

Name: Tameem

Registration # 1966



Department of Computer Systems Engineering
University of Engineering & Technology
Peshawar, Pakistan

Subject: Engineering Economics
Marks: 20

Exam: Mid Term Fall 22
Time Allowed: 2 Hours

DIRECTIONS:

1. Be clear and precise in your answers. Avoid unnecessary details.
2. You are expected to have brought a calculator and necessary stationery, anything else found in possession would be tantamount to cheating. No sharing of calculators is allowed.
3. Pages are numbers from 1-2. Make sure you have both of them.

Question 01 [Marks 5]

[CLO-1]

Fill with the proper Economic Environment Terminologies:

- i- The type of costs that are not paid with cash but occur in documents only are _____
- ii- The Life-Cycle costs are least in _____ phase.
- iii- The demand for _____ is highly elastic.
- iv- Elasticity is the % ratio of _____
- v- The two types of Economics are _____
- vi- For developing rational alternatives, we must use a consistent _____
- vii- The four key factors in selecting good engineering economic decisions are:

- viii- The type of cost that is made due to some past decision is _____
- ix- The initial breakeven point can be attained earlier by increasing the _____
- x- The indirect costs are also known as _____

Question 02 [Marks 10]

[CLO-2]

Mond-Licht Studios estimates that it increases its item's sales volume by decreasing the selling price. The revenue function is given by $aD - bD^2$ where D represents the units of demand of items per month. The fixed costs are estimated to be \$1,145 per month and the total costs for 70% of demands are \$1,647.5. Net sales at 70% utilization are \$2,556. The demand relationship with the price is given by $D = 231.0965 - 1.025p$, and the price per unit item is \$50.

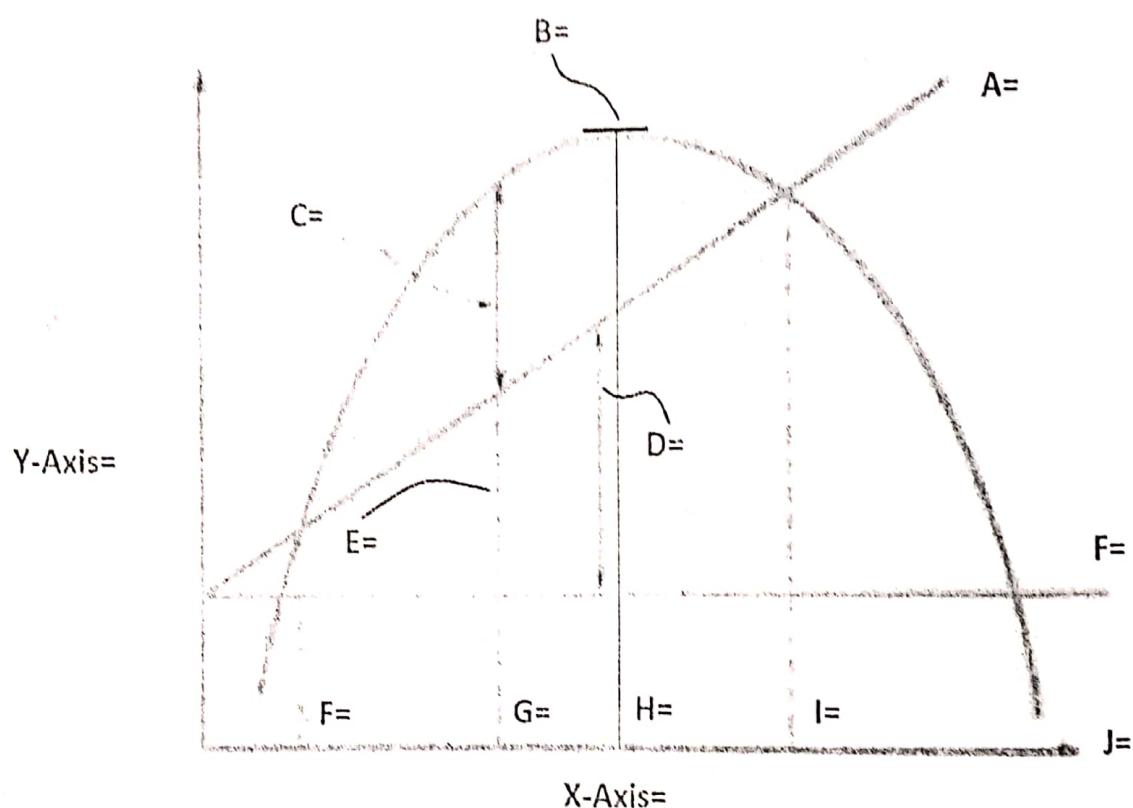
- i- Determine the volume for maximum profit.
- ii- Maximum profit for this venture.

iii- Range of profitable demand.

iv- Maximum total revenue.

Question 03 [Marks 05]**[CLO-1]**

Mark/Name the Economic Environment Terminologies and formulas for unknowns (A, B,....., J, X-axis and Y-axis) in the following Total Revenue Function.



Good Luck

Electronic Circuits Midterm Exam Spring 2022

Q1. CLO1 {C2 (Comprehension)}

(Marks 20)

Reply in one or two lines, to each of the following questions

- a. What are Intrinsic semiconductors?
- b. Why do semiconductor materials have Negative Temperature Coefficient (NTC)?
- c. Define Doping.
- d. How is a P-type extrinsic semiconductor formed?
- e. What are intrinsic carriers and how are they created?
- f. Give the most important characteristic of GaAs semiconductor.
- g. Why is Si less sensitive to temperature variation than Ge, in their electrical characteristics?
- h. How is a Donor Ion formed?
- i. What is depletion region in a semiconductor diode?
- j. Briefly describe one phenomenon that causes reverse breakdown in a diode.

Q2. Find the dynamic resistance of a diode by differentiating the Shockley's equation. (Marks 10)

Q3. CLO3 {C5 (Synthesis)}

(Marks 20)

Figure 1 shows the output of a full wave bridge rectifier. Design a circuit that would produce this output when the input is a sinusoidal signal of 10 V amplitude (Consider using different semiconductor diodes).

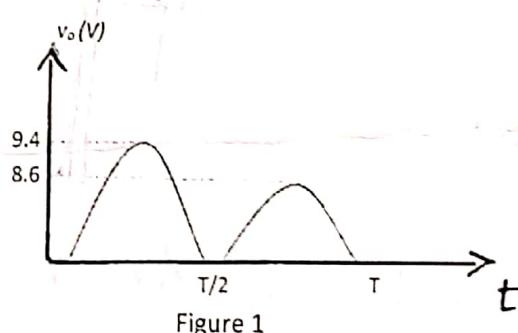


Figure 1

Q4. In the circuit of Figure 2, $V_m = 10$ Volts and $V = 3$ Volts. Draw the output waveform using a step by step procedure. (Marks 20)

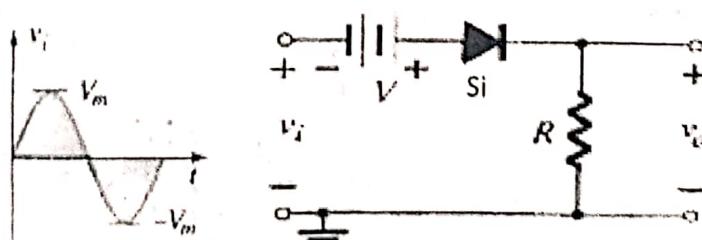


Figure 2

End



Department of Computer Systems Engineering,
University of Engineering and Technology, Peshawar,
Pakistan

Midterm Exam (Fall 2022)

Time: 2 Hours

Paper: CSE-304 Computer Organization and Architecture

Marks: 30

Note: Attempt all questions briefly and precisely on the answer sheet.

Question No. 1 (Marks=5) (CLO-1)

- i. What are interrupts? What is the difference between disable interrupts and define priorities interrupts?
- ii. How can we extend the 16-bit signed number to a 32-bit signed number? Give examples. What is the range of signed numbers if the number of bits of a word is 32 bits?

Question No. 2 (Marks=5) (CLO-2)

- i. What is the purpose of a Program Counter (PC)? How does it work?
- ii. What are the steps in the “Instruction Cycle”? What is the role of the “Interrupt Cycle”? Explain it briefly with the help of a flowchart.

Question No. 3 (Marks=5)

- i. What is the difference between dedicated and multiplexed bus types?
- ii. Consider a hypothetical microprocessor generating a 32-bit address and having a 32-bit data bus. What is the maximum memory address space that the processor can access directly if it is connected to “16-bit memory”?

Question No. 4 (Marks=5)

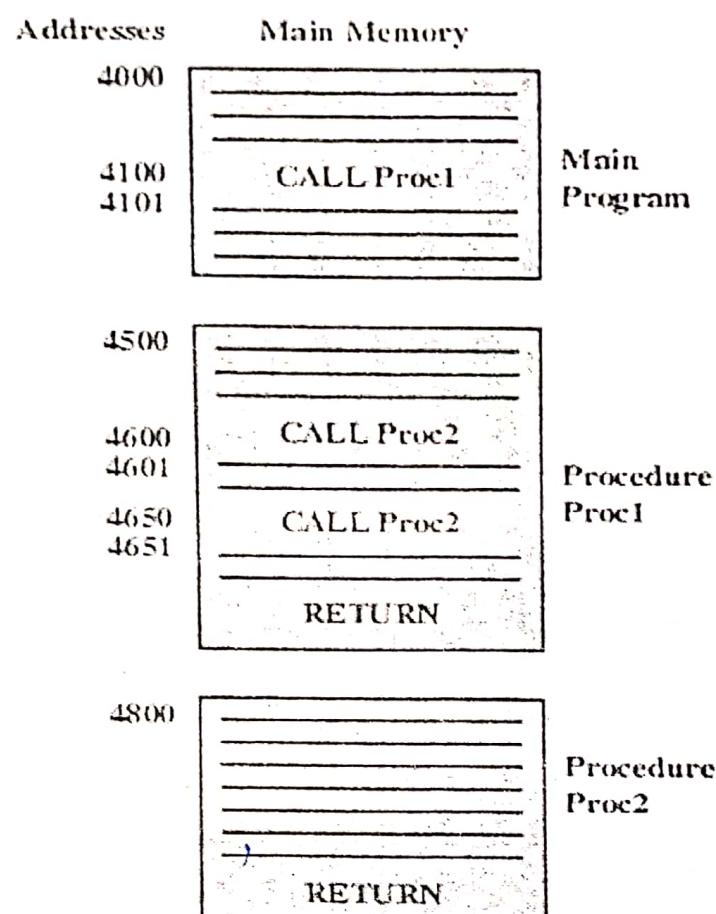
- i. What is structure, and how is it compared with the functionality of the computer architecture?
- ii. What is the purpose of the Instruction Register (IR) and Control Unit (CU)?

Question No. 5 (Marks=5)

- i. What are synchronous and asynchronous systems? Explain it with the help of a diagram.
- ii. What architectural features will allow this microprocessor to access separate “I/O devices”?

Question No. 6 (Marks=5)

What will be the contents of the stack and stack pointer for the following scenario shown in the Figure 1? Assume the stack pointer value is 5100H.

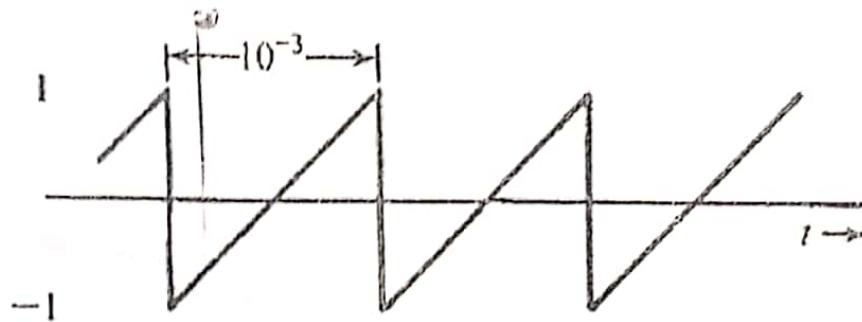


(a) Calls and returns

Figure 1

QUIZ # 5

A baseband signal $m(t)$ is the periodic sawtooth signal shown in figure below. Sketch $\varphi_{FM}(t)$ and $\varphi_{PM}(t)$ for this signal $m(t)$ if $\omega_c = 2\pi \times 10^6$, $k_f = 2000\pi$, and $k_p = \pi/2$. (Marks 10)



QUIZ # 6

$$A \cos(\omega_c t + k_f m(t) \sin \omega_c t)$$
$$\Delta f = \frac{m}{2\pi} \omega_1 + \frac{k_f m(t)}{2\pi} \quad k_f m(t) > 1 \quad 2(B_f + 2B_m)$$
$$GBM \quad GBM = 2(B_m + 1)$$

Write a detail note on Wide Band FM wave with appropriate figures and mathematical expressions. (Marks 10)

OR

The process of reconstruction a continuous time signal $g(t)$ from its samples is known as Interpolation. Explore reconstruction process in detail. (Marks 10)



Department of Computer Systems Engineering
University of Engineering & Technology
Peshawar, PAKISTAN

Subject: Digital Signal Processing (5th Semester)

Exam: Mid Term (Fall 2022)

Max Marks: 20

Attempt All Questions

Time allowed: 2 hours

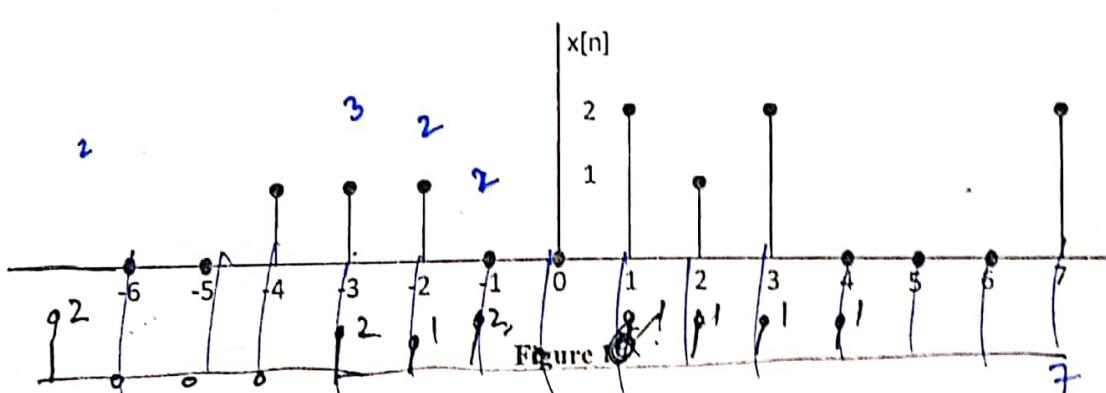
Question 1:

- 1) What is quantization, and, quantization error? How is quantization error $e_q(t)$ related with the step size Δ in case of rounding and truncation? How is quantization step size Δ related to number of quantization levels 'L' and number of bits 'b'? (3 Marks)
- 2) Let a discrete-time signal $x[n] = 2.1 \sin\left(\frac{\pi}{5}n + \frac{\pi}{5}\right) + 1$ is quantized with step sizes (a) $\Delta = 0.05$, and (b) $\Delta = 0.01$. How many bits are required in A/D converter in each case? Among the two cases which quantization is more accurate? (3 Marks)

Question 2:

(CLO_1)

- 1) For the $x(n)$ shown in Figure 1, find and sketch
(2 Marks)
- $-x(2n - 2)$
 - $\frac{1}{2}x(-\frac{1}{2}n + 4)$



- 2) Find and sketch the even part $x_e[n]$, and odd part $x_o[n]$, of the signal $x(n)$ shown above in Figure 1 above. (2 Marks)

$$x[n] = x_e[n] + x_o[n]$$

Handwritten notes:
Even part: $x_e[n] = \dots$
Odd part: $x_o[n] = \dots$
 $x[n] = x_e[n] + x_o[n]$

Question 3:

(CLO_2)

- 1) Signal $x[n]$ is passed through the system with impulse response $h[n]$ given below.
Determine the response $y[n]$, (4+1 Marks)

$$x[n] = \begin{cases} (\frac{1}{2})^n, & -1 \leq n \leq 3 \\ 0, & \text{otherwise} \end{cases}$$

and

$$h[n] = \begin{cases} n^2, & -1 \leq n \leq 1 \\ 0, & \text{otherwise} \end{cases}$$

(E1),

Is the system given by $h[n]$ an FIR or IIR, and why?Is $h[n]$ a stable system or unstable system, and why?

- 2) Find the natural response of the following LTI system with given initial condition. (2 Marks)

$$2y[n] - \frac{2}{3}y[n-1] = \frac{1}{2}x[n] + 3x[n-1]$$

$$y[0] = 2$$

- 3) Find the z-transform of the following signals using the **definition** of z-transform and find their region of convergence? (3 Marks)

a) $x[n]$ given in Figure-1.

b) $x[n] = (\frac{1}{3})^n u[n-2]$

2/2

$$f(n) \quad h(n)_{-3}$$



UNIVERSITY OF ENGINEERING AND TECHNOLOGY PESHAWAR
Mid Term Exam (Fall 2022)
Department of Computer Systems Engineering

Instructor: Dr. Zahid Wadud Mufti
Subject: Communication Systems

Time Allowed: 2 Hr
Semester: 5th

Instructions:

- Attempt ALL questions in sequence; Paper consists of SIX questions.
- Write your name on all resources before starting paper.
- Read the complete paper in the first 15 minutes and get you queries (if any) clarified within this time; no question will be entertained after this time, and if you feel any data is missing, you can assume any reasonable values for it.

Question # 1 (Marks = 10)

The information in an analog waveform, with maximum frequency $f_m = 3\text{kHz}$ and peak voltage $V_p = 2V$, is to be sample and quantized with $L = 16$ quantization levels.

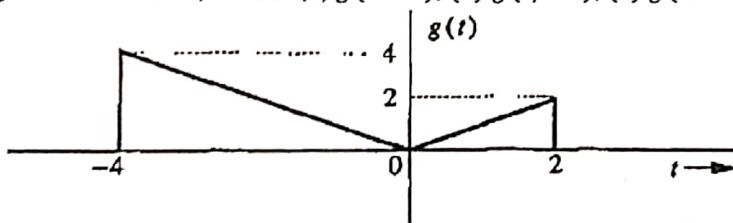
- What is the quantization spacing?
- What is the sampling interval?
- What is the bit transmission rate?
- What bandwidth efficiency if transmission bandwidth is 12 KHz?

Question # 2 (Marks = 10)

- What are the fundamental parameters that control the capacity (data rate) and quality of information?
- If signal to noise ratio is found to be 20 dB for certain channel then what will be the Shannon capacity for GSM signal?

Question # 3 (Marks = 10)

For the signal shown below, sketch: (a) $g(t - 4)$; (b) $g(t/1.5)$; (c) $g(2t - 4)$; (d) $g(2 - t)$.

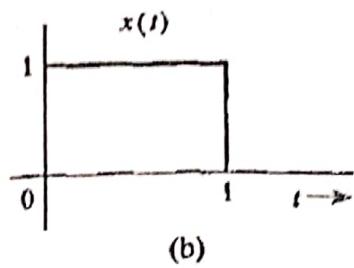
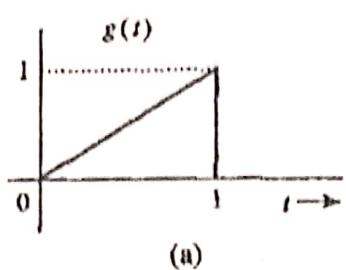


Question # 4 (Marks = 10), (CLO-1, PLO-2)

Find the Fourier transform of the pulse $g(t) = \text{rect}(\frac{t}{T})$, also analyze the bandwidth of the $\text{rect}(\frac{t}{T})$ function and comment how the width of the pulse effect the bandwidth of the signal?

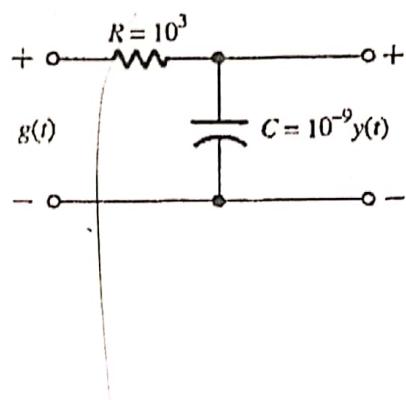
Question # 5 (Marks = 10)

For the signal $g(t)$ and $x(t)$ shown below, find the component of the form $x(t)$ contained in $g(t)$. In other words, find the optimum value of c in the approximation $g(t) \approx cx(t)$ so that the error signal energy is minimum. What is the error signal energy?



Question # 6 (Marks = 10), (CLO-2, PLO-2)

If $g(t)$ and $y(t)$ are the input and the output, respectively, of a simple RC low-pass filter below, determine the transfer function $H(\omega)$ and sketch $|H(\omega)|$, $\theta_h(\omega)$, and $t_d(\omega)$. For distortion less transmission through this filter, what is the requirement on the bandwidth of $g(t)$ if amplitude response variation within 2% and time delay variation within 5% are tolerable? What is the transmission delay? Find the output $y(t)$.



University of Engineering & Technology, Peshawar

Department: Computer Systems Engineering

Semester: 4th Semester

Allowed Time: 120 Minutes

Paper: Probability Methods in Engineering

Exam Type: Final term

Total Marks: 60

Instructions:

- 1- This exam is CLOSED books/notes/Internet.
- 2- Sharing of books, notes and other materials during this exam is not permitted.
- 3- There are 4 problems in total. Some problems are harder than others. Answer the easy ones first to maximize your score.
- 4- Problems will not be interpreted during the exam.

Answer All Questions

Q1: Part A: In a bolt factory, three machines M_1 , M_2 , and M_3 manufacture 2000, 2500, and 4000 bolts every day. Of their output 3%, 4%, and 2.5% are defective bolts. One of the bolts is drawn very randomly from a day's production and is found to be defective. What is the probability that it was produced by machine M_2 ? (Marks 7)

Q1: Part B: The results of a survey of a group of 100 people having insurances with a certain company are as follows: 40% have both home and car insurances with the company. The probability that person selected at random from this group, has a car insurance is 0.7. What is the probability that a person selected at random has a home insurance knowing that he has a car insurance? (Marks 7)]

Q2: Part A: Let X denote a discrete random variable that can take the values $\{-1, M, 1\}$. Given that X has probability distribution function $f(x) = \frac{x+2}{6}$, find the expected value of X . (Marks 7)

Q2: Part B: Show that the expected value of the binomial random variable is np . (Marks 7)

Q3: Part A: Find the variance of the geometric random variable. (Marks 7)

Q3: Part B: Let X be a discrete random variable $R_x = \{1, 2\}$ having support and probability mass function is given as

$$\begin{aligned} f(x) &= \begin{cases} p & \text{if } x=1 \\ q & \text{if } x=2 \end{cases} \\ E(X) &= 1 \cdot p + 2 \cdot q = 1 \cdot p + 2 \cdot (1-p) = 2p - p^2 \\ E(X^2) &= 1^2 \cdot p + 2^2 \cdot q = 1 \cdot p + 4 \cdot (1-p) = 4p - 3p^2 \\ \text{Variance} &= E(X^2) - E(X)^2 = (4p - 3p^2) - (2p - p^2)^2 = (p-1)p^2 \end{aligned}$$

$$p_X(x) = \begin{cases} 3/4 & \text{if } x = 1 \\ 1/4 & \text{if } x = 2 \\ 0 & \text{otherwise} \end{cases}$$

$\mu_3 = 4$
 $\sigma^2 = 3.5$
 $\gamma_1 = 3.5$

Find the third central moment of X using moment theorem. (Marks 7)

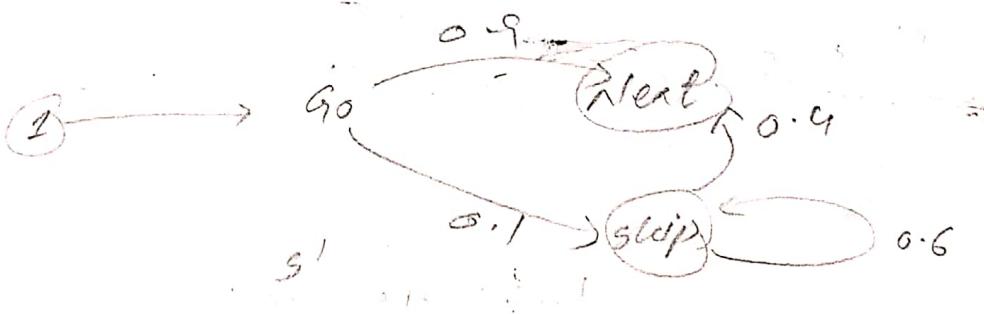
Q4: Part A: A customer help center receives on average 3.5 calls every hour. (Marks 7)

- What is the probability that it will receive at most 4 calls every hour?
- What is the probability that it will receive at least 5 calls every hour?

Q4: Part B: Your attendance in your Probability Methods in Engineering (PME) class can be modeled as a Markov process. When you go to class, you understand the material well and there is a 90% chance that you will go to the next class. However when you skip class, you become discouraged and so there is only a 60% chance that you'll go to the next class. Suppose that you attend the first day of class. Determine (Marks 5)

- Transition probability matrix.
- State-transition diagram for this problem.

Q4: Part C: Let V be the voltage of a signal in S_V having possible values 1, 2 and 3 with $p_V(k)$ as $1/4$, $1/2$ and $1/4$ respectively. Find the mean power $E[P]$ of the signal where $P = V^2$ and $R = 1$. Find $E[Z]$ where $Z = (V+1)^3$. (Marks 6)





Department of Computer Systems Engineering
University of Engineering & Technology
Peshawar, PAKISTAN

Subject: Signal and Systems (4th Semester)

Exam: Mid Term (Spring 2022)

Max Marks: 25

Attempt All Questions.

Time allowed

: 2 hours

Question 1:

- 1) For the continuous time signal $x(t)$ and discrete-time signal $x[n]$ given in Figure-1 below; find and sketch the following signals. (CLO1) (4 Marks)

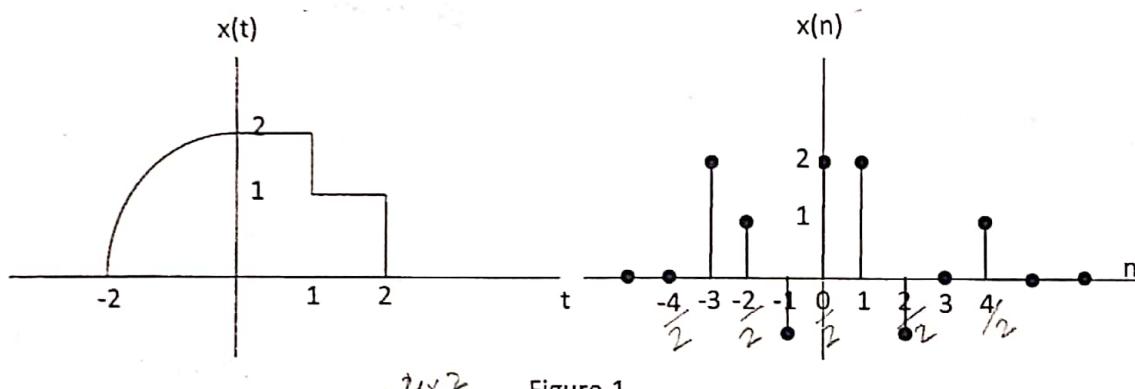
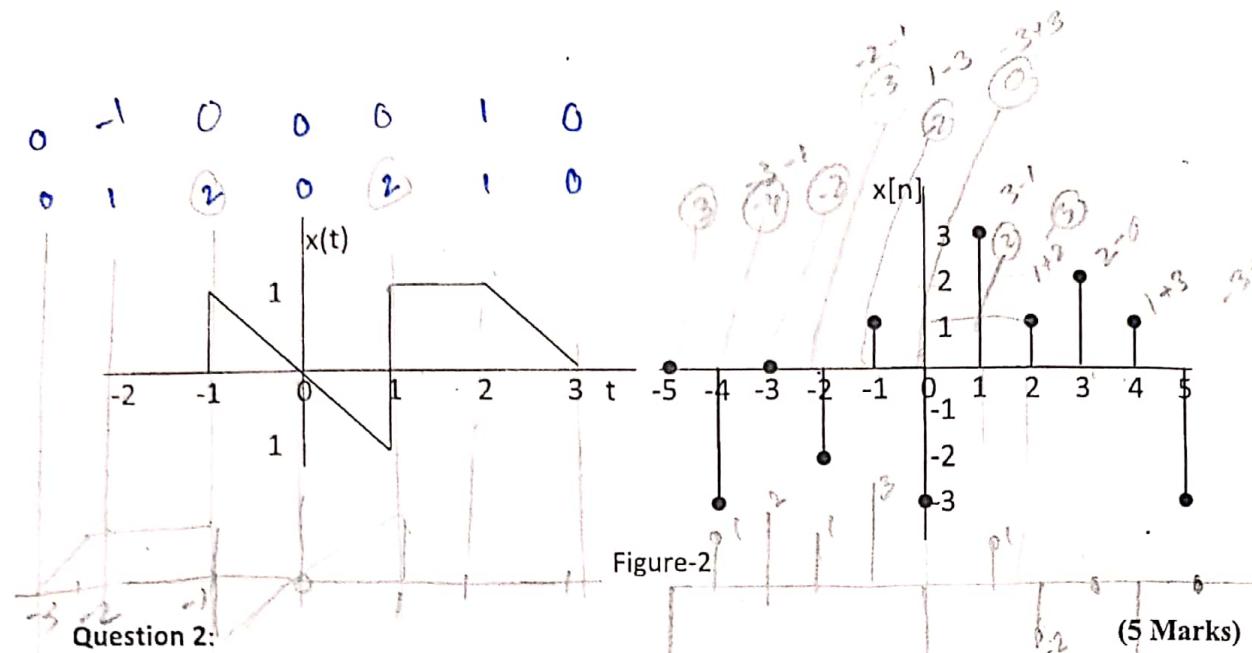


Figure-1

- a) $x(-2t + 2)$
- b) $-2x(-\frac{1}{2}t + 2)$
- c) $x[2n - 2]$
- d) $2x[-\frac{1}{2}n + 1]$
- 1
- 2) What are even and odd signals? Can a signal be neither odd nor even? Can a signal be even and odd at the same time? (CLO1) (2 Marks)
- 3) Find and sketch the even and odd parts of the continuous time signal $x(t)$ and discrete-time signal $x[n]$ given in Figure-2 below. (CLO1) (4 Marks)
- Handwritten notes for question 1d):*
 $\begin{aligned} &x[n] = \begin{cases} 2, & n = -1 \\ 0, & \text{otherwise} \end{cases} \\ &\text{Even part: } x_e[n] = \begin{cases} 2, & n = -1 \\ 0, & \text{otherwise} \end{cases} \\ &\text{Odd part: } x_o[n] = \begin{cases} 0, & n = -1 \\ 2, & n = 1 \\ 0, & \text{otherwise} \end{cases} \end{aligned}$



Question 2:

Figure-2

(5 Marks)

- State the following properties of systems and explain each one with the help of an example?
- System with memory vs system without memory
- Causal vs non-causal systems
- Invertible vs non-invertible systems
- Linear vs non-linear system
- Time-invariant system vs time-variant system

~~Ans 0.5~~

Question 3:

- Use the convolution sum/integral to find the outputs for the following pairs of signals and LTI systems (continuous time system $h(t)$ and discrete time system $h[n]$) given below in Figure-3. Also sketch the output signals $y(t)/y[n]$. (CLO2)

(5+5 Marks)

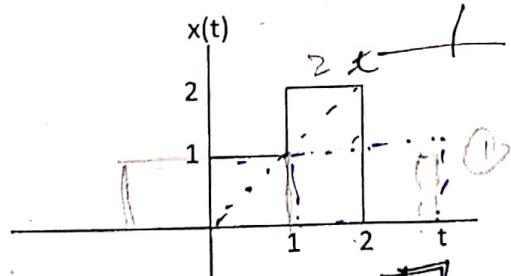
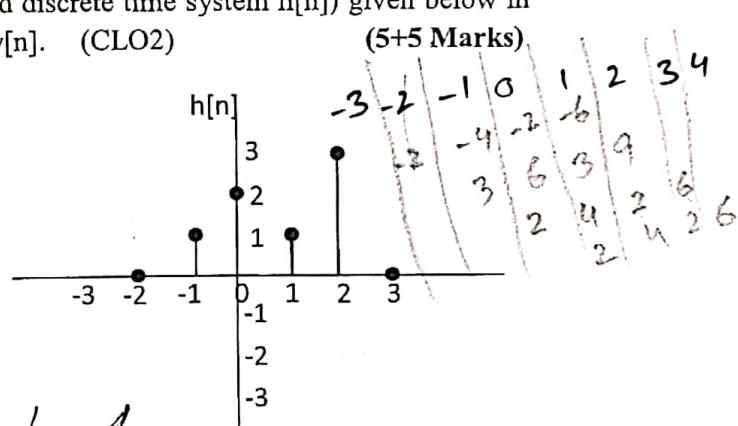
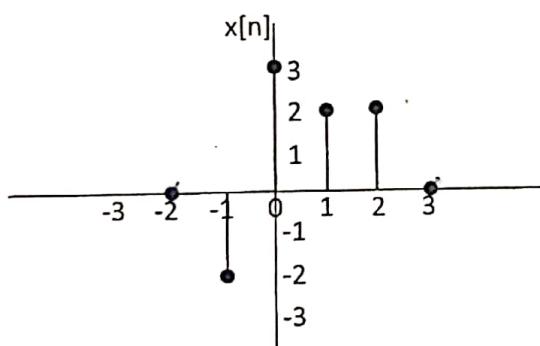
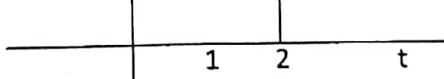


Figure 3

~~Ans~~ $h(t)$



~~E<4~~

$r(t) \cdot h(t-t)$



Exam: Final term (Fall 2022)

Paper: CSE-305 (5th Semester)

Time: 2 Hours

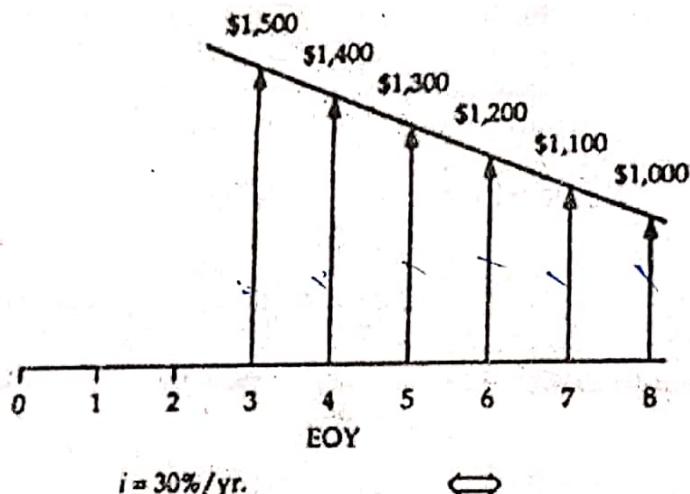
Marks: 50

Note: Attempt all questions on the answer sheet.

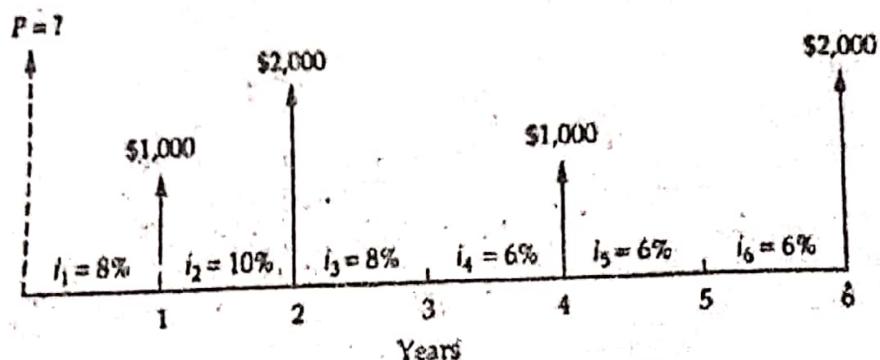
Question No. 1 (CLO 2-3, Marks 20):

Attribute suitable engineering economic terminology to the following scenarios.

- a. Devise a single-line notational expression for the following gradient series at N=8. (3 Points)



- b. Devise the sinking fund notation for 10% interest and 8-time stamps. (1 Point)
- c. Devise the single cash flow that represents the following notational expression for the present worth: $\$2000 (\text{P/A}, 5\%, 20) + \$175 (\text{P/F}, 5\%, 1) + \$200 (\text{P/G}, 5\%, 20)$. (3 Points)
- d. Evaluate the rate of interest that can reduce a single payment at the EOY-10 to 5 times at present. (4 Points)
- e. Provided nominal interest rate APR of 10% compounded monthly and the uniform payment made quarterly, devise the expression for the effective interest rate EIR for this venture. (2 Points)
- f. Calculate the number of time stamps required to increase an initial investment to fifteen times its initial value at the rate of 12.5%. (3 points)
- g. Devise a single-line notational expression for the following multiple single payment cash flow at P: (3 Points)
- h. Name the formal economic terminology for $(\text{P/F}, i\%, N)$. (1 Point)

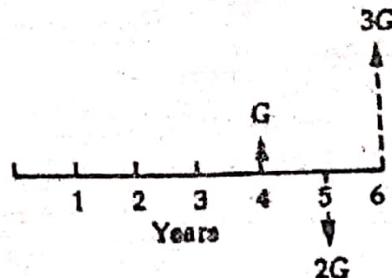
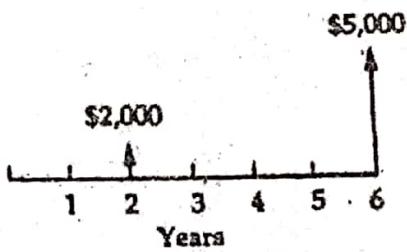


Question No. 2 (CLO 3, Marks=10)

The running businesses of Wilbur trout ranch are for sale and your company wants to purchase it for a more wanted investment after 7 years. The initial costs for the business are \$50,000. Annual costs for maintenance, supplies, and so on are estimated to be \$3,000 per year. Revenues from the ranch are expected to be \$7,000 per year. The salvage value of the land after 7 years is \$25,000. The annual minimum attractive rate of return is 12%. As a quality assurance engineer, you are asked to devise an economic feasibility plan for the company's new venture. What would you suggest to your company based on the feasibility plan you devised? [Hint: Use AW Method with $CR(MARR) = (I-S)(A/F, i\%, N) - I(i\%)$]

Question No. 3 (CLO 2, Marks=10)

Solve the following cash flow for the value of G, given that both cash flows are equivalent. Let the interest rate be equal to 12%.



Question No. 4 (CLO 3, Marks=10)

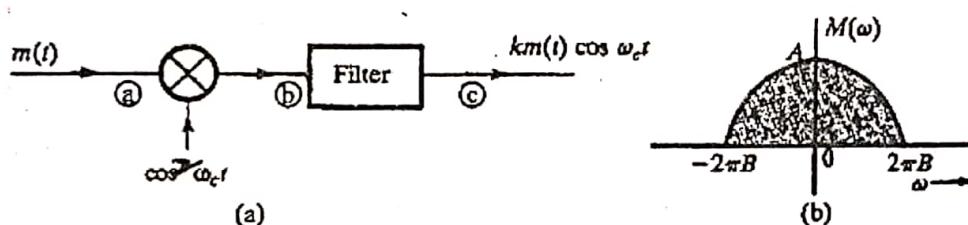
The retirement plan for a venture is made for the \$100 (A) saved at the end of each month (K) that earns at the rate of 4.5% (r) interest compounded continuously (∞) per year. Determine the accumulated amount saved with this plan at the end of 30 years. If this plan is not selected and the same savings are made to another venture that earns at 5% (r) interest compounded monthly (M), will this accumulated amount at the end of 30 years overcome the amount gained with the previous plan? [Hint: Determine which plan is better by finding the future worth]



Question No. 1 (Marks 10)(CLO-3, PLO-3)

You are asked to design a **DSB-SC** modulator to generate a modulated signal $km(t)\cos\omega_c t$, where $m(t)$ is a signal band-limited to B Hz. Figure below shows a **DSB-SC** modulator available in the stock room. The carrier generator available generates not $\cos\omega_c t$, but $\cos^2\omega_c t$. Explain whether you would be able to generate the desired signal using only this equipment. You may use any kind of filter you like.

- What kind of filter is required in figure below?
- Determine the signal spectra at points **b** and **c**, and indicate the frequency bands occupied by these spectra.
- What is the minimum usable value of ω_c ?

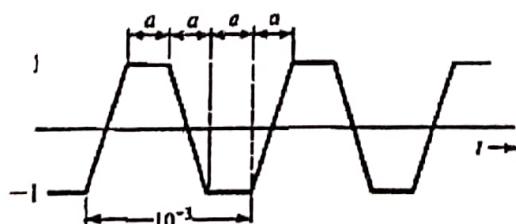


Question No. 2 (Marks 10)

What are the **BW** efficient variants of the **AM** signals? Describe **SSB** in detail and the role of Hilbert transformation to overcome **BW** inefficiency.

Question No. 3 (Marks 10)

Sketch $\varphi_{FM}(t)$ and $\varphi_{PM}(t)$ for the modulating signal $m(t)$ shown in figure below, given $\omega_c = 10^8$, $k_f = 10^5$, and $k_p = 25$



Question No. 4 (Marks 10)

- "As long as the sampling frequency f_s is greater than twice the signal bandwidth B (in hertz), $G(\omega)$ will consist of no overlapping repetitions of $G(\omega)$ ". Describe in detail the quoted text with proper reasoning and mathematical proof. Also show the relevant figures.

- b) The treachery of Aliasing is the fundamental difficulty in reconstructing a signal from its samples. Describe the cause and solution of the Aliasing effect.

Question No. 5 (Marks 10)

A signal $m(t)$ band-limited to $3kHz$ is sampled at a rate 33.33% higher than the Nyquist rate. The maximum acceptable error in the sample amplitude (the maximum quantization error) is 0.5% of the peak amplitude m_p . The quantized samples are binary coded. Find the minimum bandwidth of a channel required to transmit the encoded binary signal. If 24 such signals are time-division-multiplexed, determine the minimum transmission bandwidth required to transmit the multiplexed signals.



Department of Computer Systems Engineering
University of Engineering & Technology
Peshawar, PAKISTAN

Subject: Digital Signal Processing

Exam: Final Term (Fall 2022)

Total Marks: 25 Time allowed: 2 hours

Question 1:

(CLO2)

- 1) The set of the Fourier Series coefficients a_k of a discrete-time signal $x[n]$ is given below, draw the magnitude and phase spectrum of $x[n]$. What will the period N and fundamental frequency ω_0 of the signal $x[n]$? Express the signal $x[n]$ in the form $x[n] = \sum_{k=-N}^{N} a_k e^{j k \omega_0 n}$ and sketch $x[n]$. (2+1+2 Mark)

$$a_0 = 1, \quad a_1 = \frac{1}{2} - \frac{1}{2}j, \quad a_2 = 0, \quad a_3 = \frac{1}{2} + \frac{1}{2}j$$

- 2) Given the Fourier series coefficients a_k for the signal $x[n]$ in part(a) above; find the Fourier series coefficients b_k and c_k for the signal $x_1[n]$ & $x_2[n]$ given below; (2+2 Marks)

$$x_1[n] = 2x[n-1]$$

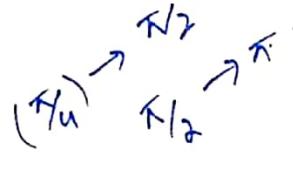
$$x_2[n] = x[n-1] + x[1-n]$$

Note: Mention the property of Fourier series used at every step

Question 2:

- 1) Use Fourier Transform method to find the output $y[n]$ of the LTI system given by the following difference equation when the input signal $x[n]$ is passed through it. (4 Marks)

$$y[n] = x[n] + \frac{3}{4}y[n-1] - \frac{1}{2}y[n-2]$$
$$x[n] = \frac{1}{2} + 2\cos\left(\frac{\pi}{4}n - \frac{\pi}{6}\right) + \frac{1}{3}\cos\left(\frac{\pi}{2}n\right)$$



Question 3:

(CLO3)

- 2) Determine the direct form I, direct form II and transpose structures for the LTI system given below. Also compare the good and bad aspects of these structures. (4 Marks)

$$y[n] + 0.2y[n-1] - 0.5y[n-2] = 3x[n] + 1.5x[n-1] + 3.6x[n-2]$$

Question 4:

(CLO 4)

- 1) Draw the spectrum of an Ideal low pass filter. Why this ideal filter cannot be implemented practically? How the real filters differ from the ideal filters and how the spectrum of such real filter deviates from the ideal behavior. (3 Marks)
- 2) Design a low pass FIR filter to meets the specifications given in Figure-1 bellow. Justify your choice of window and filter length M. (4+1 Marks)

Note: The characteristics of different windows are given below.

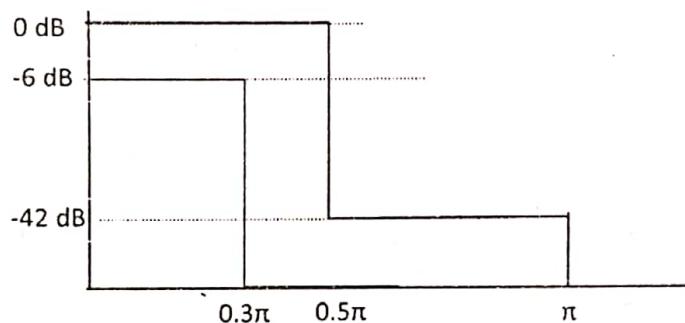


Figure-1

Window	Main-lobe width	Stop-band attenuation	Equation $0 \leq n \leq M-1$
Rectangular	$\frac{4\pi}{M}$	-21	1
Hanning	$\frac{8\pi}{M}$	-44	$0.5 \left(1 + \cos \frac{2\pi(n - \frac{M-1}{2})}{M-1} \right)$
Hamming	$\frac{8\pi}{M}$	-53	$0.54 + 0.46 \cos \frac{2\pi(n - \frac{M-1}{2})}{M-1}$
Blackman	$\frac{12\pi}{M}$	-74	$0.42 + 0.5 \cos \frac{2\pi(n - \frac{M-1}{2})}{M-1} + 0.08 \cos \frac{4\pi(n - \frac{M-1}{2})}{M-1}$

SYSTEMS PROGRAMMING LAB EXAM FALL 2022

Time Allowed: 1 hour

Question # 1 [20 Marks/15 minutes][CLO 2/PLO 3]:

Write a program "minmax.c" that takes an array as command line arguments. Program shall create two child processes. One child process finds and returns the minimum value and other calculates and returns the maximum value in the array. The program "minmax.c" shall receive the values returned by the child processes and display these values.

Question # 2 [25 Marks/30 minutes][CLO 3/PLO 3]:

Write a program to implement file server using fifos.

Server shall take the name of a directory and a file as input from command line and searches if the file is present in the directory or not.

In case the file is found, it should send the contents of the file to the client.

Client shall receive the contents and save it on disk in a file in /home/STUDENT/Desktop directory.

DSP Lab Exam

Final Term

Time Allowed 30 Mins

Write your name & Registration No on the Answer Sheet.

1. What is power spectral density, mention at least **two methods to estimate** the power spectral density of a signal in MATLAB.
2. You have analyzed both the spectrum and spectrogram of various signals during your lab work. What is the **difference** between spectrum and spectrogram.
3. Write down **function/use of dsp.spectrumanalyser object**, what are **main advantages** of using this object.
4. You used scalogram. In which **scenarios** you prefer it to use for analysis of signals



Microprocessor Based System Design (MBSD)
6th Semester Mid-Term, Spring 2023

Max. Points: 20

Max. Time: 2 hours

Instructions:

1. Attempt ALL questions.
2. Exam is open book and open notes.
3. Cell phones and Laptops are strictly prohibited.
4. Exam is worth 20% of the final grade.

6555

Q 1).

CLO-5/PLO-3 [Cognitive Domain: Synthesis]

8-points

Design a system, where the Software in C will generate, a signal of

- A. 0.25KHz with a duty cycle of 10% on P2.0 pin.
B. Whenever a user presses a button at (P3.2), the signal toggles to 0.5KHz with a duty cycle of 50%.
C. Again, pressing the same button will generate a signal of 1KHz with a duty cycle of 75%.

A third time button press will result in the generation of case A and so on.

• Draw the schematic diagram showing clearly the button circuit and oscilloscope.

• Draw the timing diagram with cursors clearly showing the time period with appropriate units.

• Assuming oscillator clock of 24MHz is used.

• Use timer interrupt. Use External interrupts.

• Polling is not allowed.

Q 2).

8-points

CLO-3/PLO-2 [Cognitive Domain: Application]

Fill the table by solving the values of variables in the program.

```

unsigned char x = 0x12, y=0, z = 0, R = 7 ;
void main(void)
{
    while(y<5) {
        x = 0x80 - y;           0111 1111
        x^= x;
        x += 0x7F;
        x = x>>y;
        R += (R << 1);
        z += (x+y+R);

        y++;
    }
}

```

	X	R	Z
Y=0	7F (127)	21 (0x15)	148 (0x94)
Y=1	63 (0x3F)	63 (3F)	17 (13)
Y=2	31 1F	109 B9	241
Y=3	15 0F	55 (37)	58
Y=4	7	165 (A5)	234

Name & Reg No: _____

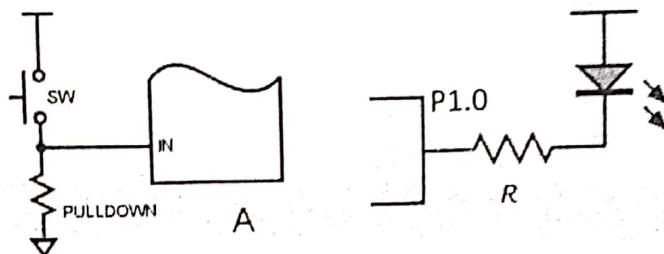
Q 3).

4-points

CLO-2/PLO-1 [Cognitive Domain: Comprehension]

Translate the following tasks into C code.

- i) If we have an active-high button (A) at P2.5 pin and an *active-low LED* at P1.0 as shown below,



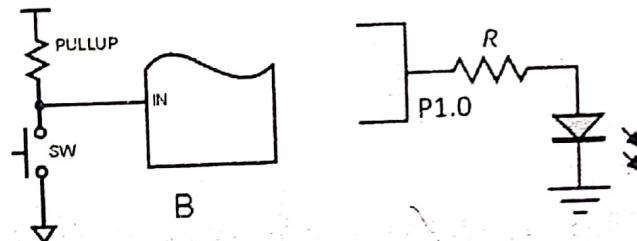
P2.5 = _____;

Scan the button using polling

While (_____)

{
P1.0 = _____ // Button pressed, TURN ON the active-low LED at P1.0
}

- ii) If we have an active-low button (B) at P2.5 and an *active-high LED* at P1.0 as shown below,



P2.5 = _____;

Scan the button, using polling

While (_____)

{
P1.0 = _____ // Button pressed, TURN ON the active-high LED at P1.0
}

Name & Reg No: Tameem 1866



Department of Computer Systems Engineering
University of Engineering & Technology
Peshawar

Microprocessor Based System Design (MBSD)
6th Semester Final-Term, Spring 2023

Max. Time: 2 hours

Max. Points: 50

Instructions:

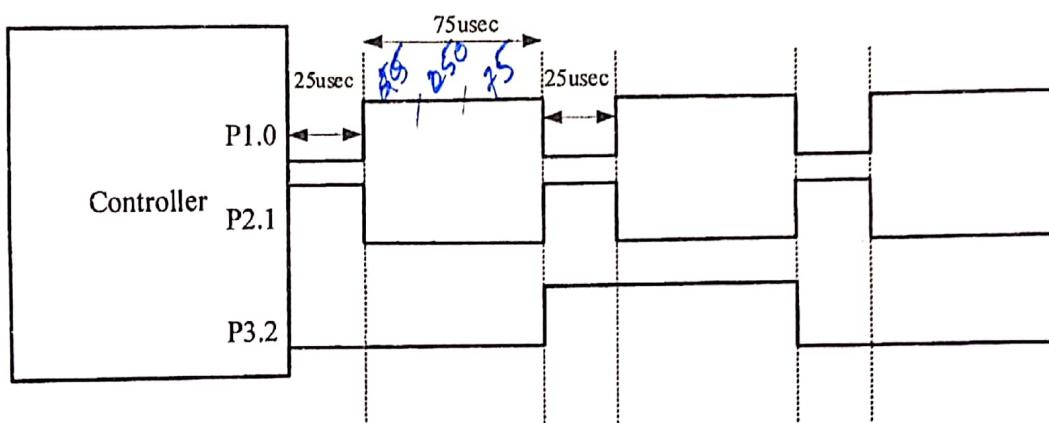
1. Attempt ALL questions.
2. Exam is open book and open notes.
3. Exam is worth 50% of the final grade.

Q 1).

15-points

Design CLO-2/PLO-1 [Cognitive Domain: Comprehension]

- A. Translate the timing diagram below and write the code for it to generate these periodic signals. Use timer interrupts for this purpose.



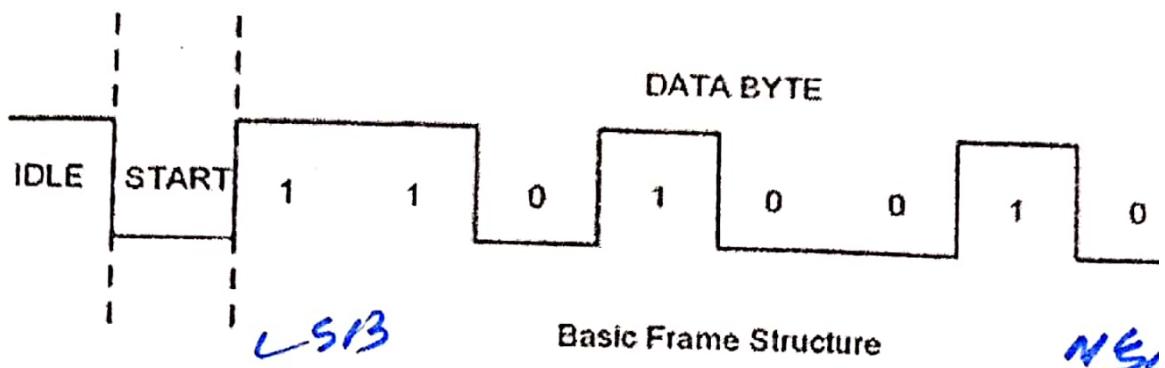
Can you generate all three signals using a single timer?

Name & Reg No: _____

Q 2).

CLO-3/PLO-3 [Cognitive D]

An Engineer at NXP semiconductor found this data on oscilloscope when communication between two 8051 controllers.



Write the C code for it by Solving the bit-duration of the above timing diagram
What data will be received by the receiver?
What is the transmission rate?

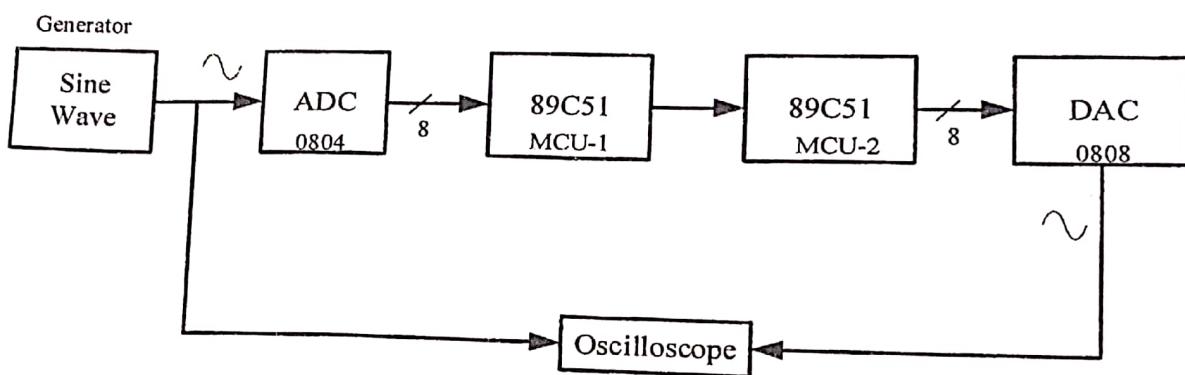
Name & Reg No: _____

Q 3.

20-points

CLO-5/PLO-3 [Cognitive Domain: Synthesis]

Design a system, where the Software in C is used to interface an ADC and DAC, to two 89C51 microcontrollers as shown below in figure,



Develop the system as shown above.

The oscillator frequency of both microcontrollers is fixed at **22.118MHz**. Keeping in view the fastest possible transmission rate of serial comm and ADC conversion rate. How much the frequency of input signal can be increased? Run the system at that frequency and write the code for it.

- a. What will be transmission rate of MCU-1 in bits per second.
- b. What sampling rate will you choose for ADC.
- c. Assuming sampling frequency = $(10 \times \text{Input sine wave frequency})$
- d. If you choose X Hz as the fastest possible frequency of input sine wave. Which component will be the bottleneck at $(X+1)$ Hz. Will it be ADC, DAC, Serial Comm or something else?
- e. Draw the timing diagram of input sine wave signal and output of DAC. Show the amplitude and time period.
- f. Use timers for precise calculations.

*Name: Tameem ud Din

*Registration: 20 PW CSE 1866

**Department of Computer Systems Engineering
University of Engineering & Technology Peshawar**

**Digital System Design
CSE 308**

**Midterm Examination Spring 2023
13 April 2023, Duration: 120 Minutes**

****Exam Rules****

Please read carefully before proceeding.

- 1- This exam is closed books/notes/Internet.
- 2- Answer all problems on the answer sheet.
- 3- Problems will not be interpreted during the exam.

Good Luck!

Problem 1. (25 pts.)

Below is an RTL (or Dataflow) description for a circuit.

```
module RTL_circuit (x, y, a, b, c);

    input a, b, c;
    output x, y;
    wire a, b, c, x, y;
    wire na, nb, nc, t3, t4, t5;

    assign na = !a;
    assign nb = !b;
    assign nc = !c;
    assign t3 = na && b && c;
    assign t4 = a && nb && c;
    assign t5 = a && b && nc;
    assign x = t3 || t5;
    assign y = a || t4;

endmodule
```

- 1(a) (3 pts.) Give a Verilog statement that instantiates the above RTL_circuit, with the instance name MID. When you instantiate the circuit, use the same names for wires as is used in the module port list.
- 1(b) (6 pts.) Rewrite the RTL_circuit using Verilog built-in primitives and structural Verilog. Part of the module is done for you.

```
module struct_circuit (x, y, a, b, c);

    input a, b, c;
    output x, y;
    //Write your code here

endmodule
```

- 1(c) (3 pts.) Draw a gate-level diagram for your module in 1(b). Label all nets on the diagram.
- 1(d) (6 pts.) Rewrite the RTL_circuit using behavioral Verilog. Part of the module is done for you.

```

module behav_circuit (x, y, a, b, c);

    input a, b, c;
    output x, y;
    //Write your code here

endmodule

```

1(e) (7 pts.) Write the output of RTL_circuit for the following test bench.

```

//test bench for RTL_circuit
module test_RTL_circuit;

    reg a, b, c;
    wire x, y;

    RTL_circuit RTLC (x, y, a, b, c);

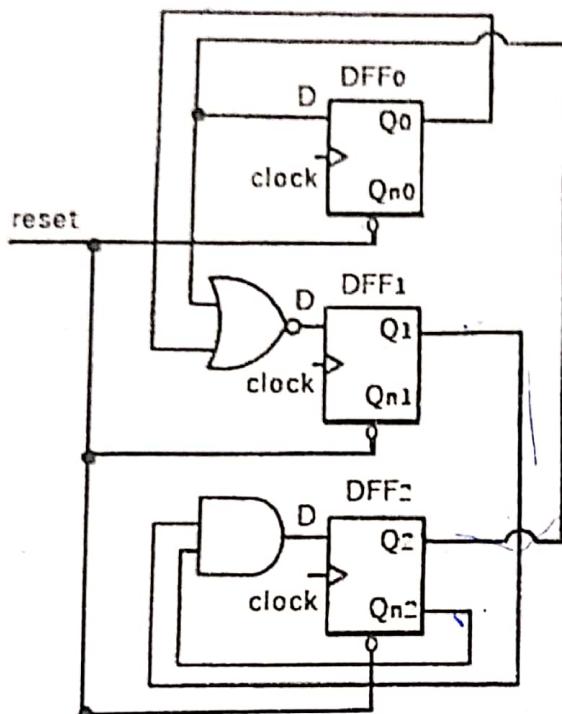
    Initial begin
        a = 1; b = 1; c = 1;
        #30 a = 0; b = 1; c = 1;
    end

    initial begin
        $display ($time, " x = %b and y = %b", x, y);
        #6 $display ($time, " x = %b and y = %b", x, y);
        #5 $display ($time, " x = %b and y = %b", x, y);
        #20 $display ($time, " x = %b and y = %b", x, y);
        #5 $display ($time, " x = %b and y = %b", x, y);
        #6 $display ($time, " x = %b and y = %b", x, y);
        #8 $display ($time, " x = %b and y = %b", x, y);
    end
endmodule

```

Problem 2. (10 pts.)

In this problem, design a 3-bit counter (the circuit diagram and state table are shown in **Figure 1**) using as building block the D flip-flop given in **Figure 2**.



Input		
reset	clock	$Q_2 Q_1 Q_0$
0	X	000 (0)
→1	↑	010 (2)
1	↑	110 (6)
1	↑	001 (1)
1	↑	000 (0)

Figure 1. The circuit diagram (left) and state table (right) of the 3-bit counter

```

module DFF (D, clock, reset, Q, Qn);

    input D; // Data input
    input clock; // Clock input
    input reset; // Asynchronous active-low reset
    output Q, Qn; // Outputs Q and Q'
    reg Q;

    always @ (posedge clock or negedge reset)
        if (reset==1'b0)
            Q <= 0;
        else
            Q <= D;

    assign Qn = ~Q;
endmodule

```

Figure 2. Verilog code for rising-edge D flip-flop with asynchronous active-low reset

The suggested skeleton file for the counter has been written below. The module has 2 inputs - **clock** and **reset** which is active-low. The output is **out** which is 3-bit in size.

```
module counter (clock, reset, out);

    input clock, reset;
    output [2:0] out;
    // Write your code here

endmodule
```

Problem 3. (10 pts.)

In this problem, write Verilog code for an 8-to-1 multiplexer. In this case, the value on the 3-bit select line will route 1 of 8 inputs to the output. This module is purely combinatorial.

The following are the ports of the module:

Sel	3-bit select line
I0, I1, I2, I3, I4, I5, I6, and I7	1-bit data inputs
OUT	1-bit output

Problem 4. (10 pts.)

For this design, combine the counter (from **Problem 2**) with the multiplexer (from **Problem 3**) to create a circuit such that the output of the counter controls the select lines of the multiplexer.

This top-level design has the following port definitions:

clk	1-bit clock
reset	1-bit reset line
D0, D1, D2, D3, D4, D5, D6, and D7	1-bit data inputs
OUT	1-bit output



Department of Computer Systems Engineering
University of Engineering & Technology Peshawar
6th Semester Final-term Examination, Spring 2023
Course Title: Technical Writing
Course Code: CSE311
Total Marks: 50
Maximum Weightage: 50%
Time allowed: 02 Hours

Name: Tameem ud Din

Reg #: 20PWCSE1866

- Attempt all five questions; all of them carrying equal marks.
- Do not write anything on this question paper except your name and registration number.
- Mobile Phones, Smart Watches and all types of Programmable Devices are strictly prohibited.

Q1 – You are employed as a Network & Security Officer in a large multinational company. Your company's wireless security system has been facing problems due to its extensive use or may be due to some other causes. Write a letter to the purchase manager, explaining the problem and requesting the purchase of a new multi-function device. Provide the rationale/justification for the expense.

Affective-2 (Responding)

Q2 – In your candid opinion, how should the content, delivery and assessment of this course "Technical Writing" be changed for the upcoming batches? Affective-3 (Valuing)

Q3 – What are the essential ingredients of a good proposal? Explain/Justify with the help of your own FYP proposal that you wrote as an assignment for this course. Affective-4 (Organization)

Q4 –

Congratulation! You've completed your degree and got a terrific job in your field. One of your instructors was especially helpful to you when you were a student. Besides other facilitations, this instructor also wrote an effective letter of recommendation that was instrumental in helping you obtain your job. Now write an email of thanks/appreciation to your instructor.

Q5 –

- a) Following are the 7Cs of Effective Business Communication. Write a line about each.
 1. Correctness
 2. Clarity
 3. Conciseness
 4. Completeness
 5. Consideration
 6. Concreteness
 7. Courtesy
- b) What do you understand by the phrase "Tell them what you are going to tell them then tell them and then tell them what you have told them"?



**Department of Computer Systems Engineering,
University of Engineering and Technology, Peshawar,
Pakistan**

Midterm Exam (Spring 2023)
Time: 1 Hour 45 Minutes

Paper: CSE-403 Database Management System
Marks: 80

Note: Attempt all questions on answer sheet.

Paper Part B

Q II. Draw an E-R Diagram for each of the following scenario. Ensure that all entities, attributes, relationships, degree of relationships, types of relationship, cardinalities and the given business rules are correctly depicted with appropriate notations in the ERD. If you believe that you need to make additional assumptions, clearly state them for each situation. **(Marks=70) (CLO-2)**

- a) An Employee may be assigned a company CAR, but some Employees do not qualify for a company CAR. A CAR will be assigned to one and only one Employee. Each car has associated with it zero to any number of recorded accidents.
- b) An animal may eat many other different animals or may not eat any animals (vegetarian). An animal may be eaten by many different animals or may not be eaten by any animal at all.
- c) In a Manufacturing Company, a part has at least one alternative part (or substitute part). Some parts do not serve as an alternative (substitute) for any parts. Also, a part may serve as an alternative for many different parts.
- d) Create an ERD for a service station business that provides goods and services to its customers. Typically a customer comes in with their vehicle and requests certain work to be performed. For example a customer may request an oil change and for a new set of four tires to be provided and installed. The work items that can be performed or supplied can be of two types: a service (such as the oil change) and actual physical items (such as litres of oil). There will be several services that can be performed such as tire installation, changing oil, or fixing a flat tire. Each of these will have some cost to be charged to a customer. There are many concrete items that are supplied and charged to a customer such as fan belts, litres of oil, or tires – these are things that are kept in inventory. Consider creating a hierarchy for products (goods / services); make up reasonable attributes.
This service station has customers that fall into two groups: some are private individuals and others are businesses. Individuals will have a first name, last name, address and phone number. A business will have a business name, address, phone number and a contact person who has a first name and last name. Consider creating a hierarchy for customers.
The service station needs to keep track of all the goods and services it provides to its customers so that it has a historical record and knows what it has charged to each customer. Each visit to the service station by a customer will generate a work order that keeps track of the work that was done for the customer's vehicle. Vehicles have license plate numbers, and other attributes to describe them (make, model, colour, ...). For each visit of a customer to the station the system needs to know the date the visit occurred, the details of the work performed and goods provided, and the total charge to the customer.
- f) An institute facilitates its students to participate in three types of sports events: Long Jump, Discus Throw and 100- Meter race. The following attributes are recorded for each event:
 - Long Jump: Student Roll Number, Name, House, Age, Recorded Jump
 - Discus Throw: Student Roll Number, Name, House, Age, Distance covered
 - 100 m. Race: Student Roll Number, Name, House, Age, Time taken

Apply rule of generalization and develop an EER model segment using Visio notation. Assume that each of this sport event can be a part of exactly one of these subtypes.

Q III. List 5 potential benefits and costs/risks associated with Database approach over conventional file systems. **(Marks=10)**



Department of Computer Systems Engineering,
University of Engineering and Technology, Peshawar,
Pakistan

Midterm Exam (8th, Spring 2024)

Time: 2 Hours

Paper: Artificial Intelligence (CSE-407)

Marks: 30

Note: Attempt all questions on the answer sheet.

Any other instructions, if required.

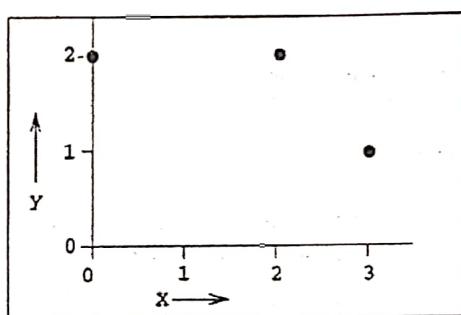
Question No. 1 (Marks=2, CLO-1)

Suppose that X_1, \dots, X_m are categorical input attributes and Y is categorical output attribute. Suppose we plan to learn a decision tree without pruning, using the standard algorithm.

(True or False) If X_i and Y are independent in the distribution that generated this dataset, then X_i will not appear in the decision tree. Explain your answer.

Question No. 2 (Marks=5, CLO-2)

Suppose you have this data set with one real-valued input and one real-valued output:



X	Y
0	2
2	2
3	1

- What is the R^2 value?
- Suppose we use a trivial algorithm of predicting a constant $y = c$. What is the mean squared error in this case? (Assume c is learned from the non-left-out data points.)

Question No. 3 (Marks=5, CLO-2)

Pakistan International Airlines has developed 2 different classifiers (A and B) for the prediction whether a flight originating from Peshawar will arrive at its final destination on time or not. True or Positive here is 'On time' and it refers to the case when the flight is no more than 5 minutes late than the scheduled time. The classifiers were tested on a data-set of 500 flights, and the results are as follows:

	Actual	
	On time	Late
Classifier A, predicted on time	131	155
Classifier A, predicted late	19	195
Classifier B, predicted on time	82	72

- Construct confusion matrix for both the classifiers?
- Which is the preferable classifier in terms of accuracy?

Question No. 4 (Marks=5, CLO-3)

Compute K Nearest Neighbor Algorithm

Hints:

- Determine parameter K number of nearest neighbors.
- Calculate the distance between the query-instance and all the training samples.
- Sort the distance and determine nearest neighbors based on the Kth minimum distance.
- Gather the category of the nearest neighbors.
- Use simple majority of the category of nearest neighbors as the prediction value of the query instance.

X1= acid durability (seconds)	X2= Strength (kg/sq meter)	Y = classification
7	7	Bad
7	4	Bad
3	4	Good
1	4	Good

Now the factory produces a new paper tissue that pass laboratory test with $x_1=3$ and $x_2=7$. Without another expensive survey, can we guess what the classification of this new tissue is?

Question No. 5 (Marks=10, CLO-3)

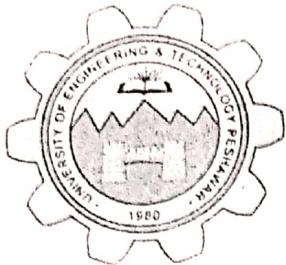
A second-hand car dealer has 10 cars for sale. She decides to investigate the link between the age of the cars, x years, and the mileage, y thousand miles. The data collected from the cars are shown in the table below.

Age, x (years)	2	2.5	3	4	4.5	4.5	5	3	6	6.5
Mileage, y (thousands)	22	34	33	37	40	45	49	30	58	58

[You may assume that $\sum x = 41$, $\sum y = 406$, $\sum x^2 = 1$, $\sum xy = 1818.5$]



- Find S_{xx} and S_{xy}
Hints $S_{xx} = \sum x^2 - (\sum x)^2 / n$ $S_{xy} = \sum xy - (\sum x \sum y) / n$
- Find the equation of the least squares regression line in the form $y = ax + b$. Give the values of a and b to 2 decimal places.
- Give a practical interpretation of the slope b
- Using your answer to part (b), find the mileage predicted by the regression line for a 5-year-old car.



Department of Computer Systems Engineering
University of Engineering & Technology Peshawar
6th Semester Mid-term Examination, spring 2023

Course Title: Technical Writing

Course Code: CSE311

Total Marks: 20

Maximum Weightage: 20%

Time allowed: 02 Hours

Name: Tameem

Reg #: 20pwse 1866

- Attempt all questions Marks are written in parenthesis in front of every question
- Do not write anything on this question paper except your name and registration number.
- Mobile Phones and Smart Watches are strictly prohibited

Q1 –

CLO1: Affective-2 (Responding)

(5)

What type of a document is the following? Also point out and correct the mistakes therein.

After having know him for a handsome amount of time, as his friend, it is my joy to reproduce him to PTC summer internship program 2018. I first got to know him when he was playing cricket in the streets. Both of the courses I teach him he passed with good grades and impressed me. His intelligent questions and dedication to the course quickly made him stand out from his peers. Later on, when he requested to be my Teaching Assistant (TA) I was more than happy to have him on my team.

He performed his duties with finesse and alacrity. I saw that he has an insightful and perceptive mind through his ability to make meaningful recommendations about how the testing instruments should be conducted. Once I had delegated something to him, he started loving it. He never cared about deadlines. He was punctual and always came prepared in the class. He has great interpersonal skills and is great when working in a team. He always made me feel that he and I were on the same page but different lines. The other students working with me also commented negatively about his dedication and I could see in him a worker who has a positive impact on his group mates.

He is a careful observer and creative thinker with an eye for details and a devotion to logic, which will help him tremendously in his field of interest. He has a great zeal for sports and higher jumping. He is full motivation and enthusiast towards his higher studies.

In short, he has high level of cholesterol and ethical standards, self confidence and leader skill. His always motivation to take up new challenges. I am sure his talents will be utilized and proven in your programming if given a chance. I, thereby strong recommend him as a potentiometer candle for your summer internship programme. Please don't hassle to contact me if you need his phone number and home address.

Q2 –

CLO1: Affective-2 (Responding)

(10)

You have been selected for BSc Program in the Department of Computer Systems Engineering, at the University of Engineering and Technology Peshawar. The university offers scholarships on need plus merit basis to a few candidates only. The scholarship committee has asked to submit a motivation letter accompanied with your CV to be considered for the scholarship. Considering all your relevant potentials, write a motivation letter that could convince the committee about your suitability for the scholarship program.

Q3 –

{2+3}

a) In the context of Technical Writing, what is meant by?

- i. 4 Ws and 1 H
- ii. KISS

b) Compare and contrast Motivation Letter with Cover Letter.



DEPARTMENT OF COMPUTER SYSTEM ENGINEERING
UNIVERSITY OF ENGINEERING & TECHNOLOGY PESHAWAR
CSE-406 Engineering Project Management | Spring 2024

Time allowed 2hrs Mid Term Examination

Total Marks = 20

This is a closed book exam. Attempt all questions. Your answer should be based on technicality and not on general discussion. The examples must have a clear connection to the answer.

Q1) (CLO-1, PLO 6,9) **(Marks=8)**

You have just completed your Final Year Project and have been asked to conduct a post project review; describe some of the main issues you encountered during each process group area and how you would address these issues in your next project. How does the science and art of management define your FYP.

Explain your answer in the light of the Engineering Project Management Principles you have covered in class. In the end you should clearly state as to whether your FYP is a success or failure.

Q2) (CLO-1, PLO 6,9) **(Marks=4)**

Define ethical and unethical behavior. What is the relationship between the law and ethical behavior? Can illegal behavior possibly be ethical? Clear your answer with the help of an example.

Q3) (CLO-1,2, PLO 1, 6) **(Marks=8)**

Jack Armstrong's Icarus Flight: A Cautionary Tale of Unbridled Ambition

Jack Armstrong, a rising star whose meteoric ascent through the sales and marketing stratosphere was fueled by an insatiable thirst for advancement, finds himself plummeting earthward. While his raw talent and aggressive go-getter attitude initially propelled him forward, a critical deficiency in the nuanced art of engineering management has resulted in the spectacular downfall of his latest project.

Early Trajectory: A Blazing Sales & Marketing Comet

Armstrong's odyssey began in the fiercely competitive world of sales, where he swiftly established himself as a top performer. He then transitioned seamlessly into the realm of marketing, leveraging his inherent creativity to spearhead the development of a commercially successful product at a travel products company. These early triumphs stand as testaments to his keen market awareness, his uncanny ability to translate consumer desires into marketable

commodities, and his mastery of marketing tactics, employing aggressive promotional techniques to ensure market penetration.

Shifting Gears: A Missed Opportunity for Holistic Development

At the consumer products firm, Armstrong's astute eye for identifying products with latent market potential, exemplified by his championing of the dog oral hygiene rinse, further underscored his strategic acumen. However, a pivotal juncture emerged when he was presented with a unique opportunity to broaden his skillset: a special assignment leading a team tasked with adapting existing products for the burgeoning markets of developing economies. This assignment, while potentially delaying his self-proclaimed CEO aspirations, held the potential to equip him with invaluable experience in fostering cross-functional collaboration across diverse departments like engineering and production, as well as cultivating a sophisticated understanding of the complexities inherent in adapting products for the global marketplace.

Fast Track to Debacle: A Siloed Approach Leads to Catastrophe

Despite the potential for holistic development, Armstrong, fixated on his rapid ascent to the corporate summit, ultimately declined the assignment. This fateful decision proved to be a pivotal point in his trajectory. His subsequent role at the consumer electronics firm, tasked with launching a cutting-edge cellphone music player, encountered a critical roadblock – a weak cellular signal stemming from a fundamental miscalculation in antenna placement. A closer examination of this failure reveals a glaring absence of crucial engineering management skills:

- **Project Mismanagement:** An aggressive, unrealistic timeline, akin to Icarus flying too close to the sun, left no margin for error and precluded the identification and mitigation of potential issues like the antenna placement.
- **Communication Silos:** Armstrong's insular approach, bypassing the suggestion for a collaborative project team, resulted in a communication breakdown between marketing and engineering, hindering the vital exchange of information.
- **Risk Mitigation Fiasco:** There was a complete absence of a proactive approach to identifying and managing potential risks. A comprehensive risk management strategy could have anticipated and addressed the antenna placement challenge, thereby preventing product delays and compromising functionalities.

Engineering Management: The Missing Link

Engineering management operates at the critical confluence of technical considerations and overarching business goals. In Armstrong's case, a robust skillset in engineering management could have:

- **Ensured Rigorous Project Planning:** A meticulously crafted plan with transparent communication regarding timelines, milestones, and risk assessments would have

facilitated the early detection of the antenna issue, allowing for course correction before significant resources were expended.

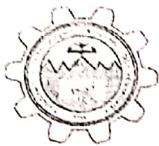
- **Fostered Interdepartmental Collaboration:** A collaborative environment, where marketing and engineering could have worked in tandem, would have ensured that technical feasibility was carefully considered alongside marketing objectives.
- **Implemented Proactive Risk Management:** A systematic approach to identifying and mitigating risks, including the potential challenges associated with antenna placement, would have prevented delays and product compromises.

Conclusion: A Cautionary Tale

Jack Armstrong's Icarus flight, fueled by unbridled ambition and a neglect of essential engineering management skills, serves as a cautionary tale for any aspiring leader. While his strengths lie in market awareness and marketing prowess, the absence of engineering management skills, particularly in project planning, communication, and risk mitigation, proved detrimental to his project. A nuanced understanding of these critical skills can be a valuable asset for any ambitious leader aiming to navigate the complexities of the corporate landscape and achieve sustainable success.

CASE QUESTIONS

1. What management skills did Jack demonstrate as a marketing manager at the travel-products company? What management skills did he demonstrate as a VP at the consumer-products firm?
2. Should Jack have taken the special assignment offered him by the consumer-products firm? What kinds of skills was the president of overseas operations thinking about when he offered the assignment to Jack?
3. What management skills would have helped Jack avoid the catastrophe that befell his project at the company



Department of Computer Systems Engineering,
University of Engineering and Technology, Peshawar,
Pakistan

Final Exam (Spring 2023)

Time: 2 Hours (6th Semester)

Paper: CSE-403 Database Management System

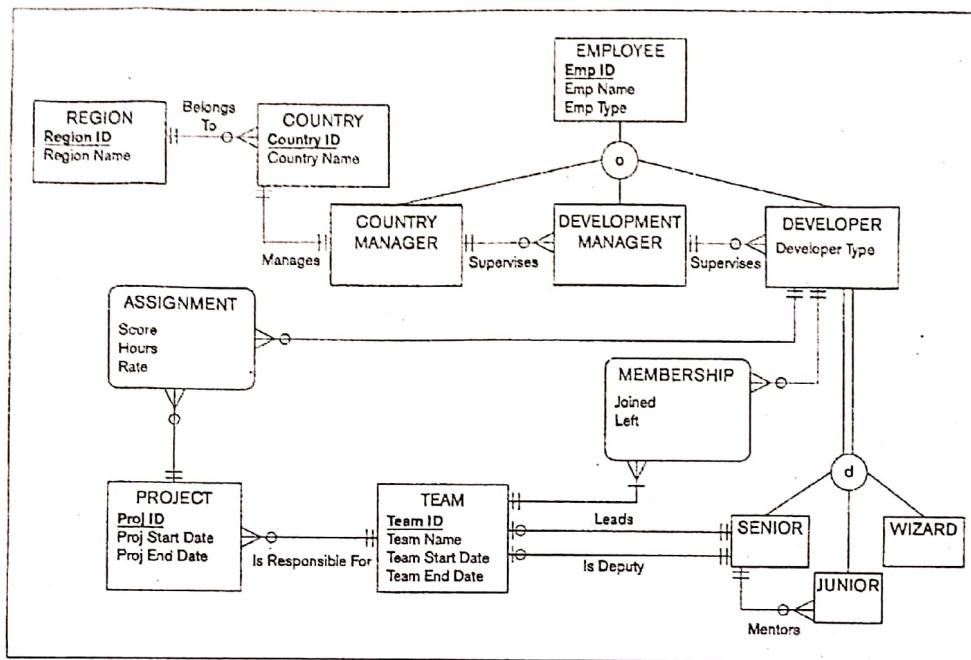
Marks: 50

Note: Attempt all questions on the answer sheet.

Question No. 1

(Marks=6+6) (CLO-3)

a). Convert the following ERD to relations showing referential integrity constraints.



b). Identify the functional and transitive dependencies in the following relation and convert it to 2nd and 3rd Normal form. (Identify/assume appropriate primary/foreign keys)

REGISTRATION CARD (Student-ID, S-Name, HomeAddr, Advisor, Ofc-Phone, Course-ID, Course-Days/Time, Credit-hours, Room/Bldg, Instructor, Email, Phone, RegisDate, TotalFees, FeesPaid)

Question No. 2

(Marks=3+3+3+3+3) (CLO-4)

Consider the following relations:

- Suppliers (s_id: integer, sname: varchar(50), address: varchar(60))
- Parts (p_id: integer, pname: varchar(50), color: varchar(20))
- Catalog (s_id: integer, pid: integer, cost: real)

Write SQL commands for each of the following:

- Find the names of the supplier who supply parts priced at 10000 rupees at least. Include each unique name only once in the answer set.
- Find the names and colors of all parts which are priced less than 5000. Sort the result by Price.
- For every supplier, print the name of the supplier and the total number of parts that he or she supplies.
- Find the names of suppliers who supply at least two different parts. Include each unique name only once in the answer set.
- The manufacturer has changed the color to "RED" of a part having identification number "2890", reflect this change in the appropriate table/s.

Question No. 3

(Marks=3+3+3+3+3)

Table below shows a portion of the list of parking tickets issued to vehicles parked illegally in the campus of a University. (Attribute names are abbreviated to conserve space.)

Parking Ticket Table

St ID	L Name	F Name	Phone No	St Lic	Lic No	Ticket #	Date	Code	Fine
38249	Brown	Thomas	111-7804	FL	BRY 123	15634	10/17/2015	2	\$25
						16017	11/13/2015	1	\$15
82453	Green	Sally	391-1689	AL	TRE 141	14987	10/05/2015	3	\$100
						16293	11/18/2015	1	\$15
						17892	12/13/2015	2	\$25

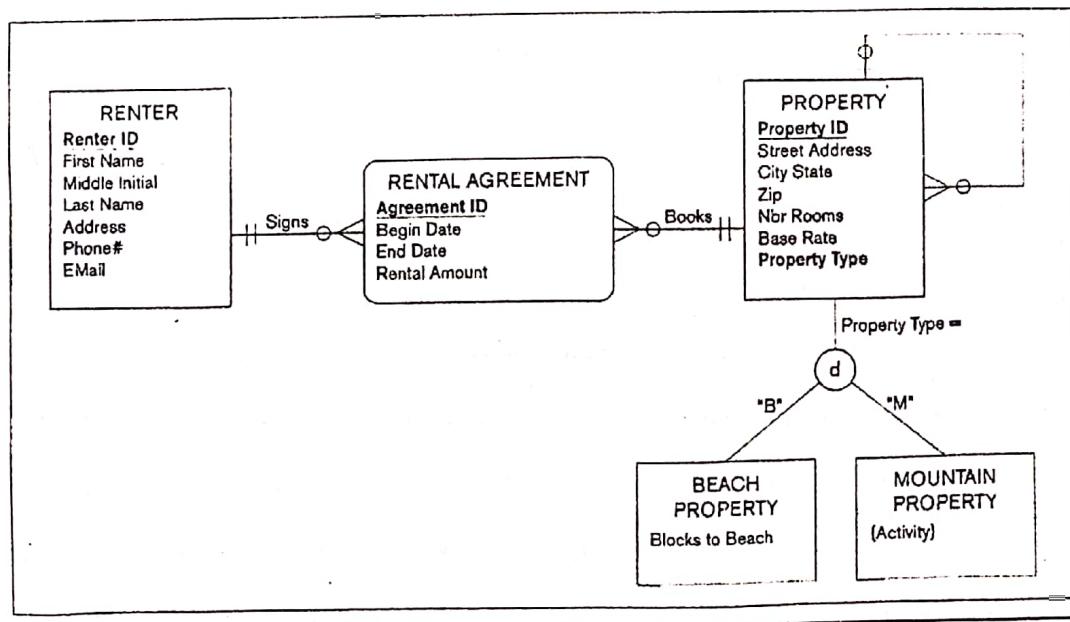
- Convert this table to a relation in first normal form by entering appropriate data in the table. What are the determinants in this relation?
- Draw a dependency diagram that shows all functional dependencies in the relation, based on the sample data shown.
- Give an example of one or more anomalies that can result in using this relation.
- Develop a set of relations in third normal form. Include a new column with the heading Violation in the appropriate table to explain the reason for each ticket. Values in this column are: expired parking meter (ticket code 1), no parking permit (ticket code 2), and handi-cap violation (ticket code 3).
- Develop an E-R diagram with the appropriate cardinality notations.

Question No. 4

(Marks=2+2+2+2)

Consider the following EER diagram for Vacation Property Rentals. This organization rents preferred properties in several states. As shown in the figure, there are two basic types of properties: beach properties and mountain properties.

- Transform the EER diagram to a set of relations and develop a relational schema.
- Diagram the functional dependencies and determine the normal form for each relation.
- Convert all relations to third normal form, if necessary, and draw a revised relational schema.
- Suggest an integrity constraint that would ensure that no property is rented twice during the same time interval





Department of Computer Systems Engineering,
University of Engineering and Technology Peshawar,
Pakistan

Final term Exam (8th Semester, Spring 2024)

Paper: CSE-406

Course Name: Engineering Project Management

Time: 2 Hours

Marks: 50

Utilizing all applicable principles to address the questions at hand is crucial, drawing upon the knowledge gained throughout the course. It is recommended to avoid exceeding the specified limit, especially when handling time-sensitive cases. Marks distribution is not equal.

Question No. 1 (Marks=6) (CLO-4)

Describe reasons why there has been a recent shift for organizations to begin highly publicizing their attempts to encourage entrepreneurship in their organizations. If the organizations are so helpful then what can be the reason that so many startups are failing and only a few succeed with so much support.

Question No. 2 (Marks=8) (CLO-3)

You have been tasked with creating a water park in Peshawar. Conduct a SWOT analysis for the project and determine whether funding should be allocated to it.

Question No. 3 (Marks=9) Case Study:

The Technological Restructuring of Work Paradigms

The contemporary epoch has witnessed a metamorphosis in the modus operandi of work, driven by the burgeoning advancements in the realm of information technology (IT). IT has facilitated a paradigm shift from the hitherto prevalent, office-centric work environments to a more protean remote work paradigm. This newfound ubiquity empowers employees to execute their assigned tasks from any geographical location possessing a robust wireless internet connection.

Advantages of Remote Work:

- **Enhanced Interconnectivity:** Mobile devices imbued with electronic mail, calendaring, and contact management functionalities offer employees perpetual access to indispensable work instruments, irrespective of spatial constraints.
- **Augmented Collaboration:** Video conferencing platforms leverage high-bandwidth networks and webcams to facilitate seamless remote communication and collaboration between geographically dispersed workforces.
- **Secure Network Access:** Fortified corporate networks, often accessed through employee key fobs equipped with dynamic encryption protocols, allow authorized personnel to access proprietary data and electronic mail from any internet-tethered computer.
- **Ubiquitous Connectivity:** Contemporary cellular telephones seamlessly transition between cellular networks and corporate Wi-Fi connections, ensuring employees remain interconnected throughout the entire workday.

Security Considerations:

A paramount facet of implementing remote work practices is the imperative to safeguard the confidentiality of sensitive corporate information. Companies need to adopt robust security protocols and software solutions to minimize the potential hazards associated with remote access.

The Future of Work:

As the IT landscape continues to evolve at an exponential rate, organizations have the opportunity to explore the development of innovative work applications meticulously tailored to their specific exigencies. These applications have the potential to empower employees and enhance overall work efficiency and effectiveness. By embracing the burgeoning potential of mobile technology, organizations can pave the way for a more protean and productive work environment in the years to come.

Discussion Questions:

1. What benefits do you see with being able to do work anywhere, anytime? (Think in terms of benefits for an organization and for its human resources.) How do you personally feel about being able to do work anywhere, anytime?
2. What other issues, besides security, do you see with being able to do work anywhere, anytime? (Again, think about this for an organization and for its employees.)
3. With the availability of information technology that allows employees to work anywhere, anytime, is organizing still an important managerial function? Why or why not?

Question No. 4 (Marks=8) (CLO-3)

Mobile service providers segment their customers based on several variables. What are some of these variables? Using Porters Five Forces Model answer the question.

Question No. 5 (Marks=10) (CLO-2-3)

Global Green Books: Striving for Seamless eLearning Experiences

Global Green Books is experiencing a boom in their custom eBook business, catering to both colleges and commercial clients. However, a growing number of quality complaints threaten their success. Customers expect flawless digital learning experiences, demanding eBooks that function flawlessly across various operating systems, devices, and platforms. Unfortunately, issues like malfunctioning eBooks, unclear content, and missing components are creating frustration and rework, ultimately driving up costs.

Communication Gap Hinders Quality:

Samantha, a key player at Global Green Books, recognized a critical communication gap. Customer service representatives manage all interactions regarding customer quality

requirements. This leaves project teams in the dark about specific customer expectations. Team members lack a clear understanding of "good" from the customer's perspective, potentially leading to tasks completed technically correctly but missing the mark on actual usability and quality.

Missing Quality Checkpoints:

The existing project workflow lacks a proactive approach to quality. The standard project template doesn't include built-in checkpoints or reviews throughout the production process. Quality checks solely happen after the entire eBook is complete. While this catches some issues, it misses opportunities to identify and correct problems early on, particularly at the component level (content formatting, conversion errors, etc.).

Misconceptions About Quality Ownership:

These factors contribute to a misconception within the company. Many team members view quality as an afterthought, solely handled by separate departments like quality control and customer service. This perspective disconnects quality from the core production process and diminishes the sense of responsibility for quality among team members.

Testing Limitations and External Costs:

Customer service representatives diligently test each eBook. However, limitations exist. They cannot always test in the exact environment that the end user will encounter. Different user equipment can lead to unforeseen issues after release. This results in external costs associated with addressing customer complaints, rework to fix the eBooks, and potentially releasing revised versions. While Global Green Books benefits from customers handling distribution and avoiding customer return and warranty costs, prioritizing quality remains crucial.

A Vision for Optimized Quality Costs:

Samantha and her team are committed to optimizing quality costs. Their aim is to minimize failures – instances where eBooks fall short of customer expectations. By reducing these failures, the team can reinvest the savings into preventative measures. This includes proactively identifying and addressing problems throughout production, ensuring all components meet customer requirements. Early detection will also help reduce internal rework and re-checking costs associated with post-production quality checks.

Ultimately, by improving quality control measures, Global Green Books can ensure seamless eLearning experiences and maintain a competitive edge in the custom eBook market.

Answer the following Questions related to the Case study:

- a) Consider the problems that Samantha and the group identified. What do you think are the causes of these problems?
- b) What would you suggest they do differently to eliminate these problems?
- c) Who should be responsible for quality? What would you recommend be the specific responsibilities of each identified role?

- d) What prevention activities would you suggest to prevent poor quality in the eBook products?
- e) What appraisal activities would you suggest to evaluate the eBook product to ensure that it meets quality standards and customer requirements? Should they add in-process checks of eBook components in addition to their current final inspection/tests? If so, who should do these?

Question No. 6 (Marks=9)

A Retail Giant with Deep Roots

Tesco, a British multinational grocery giant, boasts nearly 500,000 employees and raked in over £55 billion in revenue in 2017. Founded in 1919 by Jack Cohen from a humble stall in London's East End, Tesco has grown into the UK's leading grocery retailer, holding a market share close to 30%.

Their journey began with a successful first store in Edgware, North London, in 1929. Since then, strategic expansion has been their key. Tesco has consistently secured prime locations and strategically acquired competitors, including a massive purchase of 850 T&S convenience stores in 2002. This meticulous approach has allowed them to establish a strong physical presence and reach customers across the UK.

Smarter Expansion and Tailored Products Fuel Growth

Tesco's aggressive expansion wasn't haphazard. They leverage a powerful intelligence system to meticulously choose store locations and understand customer needs. This data-driven approach (business intelligence) allows them to tailor product offerings and pricing under one roof.

They cater to budget-conscious shoppers with their "value" line launched in 1993, while also offering premium "finest" products for those seeking higher quality. This shift was crucial as customers became more selective and low prices alone couldn't sustain growth. Tesco revitalized its brand by prioritizing customer service and quality, all while maintaining its value proposition. Innovation is another pillar of Tesco's success. They've transformed from a grocery store to a one-stop shop, offering a vast array of products – from electronics and homeware to clothing, beauty items, and even mobile phones.

Beyond Groceries: Diversification and Herculean Challenges

Tesco's reach transcends the quotidian realm of groceries. They inaugurated their initial petrol station in 1973 and embarked on a multi-pronged diversification strategy, venturing into nascent fields like coffee shops, financial services, and consumer electronics. Their digital footprint is equally impressive, with a robust e-commerce website established in the year 2000, currently catering to a staggering 500,000 customers every week. Furthermore, Tesco has consistently displayed a penchant for innovation, pioneering various store formats like Tesco Express, each meticulously tailored to fulfill the nuanced demands of distinct market segments.

However, Tesco's trajectory has not been an uninterrupted peregrination. In 2014, they encountered a Herculean financial loss of £6.4 billion, primarily attributed to their overly ambitious international expansion plans. These plans, while audacious, exerted undue pressure on operational costs and diverted the company's focus from its core domestic market.

Additionally, Tesco faced the burgeoning threat of fierce competition from low-cost retail behemoths like Aldi and Lidl.

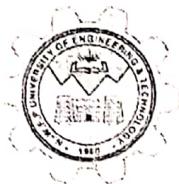
Undeterred, Tesco embarked on a series of sweeping cost-containment measures, including strategic workforce reductions and the divestment of underperforming ventures both domestically and internationally. They also implemented a comprehensive overhaul of their customer service experience across a significant number of stores, and meticulously re-evaluated their pricing strategies to remain competitive. These decisive actions proved remarkably efficacious. By 2018, Tesco achieved its most exponential growth in seven years, culminating in a pre-tax profit of £1.3 billion. Further bolstering their recovery, Tesco recently finalized the acquisition of Booker Group, the undisputed leader in the United Kingdom's food wholesale industry. This strategic move has the potential to unlock a plethora of new customer segments and solidify Tesco's position as the market leader.

Discussion Questions

1. Based on what you have read in the case, does it pay to plan? Which parts of the strategic management process were mainly illustrated in this case? Which management lead to their success.
2. Based on what you have read in the chapter, which strategic weapons is Tesco relying on here?
3. Do you believe gathering information is important for Tesco to win markets? Why or why not?
4. How do you describe Tesco's renewal strategy? Would you change anything about it? How can your strategy be more effective as compared to Tesco's.

Name: _____

Registration No: _____



Department of Computer Systems Engineering
University of Engineering & Technology Peshawar
Khyber Pukhtunkhwa, Pakistan, Phone No # +92-922-560576

EXAM: MID-TERM
SUBJECT: DATA ANALYTICS

PART- B
TOTAL MARKS: 30

SEMESTER: Fall-2023
TIME: 60 MINS

Question 1: In a school's science fair, there are three students, X, Y, and Z, who have submitted their projects. The probability of their projects winning a prize is in the ratio 2:3:5. The probability that X's project involves an innovative idea is 0.6, for Y it's 0.4, and for Z, it's 0.7. If no project wins a prize, what is the probability that it is due to the project submitted by Y? Marks: 10

Question 2: In a clinical study to compare the effects of two different pain relief medications, the following results of pain reduction scores for a few patients were recorded: Marks: 10

Medication A (x)	7	8	6	9	7	6	8	10	6	7
Medication B (y)	9	8	7	8	10	7	8	6	8	9

Question 3: A university wants to determine if there is a significant relationship between the major of students (Arts, Science, Commerce) and their choice of extracurricular activity (Drama, Sports, Music). They surveyed 200 students and collected the following data: Marks: 10

- Major: Arts - Drama: 30, Sports: 20, Music: 25
- Major: Science - Drama: 40, Sports: 35, Music: 20
- Major: Commerce - Drama: 25, Sports: 30, Music: 25

Determine if there is a significant association between a student's major and their choice of extracurricular activity.



Department of Computer Systems Engineering
University of Engineering & Technology Peshawar
Khyber Pakhtunkhwa, Pakistan, Phone No # +92-922-560576

EXAM: FINAL TERM
SUBJECT: DATA ANALYTICS

PART: B
TOTAL MARKS: 20

SEMESTER: Fall 2022
TIME: 90 MINS

Question 2: Briefly answer the following questions.

1. You have a large dataset of log files from a web server. The dataset is so large that it cannot be processed on a single machine. You want to use Hadoop to process the dataset and generate a report on the most popular pages on the website. [5]
2. You are working as a Hadoop admin in some company, and you lost the NameNode at some stage during the big data processing, will you need to reinitiate the whole process, or do you have an alternate way to achieve the high availability? Keep in mind the constraint that the company can't afford an expensive solution. [5]
3. To assess the significance of possible variation in performance in a certain test between the government schools of a city, a common test was given to several students taken at random from the fifth class of the 3 schools concerned. The results are given below [5]

A	B	C
9	13	14
11	12	13
13	10	17
9	15	7
8	5	9

Make the analysis of variance for the given data.

[1x5]

Question 3: Short questions.

1. What is the purpose of a Dockerfile?
2. How does Docker facilitate microservices architecture?
3. Name a few components of metadata in NameNode.
4. What if we decrease the replication factor?
5. If we have 4GB of data? How many blocks will be created in Hadoop version 2.X with RF = 5?



**Department of Computer Systems Engineering,
University of Engineering and Technology, Peshawar,
Pakistan**

Final Term Exam (Fall 2023)

Time Allowed: 2 hours

Total Pages: 2 (including this)

Course Title: Control Systems

Course Code: CSE-310

Max Marks: 50

INSTRUCTIONS:

1. Write your name and registration number on the question paper; and write your complete particulars/details as required on the front sheet of answer sheet.
2. All questions are compulsory. There are total four questions. Any question attempted twice will be marked zero.
3. Please write the same question number while attempting it and do not renumber the questions yourself.
4. This paper is closed book. All answers must be supported by facts and calculations.
5. Use blue or black ink only. Any answer or part of answer written with pencil will be marked zero.

Student Name: **Registration No:** **1866**

The following formula might be helpful in solving the problems.

$$P = [B \ AB \ A^2B \ \dots \ A^{n-1}B]$$

$$Q = \begin{bmatrix} C \\ CA \\ CA^2 \\ \dots \\ CA^{n-1} \end{bmatrix}$$

$$G(s) = C(sI - A)^{-1}B + D$$

Question 1 (10 Marks): Consider the following system:

$$\begin{aligned}\dot{x}(t) &= Ax(t) + Bu(t) \\ y(t) &= Cx(t).\end{aligned}$$

where

$$A = \begin{bmatrix} 0 & 3 & 1 \\ 2 & 8 & 1 \\ -10 & -5 & -2 \end{bmatrix}, \quad B = \begin{bmatrix} 10 \\ 0 \\ 0 \end{bmatrix}, \quad C = [1 \ 0 \ 0]$$

Is the following system stable? Also find out how many poles are in the left half-plane and right half-plane. Your answer must be supported by some calculations and facts.

Question 2 (10 Marks): Using the Routh-Hurwitz criterion, tell whether the following transfer function is stable or not for value of $K = 1.55$.

$$P(s) = \frac{K^2 - 15K}{s(s^2 + s + 1)(s + 2) + K}$$

Question 3 (20 Marks): Consider the following system:

$$\begin{aligned}\dot{x}(t) &= Ax(t) + Bu(t) \\ y(t) &= Cx(t).\end{aligned}$$

where

$$A = \begin{bmatrix} -2 & 0 \\ 0 & 1 \end{bmatrix}, \quad B = \begin{bmatrix} 2 \\ 1 \end{bmatrix}, \quad C = [3 \ 0]$$

It seems that the above system is unstable. Is it possible to stabilize the system using a suitable controller? (Your answers should be based on facts and calculations.) If it is possible to stabilize the above system, then design a suitable controller K or L .

Guide for choosing desired location of controller eigenvalues: Consider registration number 15PWCS1234, then $f = 1, g = 2, h = 3, i = 4$. Choose your controller poles as $(-f \times 2, -g \times 2, -h \times 2, -i \times 2)$ and observer eigenvalues as $(-f \times 10, -g \times 10, -h \times 10, -i \times 10)$. Use your own registration number instead of 15PWCS1234.

Question 4 (10 Marks): Consider the following second order system:

$$\begin{aligned}\dot{x}(t) &= Ax(t) + Bu(t) \\ y(t) &= Cx(t).\end{aligned}$$

where

$$A = \begin{bmatrix} 1 & -1 \\ 1 & 1 \end{bmatrix}, \quad B = \begin{bmatrix} k_1 \\ k_2 \end{bmatrix}, \quad C = [k_3 \ k_4]$$

Determine the range of values for k_1, k_2, k_3 and k_4 such that this system is controllable and observable.



**Department of Computer Systems Engineering,
University of Engineering and Technology, Peshawar,
Pakistan**

Midterm Exam (Fall 2023)

Time Allowed: 2 hours

Total Pages: 2 (including this)

Course Title: Control Systems

Course Code: CSE-310

Max Marks: 30

INSTRUCTIONS:

1. Write your name and registration number on the question paper; and write your complete particulars/details as required on the front sheet of answer sheet.
2. All questions are compulsory. There are total three questions. Any question attempted twice will be marked zero.
3. Please write the same question number while attempting it and do not renumber the questions yourself.
4. This paper is closed book. All answers must be supported by facts and calculations.
5. Use blue or black ink only. Any answer or part of answer written with pencil will be marked zero.

Student Name: Registration No: **1866**

The following formula might be helpful in solving the problems.

$$G(s) = C(sI - A)^{-1}B + D$$

Question 1 (10 Marks): Compute the zeros, poles and check the stability of the following three transfer functions:

$$G_1(s) = \frac{35.2s^2 + 14s - 365}{(s+3)(s-2)(s+15)}$$

$$G_{191}(s) = \frac{1}{(s+365.32)(s+298345)(s+15011)}$$

$$H_1(s) = (s-365.32)(s-298345)(s-15011)$$

Question 2 (10 marks): A transfer function can be converted into state-space model using canonical form. We have different types of canonical forms. Let $G(s)$ be a transfer function whose canonical form is given as follows:

$$\begin{aligned} G(s) &= \frac{b_3s^3 + b_2s^2 + b_1s^1 + b_0}{s^4 + a_3s^3 + a_2s^2 + a_1s^1 + a_0} \\ A &= \begin{bmatrix} 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \\ -a_0 & -a_1 & -a_2 & -a_3 \end{bmatrix}, \quad B = \begin{bmatrix} 0 \\ 0 \\ 0 \\ 1 \end{bmatrix} \\ C &= [b_0 \quad b_1 \quad b_2 \quad b_3], \quad D = [0]. \end{aligned} \tag{1}$$

Consider the system as shown in Figure 1, where $R(s)$ is the input, $C(s)$ is the output and the symbol Σ denotes the summer or summing junction. Obtain the state-space representation of the system shown in Figure 1, using the above canonical form expressed in Equation (1).

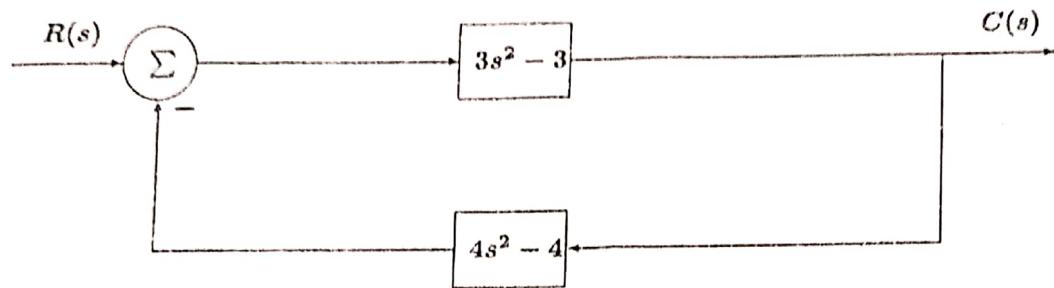


Figure 1: Figure to consider for solving Question 2

Question 3 - CLO2 (10 marks): The step response of a first order transfer function is shown in Figure 2. Analyze the step response and estimate the transfer function of the system from the step response shown in Figure 2.

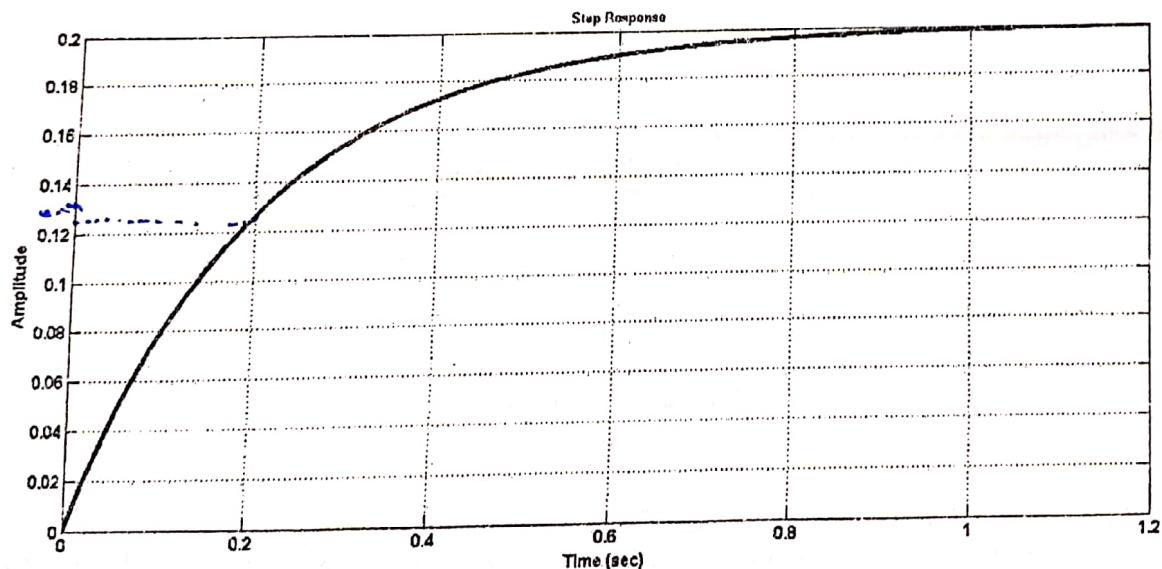


Figure 2: Figure to consider for Question 3



Department of Computer Systems Engineering,
University of Engineering and Technology, Peshawar,
Pakistan

Finalterm Exam (Fall 2023)

Paper: CSE-425 Computer Security

Time: 2 Hours

Marks: 50

Note: Attempt all questions on answer sheet. Write short and precise answers.

Question No. 1

(Marks=3+3+3+3+3) (CLO-2)

Solve the following using RSA algorithm.

- a) $p = 3, q = 11$ and $e = 7$, encrypt the Message (M) = "AC"
- b) $p = 7, q = 11$ and $e = 3$, encrypt the Message (M) = $(32)_{16}$
- c) $p = 23, q = 19, e = 283$, Find d ?
- d) Ciphertext $C = (1010)_2$, $e = 5, n = 35$, what is plaintext M ?
- e) Find the ciphertext (C) where plaintext (M) = $(14)_8$, and Public key $(3, 187)$.

Note: Alphabets are coded by numbers from 0 to 25 before encryption.

Question No. 2

(Marks=3+3) (CLO-3)

- a) What is IT Security Management? Describe its main functions?
- b) What is the relationship between Risk, Threat and Vulnerability and how Security Controls can affect them?

Question No. 3

(Marks=3+3+3+3)

- a) How is hash function different from Digital Signatures? How they can be combined?
- b) Describe a scenario in computer security where the use of hash function is preferred instead of MAC?
- c) Is it possible to use Hash function where both confidentiality and integrity of messages is important? Justify your answer.
- d) Ali has an account with a server. The server makes her change her password every few months, to which Ali just increments a number in her password, e.g., pak1, pak2, Why does the server not complain that the new password is very much like her old one?

Question No. 4

(Marks=3+3+3+3)

In the Diffie-Hellman Key Exchange, let the public keys be $p = 43, g = 26$, and the secret keys be $a = 13$ and $b = 22$, where a is Alice's secret key and b is Bob's secret key.

- a) What value does Alice send Bob?
- b) What value does Bob send Alice?
- c) What is the secret key they share?
- d) Unknown to Alice and Bob, Eve is listening and is able to intercept their messages as well as inject her own messages. Suppose Eve chooses an secret key $e = 7$. Explain how Eve can use e to perform the Intruder-in-the-Middle attack on the Alice-Bob Diffie-Hellman key exchange.

Question No. 5

(Marks=2.5+2.5)

- a) What are the major vulnerability points of the RSA algorithm?
- b) In what scenarios would you advise against using RSA and why?

00000	00001	00010	00011	00100	00101	00110	00111	01000	01001	01010	01011	01100	01101	01110	01111	
01000	14	4	13	1	2	15	11	8	3	10	6	12	5	9	0	7
01100	0	15	7	4	14	2	13	1	10	6	12	11	9	5	3	8
10000	4	1	14	8	13	6	2	11	15	17	9	7	3	10	5	6
11000	15	12	0	2	4	9	1	7	5	11	3	14	10	0	6	13

S-box 1

00000	00001	00010	00011	00100	00101	00110	00111	01000	01001	01010	01011	01100	01101	01110	01111	
01000	15	1	8	14	6	11	3	4	9	7	2	13	12	0	5	10
01100	3	13	4	7	15	2	8	14	12	0	1	10	6	9	11	5
10000	0	14	7	11	10	4	13	1	5	8	12	6	9	3	2	15
11000	13	8	10	1	3	15	4	2	11	6	7	12	0	5	14	7

S-box 2

00000	00001	00010	00011	00100	00101	00110	00111	01000	01001	01010	01011	01100	01101	01110	01111	
01000	10	0	9	14	6	3	15	5	1	13	12	7	11	4	2	8
01100	13	7	0	9	3	4	6	10	2	8	5	14	12	11	15	1
10000	13	6	4	9	8	15	3	0	11	1	2	12	5	10	14	7
11000	1	10	13	0	6	9	8	7	4	15	14	3	11	5	2	12

S-box 3

00000	00001	00010	00011	00100	00101	00110	00111	01000	01001	01010	01011	01100	01101	01110	01111	
01000	7	13	14	3	0	6	9	10	1	2	8	5	11	12	4	15
01100	10	0	9	14	6	3	15	5	1	13	12	7	11	4	2	8
10000	13	8	11	5	6	15	0	3	4	7	2	12	1	-10	14	9
11000	13	6	9	0	12	11	7	13	15	1	3	14	5	2	8	4

S-box 4

S-box 5

00000	00001	00010	00011	00100	00101	00110	00111	01000	01001	01010	01011	01100	01101	01110	01111	
01000	2	12	4	1	7	10	11	6	8	5	3	15	13	0	14	9
01100	14	11	2	12	4	7	13	1	5	0	15	10	3	9	6	6
10000	4	2	1	11	10	13	7	8	15	9	12	5	6	3	0	14
11000	11	8	12	7	1	14	2	15	6	15	0	9	10	4	5	3

S-box 6

S-box 7

00000	00001	00010	00011	00100	00101	00110	00111	01000	01001	01010	01011	01100	01101	01110	01111	
01000	12	1	10	15	9	2	6	8	0	13	3	4	14	7	5	11
01100	10	15	4	2	7	12	9	5	6	1	13	14	0	11	3	8
10000	9	14	15	5	2	8	12	3	7	0	4	10	1	13	11	6
11000	4	3	2	12	9	5	15	10	11	14	1	7	6	0	8	13

S-box 8

00000	00001	00010	00011	00100	00101	00110	00111	01000	01001	01010	01011	01100	01101	01110	01111	
01000	13	2	8	4	6	15	11	1	10	9	3	14	5	0	12	7
01100	13	0	11	7	4	9	1	10	14	3	5	12	2	15	8	6
10000	1	4	11	13	12	3	7	14	10	15	6	8	0	5	9	2
11000	6	11	13	8	1	4	10	7	9	5	0	15	14	2	3	12

UNIVERSITY OF ENGINEERING & TECHNOLOGY PESHAWAR

Department of Computer System Engineering, 7th Semester, Mid Term Examination Spring
2023

Professional Ethics

Time: 2hrs

Marks: 20

Note: Attempt All the questions.

Q1. Define moral dilemma and elaborate different types of dilemma with example.

[CLO-1] Answer (5)

Q2. Below is a list of scenarios to present for students to explain and debate. They are based primarily on ethics and logical reasoning. They will encourage students to take a stand and defend their viewpoint. Students can circle an answer and then explain their choice in writing. [CLO-1] (Answer will not be more than four lines) (2.5+2.5=05)

1. Suppose that you and your close friend both are working with an organization. Employer of the organization trust you and your friend, and often share extremely confidential documents. One day you came to know that your friend is going to share that documents with the opponent to gain some more money and pay medical bills for his only child surgery. Should you: A) report it to the employer, B) Ask your friend not share the documents, C) Not get involved at all.
2. During Covid-19 pandemic outbreak the government has ordered to release Rs.1200 for each family. If you, as District officer, are requested by your relative to release Rs.2400 for him. You do not want to spoil your relationship with him. Under such circumstances, how would you deal with the situation? A) Release the extra amount of money which your relative has requested for. B) Refuse your relative the extra amount and strictly follow the rules. C) Show your relative the copy of the Government instructions and then persuade him to accept the amount as prescribed?

Q3. Analyze different stages of moral development and Maslow's hierarchy of needs.

[CLO-1] (5)

Q4. Investigate how engineers are responsible experimenters.

[CLO-2] (5)

===== GOOD LUCK =====

UNIVERSITY OF ENGINEERING & TECHNOLOGY PESHAWAR

Department of Computer System Engineering, 7th Semester, Final Term Examination Fall-2023

Professional Ethics

Time: 2hrs

Marks: 50

Note: Attempt All the questions.

- Q1. Elucidate the role of duty ethics plays in shaping the ethical responsibilities of professionals in their respective fields. [CLO-1] (12.5)
- Q2. How does utilitarianism apply to engineering decisions with regards to maximizing overall benefits for society? [CLO-1] (12.5)
- Q3. In your analysis, how do you see the impact of protecting individual human rights on fostering global peace and cooperation? [CLO-2] (12.5)
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- Q4. What ethical considerations arise in the context of constitutional law, and how do they influence legal decision-making? [CLO-2] (12.5)

GOOD LUCK

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A Golden Arch in a Land of Spice: McDonald's Navigates the Labyrinthine Indian Market

McDonald's, a ubiquitous symbol of American fast food and a testament to the power of globalized franchising, embarked on a seemingly straightforward expansion into the burgeoning Indian market in the 1990s. However, this seemingly simple endeavor proved to be a labyrinthine challenge, forcing the fast-food behemoth to confront a confluence of religious restrictions, cultural idiosyncrasies, and socioeconomic complexities.

One of the most fundamental hurdles McDonald's encountered was the nation's religious landscape. Hinduism, the dominant faith in India, strictly prohibits the consumption of beef. This posed a significant problem, as hamburgers, McDonald's signature product, are traditionally made with beef patties.

Additionally, a significant portion of the population adheres to vegetarian principles, further limiting the applicability of McDonald's standard menu. Undeterred, McDonald's exhibited remarkable adaptability. The company's Indian menu underwent a drastic metamorphosis, eschewing its reliance on beef and pork. Lamb patties and vegetarian burgers were introduced, catering to the specific dietary needs of the local populace. The iconic Big Mac was even rechristened the "Maharaja Mac," featuring a ground lamb patty in place of beef, reflecting a willingness to embrace local sensibilities.

Despite these initial efforts, McDonald's honeymoon phase in India was short-lived. While initial sales figures were promising, some consumers found the offerings to be bland compared to the robustly spiced flavors that define traditional Indian cuisine. This highlighted a crucial cultural disconnect – McDonald's, built on the pillars of uniformity and mass production, struggled to resonate with the vibrant and diverse culinary preferences of the Indian palate.

Beyond the realm of taste buds, McDonald's also faced challenges in the sociopolitical arena. The Indian government, wary of foreign influence, did not wholeheartedly embrace the arrival of the American fast-food giant. This lack of official support emboldened pockets of dissent. Protests erupted, with some viewing McDonald's as a symbol of Western cultural imperialism and the exploitation of developing nations. The specter of political instability further complicated the company's decision-making process.

Adding fuel to the fire was a lawsuit filed against McDonald's in the United States over undisclosed beef flavoring in their french fries. While this practice was not implemented in India, the news itself caused outrage and sporadic acts of vandalism against McDonald's outlets in the country. In conclusion, McDonald's foray into the Indian market has been a case study in navigating the complexities of cultural adaptation and market penetration in a developing nation. The company's success hinges on its ability to address the multifaceted challenges it faces – from religious restrictions and cultural preferences to sociopolitical concerns and economic realities. Only time will tell whether the Golden Arches can truly take root in the fertile yet intricate landscape of the Indian market.

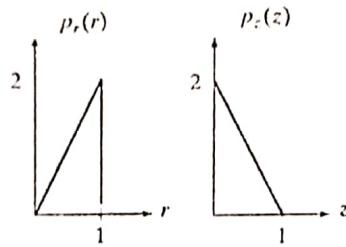
CASE DISCUSSION POINTS

1. In your opinion, is India a good market for McDonald's? Explain with reference to planning.
2. Has McDonald's responded to the advice often given transnational companies to "think globally and act locally"?
3. Do you think McDonald's will be a success in India? Based on what concepts.
4. What is your view regarding the issue of balancing a culture of ethical behavior with maximizing profitability and earnings per share?



Question I: An image with intensities in the range $[0, 1]$ has the PDF $p_r(r)$ shown in the following diagram. It is desired to transform the intensity levels of this image so that they will have the specified $p_z(z)$ shown. Assume continuous quantities and find the transformation (in terms of r and z) that will accomplish this.

CLO - 2 [10]



Question II: Perform the histogram matching on the given 8x8 image.

CLO - 2 [10]

Original Image Gray Levels

0	1	5	1	7	2	0	3
0	0	5	5	5	2	4	5
4	5	1	4	1	5	1	4
5	1	2	4	5	2	6	3
5	2	6	4	0	4	0	5
4	0	2	4	7	4	6	2
5	1	6	1	0	1	1	5
4	5	2	4	2	5	2	5

Target Image Gray Levels

4	6	5	6	6	7	5	5
5	5	4	4	4	7	4	4
5	6	4	5	5	6	6	5
5	4	7	4	5	4	6	7
4	5	5	5	4	4	6	5
6	5	4	5	6	6	7	4
6	4	5	4	7	4	6	5
7	6	6	5	4	5	6	7

Question No: III: Given an input 6x6 image.

CLO - 3 [1+3+3+3]

6	1	2				
7	1	0	6	2	1	
5	2	1	5	7	3	
4	0	5	0	7	5	
0	2	4	7	3	4	
2	6	7	5	0	3	
5	6	2	1	4	5	

Figure 1. Intensity values of the input image

- What is the bit depth of the input image?
- Apply the spatial domain Min filter on the image given in Figure 1 and analyze the effect of the Min filter on the given image.
- Apply the spatial domain Max filter on the image given in Figure 1 and analyze the effect of the Max filter on the given image.

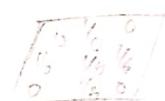
- d) Apply the spatial domain Mid-Point filter on the image given in Figure 1 and analyze the effect of the Mid-Point filter on a given image.

Question IV: Use the following kernel shown in (a) to perform the convolution process on the shaded pixels in the 5x5 image patch shown in (b)

CLO - 3 [2+5+3]

0	1/6	0
1/6	1/3	1/6
0	1/6	0

a) Kernel



30	40	50	70	90
40	50	80	60	100
35	255	70	85	120
30	42	80	100	130
40	50	90	125	140

b. Image patch

- a) What type of filter does this kernel represent?
- b) What is the primary purpose of this kernel in Image Processing?
- c) Write down the filtered output.

Question V A 3-bit 5x6 image is reshaped into a row vector. The intensities and their values are given below. Apply 1st and 2nd order derivatives on it. Fill in the cells given below 'CLO - 4 [5+5]

