H.T No: ☐☐☐☐☐☐☐☐☐☐ **R22**

CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)

Examination	:	B.Tech VI Semester Regular Examinations June-2025
Course Name	:	Microwave and Optical Communications
Course Code	:	A404315
Branch	:	Electronics & Communication Engineering
Date & Session	:	19-06-2025 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 velocity modulation. — 1 M
2. What is a slow wave structure? Draw any two structures. — 1 M
3. What is TRAPAT? Draw the structure of TRAPAT? — 1 M
4. Name the elements that exhibit Gunn effect. — 1 M
5. What is the function of a waveguide probe? — 1 M
6. Define a waveguide phase shifter. — 1 M
7. What is VSWR? — 1 M
8. List one method used for impedance measurement. — 1 M
9. What is the principle of total internal reflection in optical fibers? — 1 M
10. What is the significance of the optical fiber system link budget? — 1 M

PART-B
Answer the following. Each question carries TEN Marks.

5x10=50M

11.A). Analyze the operation of a Reflex Klystron oscillator using the Applegate diagram. — 10M

OR

11. B). A helix travelling wave tube is operated with a Beam current of 300 mA, beam voltage of 5 kV, characteristic impedance of 20 Ω. What length of helix will be selected to give an output power gain of 500 dB at 10 GHz. — 10M

12. A). Discuss the construction and working of a cylindrical magnetron. — 10M

OR

12. B). Sketch a neat diagram of a GUNN diode and explain its functions. — 10M

13. A). Explain in detail about waveguide windows, tuning screws and posts, waveguide attenuators with neat diagrams. — 10M

OR

13. B). What is Faraday rotation? Also, explain the construction and working of the rotary vane type attenuator. — 10M

14. A). Derive the expressions for Directivity, Coupling factor & Isolation of a directional coupler and S-matrix for a Magic TEE. — 10M

OR

14. B). Explain the various blocks of the Microwave bench with a neat diagram. — 10M

15. A). Compare multimode and single-mode fibers in terms of their performance and applications with suitable diagrams. — 10M

OR

15. B). Discuss various losses in optical fiber cables and suggest methods to minimize them. — 10M

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CMR COLLEGE OF ENGINEERING & TECHNOLOGY
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Examination	:	B.Tech VI Semester Regular Examinations June-2025
Course Name	:	Control Systems
Course Code	:	A404316
Branch	:	Electronics & Communication Engineering
Date & Session	:	21-06-2025 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. Why do we need mathematical modelling of process?   1 M
2. State one comparison between open loop and closed loop control systems.   1 M
3. What is marginally stable system?   1 M
4. Draw the response of first order system for impulse input.   1 M
5. What is polar plot?   1 M
6. Locate the poles and zeros on the S-plane of a system $G(S) = 10(S+2)(S+4)/(S+5)(S-6)(S+7)$.   1 M
7. Define P, I & D controllers.   1 M
8. List out the frequency domain specifications.   1 M
9. What is State space representation?   1 M
10. Compare the transfer function approach and state variable approach.   1 M

PART-B
Answer the following. Each question carries TEN Marks.   5x10=50M

11.A). Determine the transfer function of the given block diagram as shown in figure.   10M
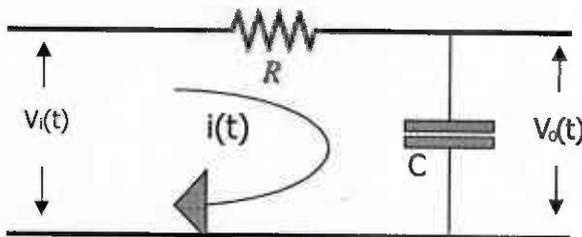
OR

11. B). Illustrate the open loop & closed loop control systems by giving suitable examples and also highlight their merits & demerits.   10M

12. A). By means of RH criterion determine the stability of the system represented by the characteristic equation
$S^4 + 2S^3 + 8S^2 + 4S^1 + 3 = 0$.   10M

OR

12. B). Derive the expression for rise time(t_r), delay time(t_d), peak time (t_p), peak overshoot (M_p).   10M

(P.T.O..)

13. A). The open loop transfer function of unity feedback system is given by $G(s)=1/s(1+s)(1+2s)$. Sketch the polar plot and determine the gain margin and phase margin. 10M

OR

13. B). Write the step by step procedure for the construction of bode plot. 10M

14. A). Design a lag compensator for any unity feedback system with open loop transfer function $G(s)$. 10M

OR

14. B). Write the applications of P, PI and PID controllers with neat diagrams. 10M

15. A). Solve the diagonal matrix for the given system matrix, using eigen vectors. 10M

$$A = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ -6 & -11 & -6 \end{bmatrix}$$

OR

15. B). Construct the state model for a system characterized by the differential equation. 10M

$$\frac{d^3y}{dt^3} + 6\frac{d^2y}{dt^2} + 11\frac{dy}{dt} + 6y + u = 0.$$

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CMR COLLEGE OF ENGINEERING & TECHNOLOGY
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Examination	:	B.Tech VI Semester Regular Examinations June-2025
Course Name	:	Linear and Digital IC Applications
Course Code	:	A404307S
Branch	:	Electronics & Communication Engineering
Date & Session	:	21-06-2025 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 slew rate of Op-Amp.   1 M
2.   What is the need for voltage Regulation?   1 M
3.   List any two applications of 555 timer in monostable mode.   1 M
4.   List the different types of Filters.   1 M
5.   What is meant by resolution of DAC?   1 M
6.   What is the conversion time of counting type ADC &Parallel comparator type ADC?   1 M
7.   Define Comparator.   1 M
8.   What is priority encoder?   1 M
9.   What are the applications of Flip-flop?   1 M
10. Distinguish between RAM and ROM.   1 M

PART-B
Answer the following. Each question carries TEN Marks.   5x10=50M

11.A). Discuss the AC Characteristics of an Op-Amp in Detail.   10M

OR

11. B). How Op-Amp is used as Integrator? Explain its working.   10M

12. A). Design a First Order HighPass filter with a cutoff frequency of 500 KHz with a pass band   10M
         gain of 2.

OR

12. B). Explain how 555 timer is used as astable multivibrator and derive the expression for its   10M
         frequency of Oscillations.

13. A). Discuss Successive Approximation ADC with necessary diagrams and suitable examples.   10M

OR

13. B). Explain about Weighted Resistor type DAC & R-2R ladder DAC design.   10M

14. A). i) Discuss about 8:1 multiplexer.   5M
         ii) Design a 4 x 2 priority encoder using logic gates.   5M

OR

14. B). Design Binary to Gray code Converter.   10M

15. A). Explain the working of the following and find the characteristic equation   10M
              i) J-K flip-flop   ii) D flip-flop

OR

15. B). Design and construct MOD-5 synchronous counter using JK flip flops   10M

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CMR COLLEGE OF ENGINEERING & TECHNOLOGY
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Examination	:	B.Tech VI Semester Regular Examinations June-2025
Course Name	:	Digital Signal Processing
Course Code	:	A404314/ A402313
Branch	:	ECE/ EEE
Date & Session	:	24-06-2025 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 Stability and Causality.   1 M
2. Illustrate Up sampling.   1 M
3. Describe the relation between Laplace and Z transform.   1 M
4. Illustrate Overlap save method for DFT computation.   1 M
5. List any two methods for digitizing the transfer function of an analog filter.   1 M
6. Explain any one main difference between FIR and IIR filters.   1 M
7. Define linear phase response of a filter.   1 M
8. List any two properties of Butterworth filter.   1 M
9. What is the advantage of cascade realization?   1 M
10. Describe Dead band effects.   1 M

PART-B
Answer the following. Each question carries TEN Marks.   5x10=50M

11.A). Apply the definitions of linearity, time-invariance, causality, and stability to classify   10M
discrete-time systems. For each of the following properties, define the term and provide
an example. Justify whether your example satisfies or violates the property.

OR

11. B). Let x(n)={1,2,3,2,5,0,4,2,3,2,1,3}, find   10M
(i) Up sample by 2 times.
(ii) Down sample by 4 times.

12. A). Find the 4-point DFT of x(n)= {1,2 ,1,2}   10M

OR

12. B). Determine the linear convolution of the following sequences using overlap-add and   10M
overlap save methods x(n) = {1,–1,0,2,1,3,1,2,–1}, h(n) = {1,3,1}

13. A). Design a digital Butterworth low-pass filter using the Bilinear Transformation method for   10M
the following specifications:
Cut-off frequency = 1 kHz, Sampling frequency = 8 kHz, Analog prototype filter
order N= 2.

OR

13. B). Derive the transformation function to convert a low-pass filter into a high-pass filter using   10M
Bilinear Transformation.

(P.T.O..)

14. A). Design a two-stage low pass FIR filter with Sampling time 1ms and fc=200Hz. Also find   10M
frequency response of the filter.

OR

14. B). Analyze the process of designing digital filters using window techniques.   10M

15. A). i) Explain the significance of Z-Transform in the analysis and realization of digital filters.   5M
ii) Interpret the conditions for stability of a discrete-time system using pole-zero analysis.   5M

OR

15. B). i) Explain the concept of round-off noise in IIR digital filters and how it affects filter   5M
performance.
ii) Summarize the different types of quantization effects encountered in digital filters.   5M

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CMR COLLEGE OF ENGINEERING & TECHNOLOGY
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Examination	:	B.Tech VI Semester Regular Examinations June-2025
Course Name	:	Professional Practice, Law & Ethics
Course Code	:	A404317
Branch	:	Electronics & Communication Engineering
Date & Session	:	26-06-2025 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 Professional Ethics.	1 M
2.	What is a Conflict of Interest in the context of professional ethics?	1 M
3.	List the essential elements of a valid contract.	1 M
4.	What is a contingent contract?	1 M
5.	Differentiate between arbitration and conciliation.	1 M
6.	What is the UNCITRAL model law on Arbitration?	1 M
7.	Name two methods of engaging labour in civil engineering.	1 M
8.	When was the Industrial Disputes Act enacted?	1 M
9.	What are the main forms of Intellectual Property?	1 M
10.	Which Act governs Patents in India?	1 M

PART-B
Answer the following. Each question carries TEN Marks.

5x10=50M

11.A).	Write the importance of a Code of Ethics in a profession and explain concepts of professionalism and professional responsibility.	10M

OR

11. B).	i) Explain the concepts of Vigil Mechanism and Whistle blowing.	5M
	ii) Briefly explain about GST and their roles of various stakeholders.	5M

12. A).	Discuss the concepts of Offer and Acceptance in the formation of a valid contract.	10M

OR

12. B).	Explain the Sale of Goods Act-1930 focusing on General Principles, Conditions & Warranties.	10M

13. A).	Describe the Arbitration and Conciliation system as an Alternative Dispute Resolution mechanism.	10M

OR

13. B).	Discuss the confidentiality aspect and the resort to judicial proceedings in ADR.	10M

(P.T.O..)

14. A). i) Elaborate on the role of Labour in Civil Engineering and various methods of engaging labour. 5M

 ii) List the key provisions of the Industrial Disputes Act, 1947. 5M

OR

14. B). Explain the significance of the RERA Act 2017 and NBC 2017 in construction-related laws. 10M

15. A). Define Intellectual Property and explain its main forms like Copyright, Trademarks, Patents, and Designs. 10M

OR

15. B). State the Law relating to Patents under the Patents Act, 1970. Identify the key aspects covered by this Act. 10M

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CMR COLLEGE OF ENGINEERING & TECHNOLOGY
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Examination	:	B.Tech VI Semester Regular Examinations June-2025
Course Name	:	Embedded System Design
Course Code	:	A404406
Branch	:	Electronics & Communication Engineering
Date & Session	:	28-06-2025 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.	List any two characteristics of embedded systems.	1 M
2.	What is a real-time operating system?	1 M
3.	What is the core component of an embedded system?	1 M
4.	What is memory shadowing?	1 M
5.	What does a brown-out protection circuit prevent?	1 M
6.	Mention one language used for embedded firmware development.	1 M
7.	Name any one type of operating system.	1 M
8.	What do you mean by multiprocessing?	1 M
9.	What does RPC stand for?	1 M
10.	Give one advantage of message passing over shared memory.	1 M

PART-B
Answer the following. Each question carries TEN Marks.   5x10=50M

11.A).	Explain the history and evolution of embedded systems. Highlight key milestones in their development.	10M

OR

11. B).	Discuss how to select a Real-Time Operating System (RTOS) for an embedded application. What factors and parameters need to be considered?	10M

12. A).	Explain the core components of an embedded system. Compare general-purpose processors and domain-specific processors with examples.	10M

OR

12. B).	Discuss different types of memory used in embedded systems and explain the concept of memory shadowing.	10M

13. A).	Explain the functions and working of the reset circuit and brown-out protection circuit in embedded systems. Why are they important?	10M

OR

13. B).	Explain the importance of firmware in embedded systems and how it interacts with hardware components.	10M

(P.T.O..)

14. A). Describe the different types of operating systems. Give examples of where each type is used.   10M

OR

14. B). Explain how priority-based scheduling works in RTOS. What problems can arise and how are they handled?   10M

15. A). Explain the different methods of task communication in embedded systems: shared memory, message passing, remote procedure call.   10M

OR

15. B). Discuss the criteria and methods used to choose a suitable Real-Time Operating System (RTOS) for an embedded application.   10M

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CMR COLLEGE OF ENGINEERING & TECHNOLOGY
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Examination	:	B.Tech VI Semester Regular Examinations June-2025
Course Name	:	Digital Image Processing
Course Code	:	A404404
Branch	:	Electronics & Communication Engineering
Date & Session	:	28-06-2025 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 Digital image.   1 M
2. List out different Types of images.   1 M
3. Define image negatives.   1 M
4. Define Histogram equalization.   1 M
5. What are the drawbacks of inverse filtering?   1 M
6. How do you restore the images in the presence of Noise?   1 M
7. Define image Segmentation.   1 M
8. Write the matrix for Prewitt's operator.   1 M
9. List two reasons why image compression is important.   1 M
10. State the goal of transform coding.   1 M

PART-B
Answer the following. Each question carries TEN Marks.   5x10=50M

11.A). Explain the fundamental steps involved in typical digital image processing.   10M

OR

11. B). Explain the concept of Hadamard Transform.   10M

12. A). Draw and explain the histogram for dark, light, low contrast and high contrast image. 10M

OR

12. B). Explain the concept of enhancement in frequency domain using high pass filters. 10M

13. A). Describe the concept of Least Mean Square filtering with relevant expressions.   10M

OR

13. B). Discuss the process of restoration by constrained least square filtering.   10M

14. A). Explain about Point, Line and Edge detection of discontinuities.   10M

OR

14. B). Explain the concept of morphological Erosion and Dilation operations.   10M

15. A). Explain the concept of Huffman coding with an example.   10M

OR

15. B). Draw the block diagram for lossless compression model and explain role of each block. 10M

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CMR COLLEGE OF ENGINEERING & TECHNOLOGY
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Examination	:	B.Tech VI Semester Regular Examinations July-2025
Course Name	:	Wireless Sensor Networks
Course Code	:	A404418
Branch	:	Electronics & Communication Engineering
Date & Session	:	01-07-2025 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.	Write the advantages of sensor networks.	1 M
2.	Mention the unique constraints of WSNs.	1 M
3.	List any two similarities between MANETs and WSNs.	1 M
4.	What is a MANET and how does it differ from a WSN?	1 M
5.	What is Zigbee and how is it related to IEEE 802.15.4?	1 M
6.	What is the main purpose of routing protocols in WSNs?	1 M
7.	Give an example of a real-time application in WSNs.	1 M
8.	What is the goal of a dissemination protocol in large sensor networks?	1 M
9.	List two roles of a WSN gateway.	1 M
10.	Why is nesC suitable for WSN programming?	1 M

PART-B
Answer the following. Each question carries TEN Marks.   5x10=50M

11.A).	What are the major advantages of Wireless Sensor Networks? Discuss various real-world applications with examples.	10M

OR

11. B).	Discuss the unique constraints and challenges faced in the design and deployment of WSNs.	10M
12. A).	Explain how microcontrollers and energy harvesting technologies influence WSN design.	10M

OR

12. B).	Discuss the major issues and challenges in Wireless Sensor Networks.	10M
13. A).	Explain the classification of routing protocols in WSNs. Discuss any two routing protocols with their advantages and limitations.	10M

OR

13. B).	Compare S-MAC and B-MAC protocols in terms of design, operation, and energy efficiency. Which is more suitable for dynamic networks and why?	10M
14. A).	What is a dissemination protocol in WSNs? Explain the need for dissemination protocols in large sensor networks.	10M

OR

14. B).	What do you understand by the quality of a sensor network? Explain different Quality of Service (QoS) parameters used to evaluate WSNs.	10M
15. A).	Explain the architecture and features of TinyOS. How does it differ from traditional OS's?	10M

OR

15. B).	Explain the key design principles of Wireless Sensor Networks.	10M

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