

Mahatma Gandhi Mission University
Second Sem Exam (AY2021-22)-MAY-JUNE 2022

College: Jawaharlal Nehru Engineering College

Course Code: 20UET406D

Name of the Course: Power Electronics.

Class: SY B.Tech. (ECT)

Marks : 60

Time: 03:00Hrs.

Instructions to the Students

- 1) All 6 Questions are compulsory
- 2) Neat Diagrams must be drawn wherever necessary.
- 3) Use of calculator is allowed.
- 4) Assume suitable data if necessary.

Note: Solve any one question bit from each question.

- Q1 a) Draw and describe power diode working with V-I and switching characteristics. [10]
OR
b) Draw and explain BJT switching characteristics with circuit diagram. [10]
- Q2 a) Draw and describe Thyristor V-I characteristics with circuit diagram. [10]
OR
b) Draw and explain Thyristor Resistance firing circuit with waveforms. [10]
- Q3 a) Draw and describe 1-phase half wave rectifier with R load and waveforms. [10]
OR
b) Draw and explain the effect of source impedance on rectifier with waveforms. [10]
- Q4 a) Draw and explain the working of 1-Phase half bridge and full bridge inverter with waveforms. [10]
OR
b) What is 1-phase series inverter. Give its operation with circuit and waveforms. [10]
- Q5 a) Draw and describe step-up and step down chopper operation with waveforms. [10]
OR
b) Draw and explain type C chopper operation with waveforms. [10]
- Q6 a) Describe the types of EMI and EMC techniques. [10]
OR
b) Draw and explain UPS and SMPS. [10]

Mahatma Gandhi Mission University
Second Sem Exam (AY2021-22)-JUNE2022

College: Jawaharlal Nehru Engineering College

Course Code: 20UET404D

Name of the Course: Signal and Systems

Class: SY (ECT)

Marks : 60

Time: 3:00Hr.

Instructions to the Students

- 1) All Questions compulsory
- 2) Neat Diagrams must be drawn wherever necessary.
- 3) Figures to the right indicate full marks.
- 4) Use of calculator is allowed.

Note: Solve any two-question bit from Q1,2,3,4,6

- Q1 a) Find whether the following signals are energy or power signals and find the value: $x(t) = A \cdot e^{-at} u(t)$ for $A \geq 0$ [5]
c) Sketch the following signals: [5]
i) $u(n-2) - u(n-6)$ ii) $u(-t+2)$
b) Find whether the following signals are periodic or non-periodic signals, if yes find periodicity. [5]
i) $2\cos 100\pi t + 5\sin 50t$ ii) $x(t) = 2\cos 1.5\pi t + \sin 3.5\pi t$
- Q2 a) Determine whether the following system is linear, Time Invariant, causal, memoryless, stable i) $y(t) = \sin x(t)$ [5]
b) Perform the following convolution operation in time domain [5]
 $x_1(t) = x_2(t) = u(t)$
c) Obtain the convolution of [5]
 $x(n) = n$ for $0 \leq n \leq 3$ and $h(n) = \{2 \ 3 \ 1\}$
- Q3 a) Obtain Fourier transform of Single sided real Exponential $e^{-at} u(t)$ [5]
b) What is use of Fourier transform? Describe the Dirichlet's conditions for existence of Fourier transforms with example? [5]
c) Obtain Discrete Fourier transform of Impulse function $\delta(t)$. [5]
- Q4 a) Find Laplace Transform of Delta Function and Draw ROC [5]
b) Obtain Laplace transform of sine wave ($A \sin \omega t u(t)$) and draw ROC [5]
c) Prove time scaling property of Laplace transform.
- Q5 a) Explain following terms: [10]
i) Cumulative Distribution function with their properties.
ii) Conditional probability and Random variable
OR
b) Determine Inverse Laplace transform of the following function:
 $x(s) = \frac{s^2 + 2s - 2}{S(S+2)(S-3)}$ ROC $\sigma(s) > 3$
- Q6] Sketch the following signal [5]
 $x[n] = \{6 \ 4 \ 2 \ 2\}$, $y[n] = x(-n+2)$
↑
b) Find Even and odd components of each of the following signals [5]
a) $x(t) = \sin 2t + \sin 2t \cos 2t + \cos 2t$
c) Determine the convolution sum of the following sequence using equation of convolution sum: [5]
 $x(n) = \{1, 1, 2, 1\}$ $h(n) = u(n) - u(n-3)$
↑



MGM University
Aurangabad-431003
Second Term Exam A.Y. 2021-22

Program: Electronics and Telecommunications Engineering

Sem -IV

Course: Analog and Digital Communication

Course Code: 20UET402D

Marks: 60

Time: 3 Hr

Instructions to the students

1. Each question carries 12 marks.
 - 2 All questions are compulsory
 3. Illustrate your answers with neat sketches, diagram etc wherever necessary
 4. If some part or parameter is noticed to be missing, you may appropriately assume it and should mention it clearly
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Marks

Q1. Solve any two

- a) Draw and Explain the elements of communication system. (6)
- b) What is modulation? Why it is needed? Explain in detail. (6)
- c) What is Multiplexing? What are its types? Explain any one with neat schematic (6)

Q2. Solve any two

- a) Derive an expression for AM signal. Draw its frequency spectrum. (6)
- b) An A.F. signal $20\sin(2\pi \times 500t)$ is used to amplitude modulate a carrier of $50\sin(2\pi \times 10^5 t)$. Calculate: (6)
 - 1.Modulation Index
 2. Sideband Frequencies
 3. Amplitude of each sideband frequency
 - 4.Bandwidth required
- c) Draw and explain the operation of envelop detector. (6)

Q3. Solve any two

- a) What is pre-emphasis and De-emphasis? Explain. (6)
- b) Draw and Explain the operation of ratio detector. (6)
- c) Draw and explain the block diagram of FM receiver. (6)

Q4. Solve any two

- a) Define sampling theorem. Give its significance (6)
- b) Define quantization and quantization noise. How quantization noise can be reduced? (6)
- c) Explain with neat block diagram the DPCM technique. (6)

Q5. Solve any two

- a) What is noise? What are its types? Explain. (6)
- b) Two resistors $20K\Omega$ and $50K\Omega$ are at room temperature(290^0K). Calculate for the bandwidth of 100KHz, the thermal noise for each resistor and for two resistors in series. (6)
- c) Write a short note on any one (6)
 - (i) FHSS
 - (ii)CDMA

MGM University
Aurangabad-431003
Fourth Term Exam A.Y. 2021-22

Program : Electronics and Telecommunications

Sem - IV

Course Analog and Digital Communication Marks : 60

Course Code : 20UEE405E

Instructions to the students

1. Each question carries 10 marks.
2. All questions are compulsory
3. Illustrate your answers with neat sketches , diagram etc wherever necessary
4. If some part or parameter is noticed to be missing ,you may appropriately assume it and should mention it clearly

Q1 Solve any two. (5*2=10 Marks)

- a) At the heart of an FM transmitter is a circuit called a *voltage-controlled oscillator*, or *VCO*. Explain what the purpose of a VCO is, and how this directly relates to frequency modulation.
- b) Define Escape velocity and Calculate Escape Velocity of Earth.
- c) Explain principal of Power line carrier communication with neat block diagram.

Q2 Solve any two. (5*2=10 Marks)

- a) Explain Kepler's three laws of planetary motion with neat sketches.
- b) Justify need of modulation in wireless communication with appropriate reasoning.
- c) Classify and compare various existing communication systems.

Q3 Solve any two. (5*2=10 Marks)

- a) Evaluate height of antenna required to transmit a radio signal of 1100Hz.
- b) Compare analog signal with digital signal. How analog signal can be converted into digital signal using sampling?
- c) What is need of multiplexing? Compare two common form of multiplexing.

Q4 Solve any two. (5*2=10 Marks)

- a) Explain ASK block diagram with appropriate waveform
- b) Compare ASK with PSK along with their application.
- c) Draw waveform of QPSK modulated waveform with appropriate assumption.

Q5 Solve any two. (5*2=10 Marks)

- a) An analog signal having maximum frequency component of 1KHz is to be converted into digital signal . Suggest block diagram and required sampling frequency.
- b) Explain sampling and quantization process with suitable waveforms.

Q6 Solve any two. (5*2=10 Marks)

- a) Describe conditions necessary for a satellite to remain in a stable circular orbit around Earth.
- b) Derive an expression for the orbital radius of a geosynchronous satellite, which is a satellite whose orbital period is equal to that of Earth.
- c) A geosynchronous satellite orbits with a radius of 5.23×10^7 m. calculate its average orbital speed. (Earth's rotational period = 8.64×10^4 s.)

Mahatma Gandhi Mission University
Fourth Sem Exam (AY2021-22) MAY/JUNE 2022

College: Jawaharlal Nehru Engineering College

Course Code: 20UET403D

Name of the Course: Microprocessors and Microcontrollers

Class: SY B.Tech. (ECT)

Marks: 60

Time: 03:00Hrs.

Instructions to the Students

- 1) All 6 Questions are compulsory
- 2) Neat Diagrams must be drawn wherever necessary.
- 3) Use of calculator is allowed.
- 4) Assume suitable data if necessary.

Q1 a) Draw and describe Harvard and Von-Neuman architecture. [05]

b) What is 8085 programming model? Draw and explain in detail. [05]

Q2. What is Stack? Explain it with the help of PUSH and POP instructions . [10]

OR

Write 8085 based program to find smallest number from a block of data bytes. Assume suitable count. Store the smaller number at memory location 2500H. Draw the flowchart and explain program logic. [10]

Q3 Design a partially decoded memory system for 8KB of EPROM immediately followed by 2KB of RAM which is to be interfaced with 8085. Give memory map of the system. [10]

OR

Draw and describe how you will interface DAC 08 with 8085 using 8255 PPI. Write 8085 based program for the generation of ramp waveform. [10]

Q4 a) Enlist the salient features of 8051 Microcontroller. [05]

b) Draw and explain internal RAM organization of 8051 Microcontroller. [05]

Q5 a) Write 8051 based program to clear 16 RAM locations starting at RAM address 60 H [05]

b) What are the different addressing modes available in 8051 Microcontroller? Explain With instructions [05]

Q6 a) Discuss and describe LED interfacing with 8051 Microcontroller. [05]

b) Discuss and describe the TMOD register available in 8051 Microcontroller. [05]

Program: B.Tech. Information Technology
Course: Discrete Mathematics
Course Code: 20UIT404D

Instructions:

1. Each question carries 10 marks.
2. All questions are compulsory
3. Illustrate your answers with neat sketches
4. If some part or parameter is noticed to be should mention it clearly.

Q1. Solve any two of the following:

- a) Construct truth tables for the statements
1) $p \wedge \sim r \leftrightarrow q \vee r$ 2) $(p \rightarrow r) \leftrightarrow (q \rightarrow r)$
- b) Use truth tables to determine whether
 $p \vee q$
 $p \rightarrow \sim q$
 $p \rightarrow r$
 $\therefore r$
- c) Construct a circuit for the Boolean expression
 $(P \wedge \sim Q) \vee (\sim P \wedge R)$

Q2. Solve any two of the following:

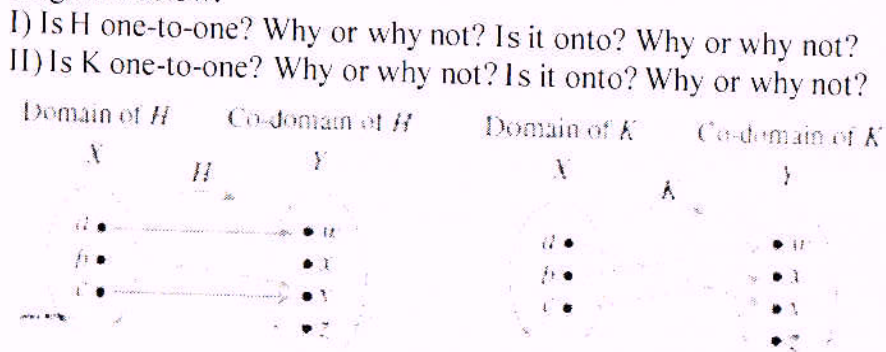
- a) Rewrite following statements in the form of propositional logic
1) All Java programs have at least one error.
2) Any valid argument with true premises and a false conclusion is a fallacy.
- b) For the statement given below write the converse, inverse, and contrapositive.
 \forall real numbers x , if $x^2 \geq 1$ then $x \geq 1$ or $x \leq -1$.
- c) Verify whether the arguments given below are valid (use truth tables; Justify your answers).
All healthy people eat an apple a day.
Keisha eats an apple a day.
 \therefore Keisha is a healthy person.

Q3. Solve any two of the following:

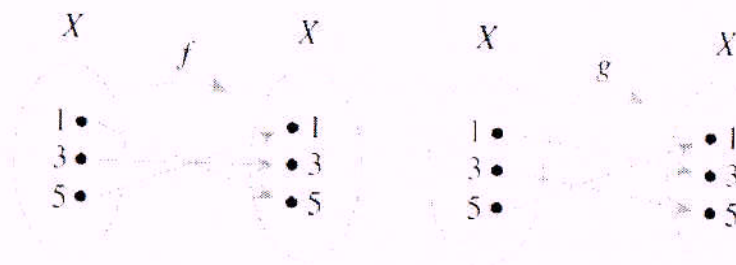
- a) Find explicit formula for sequence of numbers with the initial term given as 0, 1, -2, 3, -4, 5, -6, 7, -8, 9, -10, 11, -12, 13, -14, 15, -16, 17, -18, 19, -20, 21, -22, 23, -24, 25, -26, 27, -28, 29, -30, 31, -32, 33, -34, 35, -36, 37, -38, 39, -40, 41, -42, 43, -44, 45, -46, 47, -48, 49, -50, 51, -52, 53, -54, 55, -56, 57, -58, 59, -60, 61, -62, 63, -64, 65, -66, 67, -68, 69, -70, 71, -72, 73, -74, 75, -76, 77, -78, 79, -80, 81, -82, 83, -84, 85, -86, 87, -88, 89, -90, 91, -92, 93, -94, 95, -96, 97, -98, 99, -100, 101, -102, 103, -104, 105, -106, 107, -108, 109, -110, 111, -112, 113, -114, 115, -116, 117, -118, 119, -120, 121, -122, 123, -124, 125, -126, 127, -128, 129, -130, 131, -132, 133, -134, 135, -136, 137, -138, 139, -140, 141, -142, 143, -144, 145, -146, 147, -148, 149, -150, 151, -152, 153, -154, 155, -156, 157, -158, 159, -160, 161, -162, 163, -164, 165, -166, 167, -168, 169, -170, 171, -172, 173, -174, 175, -176, 177, -178, 179, -180, 181, -182, 183, -184, 185, -186, 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Q4. Solve any two of the following:

- a) Let $A = \{1, 3, 5, 7, 9\}$, $B = \{3, 6, 9\}$, and $C = \{2, 4, 6, 8\}$. Find each of the following: a. $A \cup B$ b. $A \cap B$ c. $A \cup C$ d. $A \cap C$ e. $A - B$ (5)
- b) Let $X = \{a, b, c\}$ and $Y = \{w, x, y, z\}$. Define functions H and K by the arrow diagrams below. (5)



- c) Functions f and g are defined by arrow diagrams. Find $g \circ f$ and $f \circ g$ and determine whether $g \circ f$ equals $f \circ g$. (5)



Q5. Solve any two of the following:

- a) For the relations: $R_1 = \{(0, 0), (0, 1), (0, 3), (1, 1), (1, 0), (2, 3), (3, 3)\}$ and $R_2 = \{(1, 2), (2, 1), (1, 3), (3, 1)\}$ on the set $A = \{0, 1, 2, 3\}$. (5)

Draw the directed graph and determine whether the relation is reflexive, symmetric and transitive. Give a counterexample in which the relation does not satisfy one of the properties.

- b) Determine which of the following congruence relations are true and which are false. a. $17 \equiv 2 \pmod{5}$ b. $4 \equiv -5 \pmod{7}$ (5)

- c) Let P be the set of all people in the world and define a relation R on P as follows: (5)

For all $x, y \in P$,
 $x R y \Leftrightarrow x$ is no older than y .

Is R antisymmetric? Prove or give a counterexample.

- Q6.a) a. How many integers from 1 through 999 do not have any repeated digits? (5)

b. How many integers from 1 through 999 have at least one repeated digit?

- Q6.b) How many positive two-digit integers are multiples of 3? b. What is the probability that a randomly chosen positive two-digit integer is a multiple of 3? (5)