagram for the instruction OUT in the above segment.

2(a) Using a 74LS138 decoder and proper logic gates interface eight input switches at input port 80H and eight alarms at output port 81H. Draw the diagram, and write a program to continuously read input switch positions, and sound the corresponding alarm at output port. Write another modified program for the same interfacing as:

\begin{verbatim}
contd... 2.
\end{verbatim}
Turn only the alarm connected at the most significant bit of output port when multiple switches are found to be at ON position.

2(b) What is the effect of don't care lines in address decoding? Explain, giving reason, that whether in an interfacing setup an input port and an output port can have the same address?

OR

2'(a) Describe the 8255 with the help of its block diagram and the control word format.

2'(b) 8255 is to be used for interfacing, where addresses of ports A, B, C, and the control register are F0H, F1H, F2H, and F3H respectively, with port A set as input port in Mode 1 and port B as output port in Mode 1. Draw the interfacing diagram, and write a control word and an initialization subroutine for setting up the ports.

3(a) Describe PUSH and POP instructions, and explain how the instructions CALL and RET operate with the help of a stack.

3(b) Draw the block diagram for the Direct Memory Access, and explain the data transfer process under this scheme.

OR

3'(a) Discuss 8085 vectored interrupts. What are pending interrupts? Explain, with an example program segment, how their status can be determined.

3'(b) Explain the RST instructions of 8085. Explain the use of RST instructions in the interrupt process.

4(a) What is a microcontroller and how does it differ from a microprocessor? Compare features of three 8-bit microcontrollers.

4(b) Discuss the PIC microcontroller in detail.

5(a) Discuss the programming model of 8086. Explain the memory segmentation, and the base-plus-index and the register-relative addressing modes of 8086.

5(b) Write a short technical note on advances in 80386 as compared to 8086.

5(c) Discuss the operation of 8086 in multiprocessor environment.
2014-15
B.TECH. (AUTUMN SEMESTER) EXAMINATION
COMPUTER ENGINEERING
COMMUNICATION ENGINEERING
EL-340

Maximum Marks: 60
Credits: 04
Duration: Three Hours

Answer all the questions.
Assume suitable data if missing.
Notations used have their usual meaning.

Q.No. Question M.M.
1(a). Consider the baseband signal \( m(t) = \cos(2000\pi t) \cos(3000\pi t) \), do the following:
   (i) Sketch the spectrum of \( m(t) \)
   (ii) Sketch the time and frequency domain DSB-SC modulated signal if carrier is \( c(t) = 3 \cos(20000\pi t) \)
   (iii) Calculate the modulation index and bandwidth of the modulated signal. [05]

1(b). Explain the narrow band frequency modulation and demodulation process with clear diagrams. [05]

OR

1(b'). If we have to change the phase of the carrier signal according to the message signal then what type of modulation scheme is used? Explain the modulation and demodulation process in such scheme. [05]

1(c). Briefly explain the working of superheterodyne radio receiver. [05]

2(a). What is aliasing and intersymbol interference (ISI)? Explain the differences. [05]

OR

2(a'). Justify the statement: “Delta Modulation is a special case of DPCM”. What do you understand by the term “slop overloading”? [05]

2(b). Consider a uniform quantizer mid-rise type. Assume that the amplitude of the sinusoidal input signal to the quantizer lies in the range of -10V to +10V. Calculate the output SNR of the quantizer for 32, 64, 128 and 256 levels. Comment on your results. [05]

OR

2(b'). What is Time Division Multiplexing (TDM)? Explain T1 carrier system. [05]
2(c). Consider the following sequence of 1s and 0s:
   (i) An alternating sequence of 1s and 0s
   (ii) A long sequence of 1s and 0s
Sketch the waveform for each of these sequences using the following method of representing 1 and 0:
   - Polar non-return-to-zero (NRZ)
   - Polar return-to-zero (RZ)
   - Manchester code
Which method is suitable for each case? Give reasons.

3(a). Discuss coherent detection of On-Off Keying (OOK) signal in the presence of additive white Gaussian noise (AWGN).

3(b). Drive an expression for the average probability of bit error for coherent reception of BPSK signal in an AWGN channel.

3(c). Assume a binary bit stream of rate 2 megabits per second (Mbps) is to be modulated on a radio frequency (RF) carrier. What is the absolute bandwidth of the RF spectrum, if raised cosine roll-off pulses are used with roll-off factor $\alpha = 0.5$? Assume BPSK and QPSK modulation techniques are used.

4(a). Consider a discrete memoryless source with seven possible symbols $x_i$ (i=1,2,...,7) and corresponding probabilities are $p_1=0.33$, $p_2=0.37$, $p_3=0.01$, $p_4=0.02$, $p_5=0.07$, $p_6=0.04$ and $p_7=0.16$. Construct Huffman codes for each symbol and calculate its efficiency.

4(b). What are the main reasons behind the use of source coding? What are the requirements for a source code to be efficient?

4(c). A 3-cell reuse mobile system is deployed in a city which is covered by 21 cells. The spectrum allocated for the service is 1.5 MHz and the system uses a hybrid of TDMA/FDMA with a carrier of 30 KHz and each carrier is time-shared by 3 users. Determine total capacity (number of channels) of the system.

OR

4(c'). Discuss briefly the important features of spread spectrum communication and how they are beneficial for wireless communications.
1. a. What is monopoly? Give examples of some situations where it would be beneficial. Also explain how the price of a product may be determined in a monopoly.

b. Explain the Law of Diminishing returns with suitable examples.

c. A company 3 years ago borrowed Rs. 40,000 to pay for a new machine tool agreeing to repay the loan in 100 monthly installments at an annual nominal interest rate of 12% compounded monthly. The company now wants to pay off the loan. How much would this payment be, assuming no penalty cost for early payment?

OR

1'. a. What is inflation? What are its causes? How does it affect the economy of a nation?

b. Machines that have the following costs are under consideration for a robotized welding process. Using an interest rate of 10% per year, determine which alternative should be selected:

<table>
<thead>
<tr>
<th>Machine</th>
<th>Machine X</th>
<th>Machine Y</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Cost (Rs)</td>
<td>250,000</td>
<td>430,000</td>
</tr>
<tr>
<td>Annual operating cost (Rs/year)</td>
<td>60,000</td>
<td>40,000</td>
</tr>
<tr>
<td>Salvage Value (Rs)</td>
<td>70,000</td>
<td>95,000</td>
</tr>
<tr>
<td>Life (Years)</td>
<td>3</td>
<td>6</td>
</tr>
</tbody>
</table>

2. a. What is depreciation? What is the need for calculating it?

b. Differentiate between defender and challenger.

It is proposed to replace a two year old precision measuring instrument immediately. The expected costs and lives of the two instruments are as follows:

<table>
<thead>
<tr>
<th>Current</th>
<th>Proposed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Original purchase price (Rs.)</td>
<td>30,000</td>
</tr>
<tr>
<td>Current market value (Rs.)</td>
<td>17,000</td>
</tr>
<tr>
<td>Remaining life (years)</td>
<td>5</td>
</tr>
<tr>
<td>Estimated value in 3 years (Rs.)</td>
<td>9,000</td>
</tr>
<tr>
<td>Annual operating cost (Rs.)</td>
<td>8,000</td>
</tr>
</tbody>
</table>

Perform the replacement study for a 3 year replacement period.

c. Five interdependent proposals are under consideration for a particular project. The present worth of capital requirement and benefits for each project are as follows:

<table>
<thead>
<tr>
<th>Alternative</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
</tr>
</thead>
<tbody>
<tr>
<td>PW of Capital (Rs.)</td>
<td>80,000</td>
<td>50,000</td>
<td>72,000</td>
<td>43,000</td>
<td>81,000</td>
</tr>
<tr>
<td>PW of Benefits (Rs.)</td>
<td>70,000</td>
<td>55,000</td>
<td>76,000</td>
<td>52,000</td>
<td>84,000</td>
</tr>
</tbody>
</table>

Select the best proposal on the basis of an incremental B/C analysis.
3 a. What is the significance of decision making tools? Discuss any one decision making tool with suitable examples.

b. What are the major areas of social responsibility of corporate sector? Discuss the implications of corporate involvement in social causes.

OR

3' a. Discuss the role of information in the manager's job. Also, state the characteristics of useful information.

b. Discuss the Administrative model of decision making.

4 a. Why are organisational goals important? How are they classified? What are the differences between strategic goals and tactical goals?

b. Differentiate between:
   i. Job enlargement and Job enrichment
   ii. Functional departmentalization and Product departmentalization

OR

4' a. Discuss how control helps the organization. What are the steps involved in the control process?

b. How is authority different from power? Differentiate between line and staff authority with suitable examples.

5 a. Explain the Q/R inventory system.

A company needs 24,000 units/year of a certain component which will be used in its main product. The ordering cost is $150 per order and the carrying cost per unit per year is 18% of the purchase price per unit. The purchase price per unit is $75. Find the economic order quantity.

b. Demand for part number 1012 was 210 in January, 100 in February and 150 in March. The forecast for January was 140 units. With a smoothing constant of 0.30 and using first order exponential smoothing, what is the April forecast? Is 0.30 a good choice as a smoothing constant?

c. Define Quality. Discuss the two aspects of quality. Name some quality control tools and explain any one of them.