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R22



CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)

Examination : B.Tech VII Semester Regular Examinations Nov/Dec-2025
Course Name : Radar Systems
Course Code : A404407
Branch : Electronics & Communication Engineering
Date & Session : 28-11-2025 AN Duration: 3 hours Max. Marks: 60

(Note: Assume suitable data if necessary)

PART-A

Answer all TEN questions

Each question carries ONE mark.

10x1=10M

1. Explain the significance of PRF (Pulse Repetition Frequency) in radar. 1 M
2. Write the simple form of the radar range equation 1 M
3. What type of signal is used in CW radar? 1 M
4. What is an FM-CW altimeter used for? 1 M
5. What is the role of Doppler frequency in MTI radar? 1 M
6. Define blind speed. 1 M
7. What are scanning patterns in radar tracking? 1 M
8. Define phase comparison monopulse radar. 1 M
9. What is the function of a circulator in radar systems? 1 M
10. Define phased array antenna. 1 M

PART-B

Answer the following. Each question carries TEN Marks.

5x10=50M

- 11.A). i) Illustrate the radar block diagram and explain the function of each block. 5M
ii) Derive the expression for the maximum unambiguous range of a radar system and explain its dependence on PRF. 5M

OR

11. B). Analyze the concepts of false alarm probability and integration of radar pulses with suitable expressions. 10M
12. A). i) Describe the working principle of a non-zero IF receiver with necessary diagram. 5M
ii) Discuss the factors affecting range and velocity accuracy in CW radar systems. 5M

OR

12. B). Derive the expressions for range and Doppler measurement in FM-CW radar with necessary diagrams. 10M
13. A). i) With a neat block diagram, explain the operation of an MTI radar. 5M
ii) Discuss the role of range-gated Doppler filters in radar signal processing. 5M

OR

13. B). Explain staggered PRFs and how they eliminate blind speeds in MTI radar. 10M

(P.T.O.)

14. A). i) Discuss the amplitude comparison monopulse radar for one- and two-coordinate tracking. 5M
ii) Describe the acquisition and scanning patterns used in tracking radar. 5M

OR

14. B). Explain the design considerations and performance trade-offs between Amplitude Comparison and Phase Comparison Monopulse Radars. 10M

15. A). i) Derive the response characteristics of a matched filter receiver. 5M
ii) Illustrate the effect of noise figure and noise temperature on radar performance. 5M

OR

15. B). Analyze branch and circulator-based duplexer configurations used in radar systems. Compare their performance. 10M

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CMR COLLEGE OF ENGINEERING & TECHNOLOGY
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Examination : B.Tech VII Semester Regular Examinations Nov/Dec-2025
Course Name : CMOS Analog IC Design
Course Code : A404408
Branch : Electronics & Communication Engineering
Date & Session : 28-11-2025 AN **Duration: 3 hours** **Max. Marks: 60**

(Note: Assume suitable data if necessary)

PART-A

Answer all TEN questions

Each question carries ONE mark.

10x1=10M

1. What are the key parameters influencing MOS device modeling? 1 M
2. Define transconductance and its significance. 1 M
3. What is a MOS switch and how does it operate? 1 M
4. What is the current mirror? State its basic principle. 1 M
5. Define common-mode rejection ratio (CMRR). 1 M
6. What is gain boosting, and where is it used? 1 M
7. Define Power Supply Rejection Ratio (PSRR) in op-amps. 1 M
8. What are the main advantages of CMOS Op-Amps over bipolar Op-Amps? 1 M
9. What is the function of a comparator in an ADC system? 1 M
10. List the major performance parameters for comparator characterization. 1 M

PART-B

Answer the following. Each question carries TEN Marks.

5x10=50M

- 11.A). Discuss the construction, characteristics, and applications of passive components (resistor and capacitor) in integrated circuits. 10M

OR

11. B). Derive the large-signal current equation for a MOSFET in different regions of operation. 10M

12. A). Discuss the limitations of a simple current mirror and explain how a beta helper configuration overcomes them. 10M

OR

12. B). Explain the working principle of a MOS diode and its use in analog sub-circuits. 10M

13. A). Draw and explain a current amplifier circuit. Discuss its transconductance, input, and output impedances, and how it differs from a voltage amplifier. 10M

OR

13. B). Explain the concept of cascode amplifiers. Derive the gain expression and discuss its trade-offs in speed, power, and noise. 10M

14. A). Explain the full design flow of a two-stage CMOS operational amplifier. Illustrate the key design trade-offs involved in this process. 10M

OR

14. B). Compare single-stage, two-stage, and cascode Op-Amp architectures in terms of gain, output swing, PSRR, and power consumption 10M

(P.T.O.)

15. A). Explain the process of characterizing a CMOS comparator, covering offset, noise, voltage gain, speed, and input capacitance. Discuss how these parameters affect system-level performance. 10M

OR

15. B). Compare different open-loop comparator topologies and discuss methods for improving their resolution and speed. 10M

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CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)

Examination : B.Tech VII Semester Regular Examinations Nov/Dec-2025
Course Name : Network Security and Cryptography
Course Code : A404410
Branch : Electronics & Communication Engineering
Date & Session : 01-12-2025 AN **Duration:** 3 hours **Max. Marks:** 60

(Note: Assume suitable data if necessary)

PART-A

Answer all TEN questions

Each question carries ONE mark.

10x1=10M

1. Differentiate symmetric and asymmetric encryption. 1 M
2. List the types of attack. 1 M
3. Explain the strength of triple DES. 1 M
4. Compare stream cipher with block cipher with example. 1 M
5. Define Euler's theorem. 1 M
6. Compare public key and private key. 1 M
7. What is the role of compression function in hash function? 1 M
8. Give the two approaches of digital signature. 1 M
9. What are the benefits of IP Security? 1 M
10. Differentiate spyware and virus. 1 M

PART-B

Answer the following. Each question carries TEN Marks.

5x10=50M

- 11.A). i) Define Steganography. Describe various techniques used in Steganography. 5M
ii) State mono-alphabetic cipher? How it is different from Caesar cipher. 5M

OR

11. B). i) Discuss the substitution Techniques in detail. 5M
ii) Discuss the Transposition Techniques in detail. 5M

12. A). Describe DES algorithm with neat diagram with advantages and applications. 10M

OR

12. B). Explain about Block cipher design principles – Block cipher mode of operation. 10M

13. A). Explain the working principles of RSA algorithm. 10M

OR

13. B). With a neat sketch explain the Elliptic curve cryptography with an example. 10M

14. A). Explain in detail about X.509 authentication services. 10M

OR

14. B). What is Digital Signature? Explain how it is created at the sender end and retrieved at receiver end. differentiate digital signature from digital certificate. 10M

15. A). Explain the working principle of SET and its application. 10M

OR

15. B). Explain how firewalls help in establishing a security framework for an organization. 10M

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CMR COLLEGE OF ENGINEERING & TECHNOLOGY
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Examination : B.Tech VII Semester Regular Examinations Nov/Dec-2025
Course Name : Satellite Communications
Course Code : A404411
Branch : Electronics & Communication Engineering
Date & Session : 01-12-2025 AN Duration: 3 hours Max. Marks: 60

(Note: Assume suitable data if necessary)

PART-A

Answer all TEN questions

Each question carries ONE mark.

10x1=10M

1. If a satellite is at 74°E longitude, what is its sub-satellite point. 1 M
2. What is meant by "solar radiation pressure" in orbital perturbations? 1 M
3. What is the function of reaction wheels in AOCS? 1 M
4. What device is used to measure the angular position of a satellite? 1 M
5. Name one commonly used uplink frequency band. 1 M
6. How does TDMA allocate satellite resources to users? 1 M
7. What type of polarization is used in Earth Station antennas to reduce interference? 1 M
8. What is the frequency range typically used for uplink in C-band communication? 1 M
9. Name one common application of GEO satellites. 1 M
10. Which type of orbit is commonly used for weather monitoring satellites? 1 M

PART-B

Answer the following. Each question carries TEN Marks.

5x10=50M

- 11.A). Discuss the history of satellite launch vehicles and their evolution, highlighting key milestones and breakthroughs that have contributed to the development of satellite communication. 10M

OR

11. B). What are passive and Active Satellites? Enlist their advantages and disadvantages? 10M
12. A). With the help of a neat block diagram describe the working of telemetry, tracking and control (TT & C) subsystem. 10M

OR

12. B). Illustrate the importance of satellite antenna? Explain the types of antennas used in Satellite communication in detail. 10M
13. A). Enlist the steps required in calculation of System noise temperature and G/T ratio in Satellite communication using relevant mathematical expressions. 10M

OR

13. B). Given: Antenna Gain (GGG) = 45 dBi, System Noise Temperature (T_{sys}) = 300 K, The receiving system operates at a frequency of 12 GHz, The noise figure (FFF) of the receiver is 3 dB, The bandwidth (BBB) of the system is 36 MHz
Determine: (i) Calculate the G/T Ratio for the system. (ii) The overall system noise figure and the contribution of the antenna to the overall noise. (iii) The total noise power in the system, given the bandwidth and the system noise temperature. (iv) The received signal power for the system, assuming the received signal strength is -120 dBm. 10M

(P.T.O..)

14. A). Explain the transmitter operation of earth station with neat diagram. 10M

OR

14. B). Explain the working of Single stage and Multi- Stage HPA in detail. 10M

15. A). Illustrate the functioning of Geostationary or geosynchronous earth orbit (GEO), list its advantages and disadvantages? 10M

OR

15. B). With the aid of block diagram representation show how signal generation takes place in GPS Satellites. 10M

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CMR COLLEGE OF ENGINEERING & TECHNOLOGY
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Examination : B.Tech VII Semester Regular Examinations Nov/Dec-2025
Course Name : Artificial Intelligence
Course Code : A404413
Branch : Electronics & Communication Engineering
Date & Session : 03-12-2025 AN **Duration: 3 hours** **Max. Marks: 60**

(Note: Assume suitable data if necessary)

PART-A

Answer all TEN questions
Each question carries ONE mark.

10x1=10M

1. Define Artificial Intelligence. 1 M
2. List the foundations of AI. 1 M
3. Compare informed and uninformed search techniques. 1 M
4. What are the optimal decisions taken in multiplayer games. 1 M
5. Explain how knowledge is represented in AI. 1 M
6. Discuss on mental events. 1 M
7. What do you mean by knowledge acquisition? 1 M
8. Which grammar is used for NLP in AI? 1 M
9. What is the working principle of expert system? 1 M
10. List few problem areas of expert systems. 1 M

PART-B

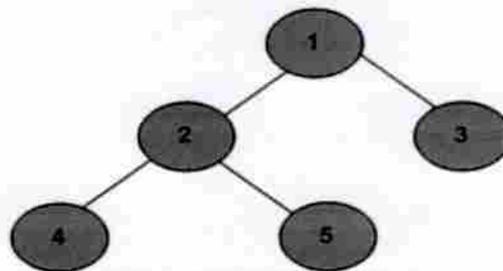
Answer the following. Each question carries TEN Marks.

5x10=50M

- 11.A). Compare simple reflex agent and model based agent with neat diagrams. 10M

OR

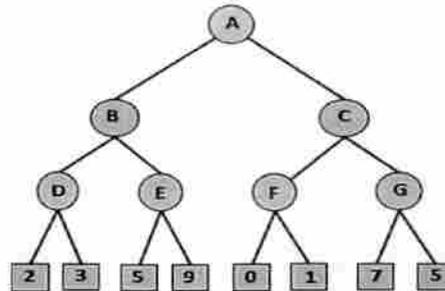
11. B). Make use of 8 queens problem to describe the five components of well defined problem. 10M
12. A). Make use of the below tree and apply Breadth First Search and Depth First Search to show the relevant path from initial state (1) to goal state (5). 10M



(P.T.O..)

OR

12. B). Explain alpha beta pruning algorithm with the advantages over min max algorithm. Apply alpha beta pruning for the below tree. 10M



13. A). “The law says that it is a crime for an American to sell weapons to hostile nations. The country Nono, an enemy of America, has some missiles, and all of its missiles were sold to it by Colonel West, who is American”. 10M
Convert the following paragraph to first-order definite clauses and apply forward chaining to prove west is criminal.

OR

13. B). Apply ontological engineering for a real world example to explain step by step procedure. Also explain categories and objects. 10M
14. A). Define the objective of Reinforcement Learning and describe the key components of Reinforcement Learning system. Use the agent-environment loop diagram to illustrate the flow of interaction 10M

OR

14. B). Discuss on different statistical learning methods used in Artificial Intelligence. 10M
15. A). Explain in detail the structure of an expert System. Discuss the roles and functions of its major components with suitable examples. 10M

OR

15. B). Compare and contrast different types of expert systems in terms of their knowledge representation. How does a hybrid expert system overcome the limitations of traditional rule-based systems? 10M

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Examination : B.Tech VII Semester Regular Examinations Nov/Dec-2025
Course Name : 5G and beyond Communications
Course Code : A404414
Branch : Electronics & Communication Engineering
Date & Session : 03-12-2025 AN **Duration: 3 hours** **Max. Marks: 60**

(Note: Assume suitable data if necessary)

PART-A

Answer all TEN questions

Each question carries ONE mark.

10x1=10M

1. Define spatial multiplexing in MIMO systems. 1 M
2. What is the significance of spatial diversity? 1 M
3. Define WISDOM in the context of 5G networks. 1 M
4. What is the function of SMNAT? 1 M
5. What is beam combining? 1 M
6. Mention two parameters affecting mm-wave propagation. 1 M
7. State the importance of multiband operation in 5G. 1 M
8. Define beam adaptation protocol. 1 M
9. Define CONASENSE. 1 M
10. State the importance of user awareness in Cyber security. 1 M

PART-B

Answer the following. Each question carries TEN Marks.

5x10=50M

- 11.A). Explain the concept of Hybrid precoding with neat diagram. 10M
- OR**
11. B). Explain in detail the types of diversity and their impact on MIMO performance. 10M
12. A). Explain the architecture and call flow of SMNAT for in-band D2D communication. 10M
- OR**
12. B). Analyze the vision and challenges of WISDOM networks in future 5G systems. 10M
13. A). Explain spatial characterization of multipath and beam combining concepts. 10M
- OR**
13. B). Derive and compute the path loss exponent using empirical data for a given mm-wave scenario. 10M
14. A). i) Explain Multiband operation and discuss spectrum utilization efficiency. 4M
ii) Explain the concepts of higher layer design consideration for mm-wave. 6M
- OR**
14. B). Explain mm-wave standardization efforts with reference to ECMA-387 and IEEE 802.11ad. 10M
15. A). Explain Human Bond Communication and its relevance to post-5G technologies. 10M
- OR**
15. B). Evaluate the challenges and prospects of future mobile technology in cognitive radio networks. 10M
