

2026.

4th Semester

ECE

ELECTRONIC DEVICES AND CIRCUITS – II

ECE-403

Full Marks : 75 SCTE/NGL/R-2026-II

Pass Mark : 30

Time : 3 Hours

SECTION A

I. Multiple Choice Question:

(8x 1 =8)

1. A unijunction has _____ pn junction.
a. One b. Two c. Three d. All of the above
2. The FET has _____ input impedance and _____ noise level.
a. low, low b. low, high
c. high, low d. high, high
3. A MOSFET uses the electric field of a _____ to control the channel current.
a. PN diode b. Resistor
c. Inductance d. Capacitor
4. Input impedance of MOSFET is _____ than that of FET.
a. Equal b. More c. Less
5. Bulk type photoconductive cells is often referred to as _____.
a. Photo inductance b. Photo resistor
c. Photo capacitor d. Photo cell
6. When two inputs are used at the two input terminals of a differential amplifier is called _____.
a. Dual input b. Single input
c. Balanced input d. Unbalanced input
7. _____ circuit is used to convert square wave input to spike output pulse.
a. Subtractor b. Adder
c. Differentiator d. Integrator

8. The figure of merit of an Op-Amp is ____
- a. Slew rate
 - b. CMRR
 - c. Bandwidth
 - d. Input offset voltage

SECTION B

1. Define a unijunction transistor. (1)
2. Draw the basic structure of a unijunction transistor. (1)
3. Write short notes on UJT relaxation oscillator. (4)

SECTION C

1. List any three important parameters of a FET. (1)
2. Explain the a.c drain resistance parameters in FET. (2)
3. Explain with the help of a neat circuit diagram the working of FET? (4)

SECTION D

1. In one sentence explain the origin of the term MOSFET. (1)
2. Explain briefly the difference between enhancement MOSFET type and depletion type MOSFET. (2)
3. List and compare the differences between JFET and MOSFET. (4)
4. With the help of drain characteristics curve, explain the operation of n-channel depletion type MOSFET. (6)

SECTION E

1. Draw the portion of electromagnetic spectrum with respect to its wavelength. (1)
2. Explain an NPN Photodiode? (2)
3. Discuss the applications of photodiodes and phototransistors as a light operated relay. (4)

SECTION F

1. Write one function of a differential amplifier. (1)
2. Draw the circuit diagram of dual input configuration in differential Amplifier. (2)

3. Write all the various possible configurations of a differential amplifier circuits. (2)
4. Draw and explain in brief the schematic block diagram of differential Amplifier. (6)

SECTION G

1. "An ideal Op Amp has Perfect balance characteristics". Justify the statement. (1)
2. Define slew rate of an Op Amp. How is it calculated? (2)
3. Explain in brief the process of identifying a low pass circuit using Op Amp. (2)
4. Draw and describe the pin out diagram of an Op-Amp along with its Functions. (6)
5. Explain the working principle of open loop non-inverting amplifier Op-Amp functions. (4)
6. Explain with the help of a circuit diagram, the operation of an Op-Amp as an integrator. (4)
7. Draw and explain in detail the block diagram of a 555 timer and its pin out Functions. (4)

ENVIRONMENTAL EDUCATION (G307)

Full Mark : 75 SCTE/NGL/R-2026-II

Pass Mark : 30

Time : 3 Hours

S.No.	Questions	Marks	CO
Part-1	I. Choose the correct answer:		
	1. Which of the following is not a component of the biotic environment: a) soil b) plants c) animals d) micro organisms	1	CO1
	2. World Environment Day is celebrated on: a) 1 st December b) 5 th June c) 5 th May d) 15 th October	1	CO1
	II. Answer the following:		
	1. Mention the types of environment.	2	CO1
	2. List some importance of environment.	2	CO1
Part-2	I. Choose the correct answer:		
	1. The transfer of matter in biogeochemical cycles involve: a) carbon b) oxygen c) land d) water	1	CO1
	II. Answer the following:		
	1. Define an ecosystem. Mention the various abiotic factors which can disrupt and ecosystem. OR Categorize the biogeochemical cycles on the basis of their pathways.	3	CO1
	2. Write a note on types of biodiversity.	3	CO1
	1. a. Explain the nitrogen cycle with diagram and explain how it benefits the ecosystem. OR b. Explain the hydrological cycle with diagram and explain how it benefits the ecosystem.	4	CO1

Part-3	I. Choose the correct answer: 1. Which of the following attributes to population: a) sex ratio b) land resources c) age distribution d) Birth and death rates.	1	CO
	2. Which of the following is the reason for water scarcity: a) deforestation b) rapid urbanization c) afforestation d) biogeochemical cycle	1	CO2
	II. Answer the following: 1. Mention the methods for conservation of forests.	2	CO2
	2. Discuss the types of natural resources.	3	CO2
	3. Mention the uses and abuses of wetlands.	3	CO2
Part-4	I. Choose the correct answer: 1. Which of the following is NOT a global environmental problem: a) food security b) water scarcity c) ethnic riots d) climate change	1	CO3
	2. The chemical the causes ozone layer depletion. a) CFCs b) CO ₂ c) H ₂ O d) CH ₄	1	CO3
	II. Answer the following: 1. Discuss some effects of ozone layer depletion.	2	CO3
	2. Describe how Green House Effect and global warming go hand in hand.	3	CO3
	3. Explain how acid rain is formed.	3	CO3
	4. Discuss the steps to be taken to curb global warming.	4	CO4

Part-5**I. Choose the correct answer:**

1. The unit to measure sound is:

- a) db b) ppm
c) mg/m³ d) volt

1

CO3

2. Hearing tests is conducted by a device called:

- a) audiometer
b) audiogram
c) hearing threshold level scale
d) sonometer

1

CO3

II. Answer the following:

1. Explain the effects of air pollutants on vegetation.

2

CO3

2. Discuss the ways in which oxides of Sulphur can be absorbed to reduce pollution.

2

CO4

3. Discuss the principle of water treatment.

4

CO3

4. Identify the places of noise pollution and its effect.

4

CO3

I. Choose the correct answer:

1. The conventional source of energy is:

- a) wind energy b) tidal energy
c) solar energy d) petroleum

1

CO4

II. Answer the following:

1. Mention the various types of pesticides.

2

CO3

2. Differentiate between conventional and non-conventional energy sources

3

CO2

3. Define Integrated Pest Management and mention its benefits.

4

CO5

Part-6

ELECTRONIC MEASUREMENT & INSTRUMENTATIONS

ECE-405

Full Marks : 75

SCTE/NGL/R-2026-II

Pass Marks : 30

Time : 3 Hours

Choose the correct answer:

(1x10=10)

1. If measured value = 48 Ohm and true value = 50 Ohm, percentage relative error is
 - a) 2%
 - b) 4%
 - c) 5%
 - d) 10%
2. Which instrument is most suitable for precise laboratory measurement?
 - a) Analog meter
 - b) Integrating type DMM
 - c) Ammeter
 - d) Galvanometer
3. In XY mode, time base is
 - a) Used
 - b) Not used
 - c) Doubled
 - d) Reduced
4. Higher accuracy is obtained in:
 - a) Capacitor method
 - b) Comparison method
 - c) Digital frequency meter
 - d) Analog meter
5. The counter in DFM counts:
 - a) Voltage
 - b) Current
 - c) Pulses
 - d) Power
6. IF method is mainly used for
 - a) Low frequency
 - b) High frequency
 - c) DC signals
 - d) Audio
7. Dummy load is used to:
 - a) Amplify signal
 - b) Absorb power
 - c) Reflect signal
 - d) Measure voltage
8. Low level power is measured in
 - a) kW
 - b) W
 - c) mW
 - d) μ W or nW

9. Why is high CMRR important in instrumentation amplifier?
 - a) To increase gain
 - b) To reject common noise signal
 - c) To reduce power
 - d) To increase speed
10. To convert a varying signal into a smooth ramp output, use
 - a) Differentiator
 - b) Integrator
 - c) Amplifier
 - d) Filter

II. Answer the following questions:

1. What is dynamic range? (2)
2. Define Digital multi meter (DMM). (2)
3. What pattern is obtained when phase difference is 90° ? (2)
4. In a certain pattern the value of Vertical tangencies = 3 and Horizontal tangencies = 2. Find frequency ratio. (2)
5. List the main blocks of a digital frequency meter. (2)
6. If the capacitor value increases in charge-discharge method, what happens to measured frequency? (2)
7. Define phase shifter. (2)
8. Why is pulse counting method more accurate than CRO method? (2)
9. If phase difference = 180° , what will be the CRO pattern? (2)
10. What is a directional coupler? (2)
11. Why is feed-through method suitable for transmission lines? (2)
12. Define signal conditioning. (2)

III. Answer the following Questions:

1. Differentiate between fundamental and derived units. (3)
2. Compare two instruments, where instrument A's resolution = 0.1 and instrument B's resolution = 0.01. Which is better and why? (3)
3. Describe the function of signal conditioning in DMM. (3)
4. Explain how DSO helps in transient response measurement. (3)
5. A digital frequency meter shows 750 counts when gate time is 0.5 seconds. Find frequency. (3)
6. In pulse counting method, time difference = 2ms and time period is 5ms. Find phase difference. (3)
7. Explain how an inverting amplifier works. (3)
8. A circuit is tested using CRO. Input voltage = 2V, output voltage = 10V. Find Gain. (4)

9. Explain the feed through power measurement method with working principle. (4)
10. A signal in a noisy industrial environment needs accurate measurement. (2+4)
- a) Which type of DMM will you use?
- b) Explain the working and justify your choice.
11. A system needs to monitor temperature, pressure and humidity. Explain how a multichannel DAS handles these inputs and mention the role of multiplexer. (4+2)

ELECTRICAL MACHINES & MEASUREMENT

ECE-409

Full Marks : 75

SCTE/NGL/R-2026-II

Pass Marks : 30

Time : 3 Hours

I. Choose the correct answer:

(1x10=10)

1. Increasing number of turns in a coil will
 - a) Decrease emf
 - b) Increase emf
 - c) Not affect emf
 - d) Make emf Zero
2. Fleming's Right hand rule is used in
 - a) Motors
 - b) Generators
 - c) Transformers
 - d) Batteries
3. Efficiency of transformer is maximum when
 - a) Iron loss > Copper loss
 - b) Iron loss < Copper loss
 - c) Iron loss = Copper loss
 - d) Losses are Zero
4. The function of a commutator is to
 - a) Increase voltage
 - b) Store energy
 - c) Convert AC to DC
 - d) Reduce losses
5. If the slip of an induction motor increases, the rotor frequency will
 - a) Decrease
 - b) Remain constant
 - c) Increase
 - d) Become zero
6. In an induction motor, torque becomes zero when
 - a) Slip=1
 - b) Slip= 0
 - c) Slip= 0.5
 - d) Slip= 1.5
7. Megger measures resistance in:
 - a) Ohms
 - b) Kilo-ohms
 - c) Mega-ohms
 - d) Milli-ohms

8. Two wattmeter method is used for

- a) Single phase
- b) 3-phase power
- c) DC circuits
- d) Low voltage

9. A DC meter rotates faster than normal. This indicates

- a) Low supply voltage
- b) High braking torque
- c) Weak braking magnet
- d) Open voltage coil

10. Wagner earthing removes

- a) Resistance
- b) Inductance
- c) Stray capacitance
- d) Power loss

II. Answer the following questions:

(2x15=30)

1. Explain the effect on induced emf when magnetic field becomes constant. (2)
2. A wire carrying current is placed parallel to magnetic field. Describe the characteristics of the force. (2)
3. State the working principle of a transformer. (2)
4. A transformer has voltage ratio=5, $N_1=1000$. Find N_2 . (2)
5. List the stator parts of a DC machine (2)
6. Explain the importance of back emf for motor protection. (2)
7. "DC motor should not be started directly without a starter" Justify this statement. (2)
8. Explain the importance of laminating stator cores in an induction motor. (2)
9. State the principle of ammeter-voltmeter method. (2)
10. Define true power. (2)
11. Explain the function of pressure coil. (2)
12. In a two wattmeter method if $W_1=2000W$ and $W_2=1000W$. Calculate the total power. (2)
13. Explain the purpose of using aluminium disc in energy meters. (2)
14. Write the balance equation of capacitance bridge. (2)
15. Explain the effects of stray capacitance at high frequency. (2)

III. Answer the following Questions:

1. Explain open circuit test with purpose and procedure. (3)
2. A transformer has output power 800W and input power 1000W. Calculate efficiency. (3)
3. Differentiate between squirrel cage and slip ring induction motor. (3)
4. State the working principle of a DC energy meter. (3)
5. A load of 2kW operates for 5 hours. Calculate energy consumed. (3)
6. Describe the balance condition of Wheatstone bridge with formula. (4)
7. An unknown resistance is connected in a circuit and the ammeter shows 2 A. When it is replaced by a standard resistor, the same current is obtained when the resistance is 15 Ω . Find the value of unknown resistance. (4)
8. A 4-pole generator has, flux per pole= 0.02Wb, Total conductors=500, Speed=1200rpm, parallel paths=2. Calculate the generated emf. (4)
9. A motor runs at $N=960$ rpm with synchronous speed $N_s=1000$ rpm. Find slip and rotor frequency. (4)
10. In an inductance bridge, $L_s=5H$, $R_1=100\text{ Ohm}$, $R_2=300\text{ Ohm}$. Find L_x . (4)

COMMUNICATION ENGINEERING – II

ECE-407

Full Marks : 75 **SCTE/NGL/R-2026-II**

Pass Mark : 30

Time : 3 Hours

SECTION A

I. Multiple Choice Question:

(6x 1 = 6)

1. For QPSK type encoding, how many digital input bits are required?
a. One b. Two c. Three d. Four
2. In Ionospheric wave propagation, during daytime ____ layers are present.
a. One b. Two c. Three d. Four
3. A small portion of reflected that return to radar set is called ____
a. EM pulse b. Duplexer c. PPI d. Echo
4. ____ is an example of MEO altitude satellite.
a. Iridium b. GPS c. VSAT d. Molnya
5. ____ is the point in the orbit where satellite is nearest to the center of the earth.
a. Azimuth b. Geosync c. Apogee d. Perigee
6. ____ is a group of cells within which no frequency is reused.
a. Channels b. Clusters c. CDMA d. Bandwidth

SECTION B

1. Name the function modem used in digital modulation. (1)
2. Mention one advantage and disadvantage each for M-ary. (2)
3. Define ASK. Explain the principles of ASK. (4)
4. Explain the basic idea of Quadrature Amplitude Modulation technique. (4)

SECTION C

1. Define information rate. (1)
2. Define error coding. (1)
3. Sketch the waveform of a digital input data '1011001' using: (2)
 - a. Manchester encoding
 - c. Bipolar AMI
4. Using mathematical concept, explain how the input signal '1101' can be transmitted using CRC technique if its generator polynomial used is $x^3 + x + 1$. (3)
5. Explain in brief the concept of Shannon- Hartley theorem. (4)
6. Define ISI. Explain in brief the usage of ISI in studying its effect on digital data transmission? (4)

SECTION D

1. Name all the layers present in ionospheric wave propagation during Daytime. (1)
2. Name the different categories where the mode of propagation of electromagnetic waves are divided. (1)
3. Define maximum usable frequency. (1)
4. State some of the advantages and disadvantages of surface wave propagation? (2)
5. Explain in detail the elementary concept about propagation of Waves. (4)

SECTION E

1. What is the function of synchronizer in a radar system? (1)
2. Mention any two basic principles governing the functionality of Radar? (2)
3. Describe in detail the radar range equation using isotropic radiator? (4)

SECTION F

1. State the reason why only a limited number of satellites is placed in Geo-stationary orbit to provide communication? (1)
2. A satellite transponder receives a downlink frequency signal of 20.2 GHz. If so, name its operating frequency band. (1)
3. Define: Altitude and Inclination (1)
4. Explain the function of TTC & M in satellite design. (2)
5. Discuss the concept of active satellite with suitable example. (4)
6. Explain the characteristic features of Low Earth Orbit Satellites. (4)

SECTION G

1. Give the full form of the terms 'MTSO' and 'MSU' (1)
2. Name some of the services provided by Intelligent Network in PSTN. (1)
3. Describe the process of setting up a call in mobile communication using mobile-to-fixed subscriber calls? (2)
4. Write some of the key features of 4G communication. (2)
5. Explain the function of signaling network in PSTN. (4)
6. Summarize the basic feature of GSM mobile communication. (4)

MICROPROCESSORS

ECE-501

Full Marks : 75 SCTE/NGL/R-2025-II

Pass Mark : 30

Time : 3 Hours

I. Choose the correct answer.

(15×1 = 15)

1. Identify the no. of Buses connected as part of the 8085 microprocessors?
a. 2. b. 3 c. 5 d. 8
2. The microprocessor places _____ address on the address bus
a. 4 bit b. 8 bit c. 16 bit d. 32 bit
3. SIM stands for:
a. Select Interrupt Mask b. Sorting Interrupt Mask
c. Set Interrupt Mask d. None of these
4. An Addressing in which the instructions contain the address of the data to be operated upon is known as:
a. Register addressing b. Implied addressing
c. Immediate addressing d. Direct addressing.
5. The circuits in the 8085 that provide the arithmetic and logic functions are called the
a. CPU b. ALU
c. I/O mapped d. None of these
6. MVI opcode means:
a. Move immediately b. Move data to accumulator
c. Move and display d. End of program
7. PROM stands for:
a. Programmable read only memory
b. Programmable read write memory
c. Programmable read and write memory
d. None of these

8. Identify the interrupt that has the highest priority?
 - a. TRAP
 - b. RST7.5
 - c. RST.5
 - d. INTR
9. HLT opcode means:
 - a. Load data into accumulator
 - b. Store result in memory
 - c. Copy the contents of accumulator
 - d. End of program.
10. Identify the basic stack operation?
 - a. Push
 - b. Pop
 - c. Both a and b
 - d. None of these
11. In the arithmetic operation, if a carry is generated D_7
 - a. Zero flag is set to 1.
 - b. Zero flag is reset
 - c. AC flag is set
 - d. None of these
12. EA stands for:
 - a. Effective address
 - b. Electrical address
 - c. Effect Address
 - d. None of these
13. Identify the RAM that requires regular referred:
 - a. Dynamic RAM
 - b. Static RAM
 - c. Permanent RAM
 - d. SD RAM
14. The instruction used for data transfer in I/O mapped I/O are:
 - a. IN, OUT
 - b. IN, LDA
 - c. SDA address
 - d. None of these
15. The address of the data is specified in the instruction
 - a. Immediate Address
 - b. Direct Address
 - c. Indirect Address
 - d. None of these

Q2. Define the following terms in Brief:

(6×2 = 12)

1. Address Bus and Control Bus.
2. Timing and Control Unit.

3. Stack pointer.
4. 8085 flag register.
5. I/O mapped I/O.
6. Interrupt.

Q3. Answer the following questions.

(6×3 = 18)

1. Explain the operation and functions of microprocessor.
2. Enumerate the components of microprocessor 8085.
3. The 8085 microprocessor performs operation in two main categories. Name and explain them.
4. Explain the term looping. Name the types of loops and explain.
5. Explain the different hardware interrupt of 8085.
6. Explain direct and indirect addressing mode with example.

Q4. Answer the following questions.

(6×5 = 30)

1. Draw the block diagram of 8085 microprocessor and explain.
2. Generate a program to perform the following functions:
Add the accumulator A with data byte 41H and register C with 87H. Add the numbers 35H directly to the sum.
3. Explain Arithmetic and Logic operation with example.
4. Explain interfacing of ADC with 8085.
5. Specify the different types of 8085 software interrupt.
6. Find the results of the 2's complement addition of the binary numbers:
 - a. 1101 1011
 - b. 0110 0101
 - c. 1001 0110
 - d. 1101 0101
 - e. 0110 110

