



ஸ்ரீ-ல-ஸ்ரீ காசிவாசி சுவாமிநாத சுவாமிகள் கலைக் கல்லூரி
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QUESTION BANK

Title of the Paper

COMMUNICATION PHYSICS

Course: III B.Sc(PHYSICS)

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MAJOR BASED ELECTIVE III

COMMUNICATION PHYSICS

Objective:

To promote scientific temper among students and update the basic functioning of various communication systems.

UNIT I Radio transmission and reception

Transmitter- modulation-need for modulation- types of modulation- amplitude, frequency and phase modulation- modulation factor-sideband frequencies in AM wave-limitations of amplitude modulation - frequency modulation-block diagram of AM and FM Transmitter.Receiver- demodulation-AM & FM radio receivers-super heterodyne radio receiver.

UNIT II Fiber Optic Communication

Introduction –structure of optical fiber –total internal reflection in optical fiber – principal and propagation of light in optical fiber - acceptance angle - numerical aperture – types of optical fibers based on material – number of modes – refractive index profile - fiber optical communication system (block diagram) - fiber optic sensors – Temperature sensor – fiber optic endoscope.

UNIT III Radar Communication

Basic radar system -Radar range –Antenna scanning – Pulsed radar system - A-Scope- Plan position indicator- Tracking radar- Moving target indicator- Doppler effect-MTI Principle- CW Doppler Radar- Frequency modulator CW Radar.

UNIT IV Satellite Communication

Introduction – history of satellites – satellite communication system – satellite orbits – classification of satellites – types of satellites – basic components of satellite communication – constructional features of satellites- multiple access – communication package – antenna- power source – satellite foot points- satellite communication in India.

UNIT V Mobile Communication

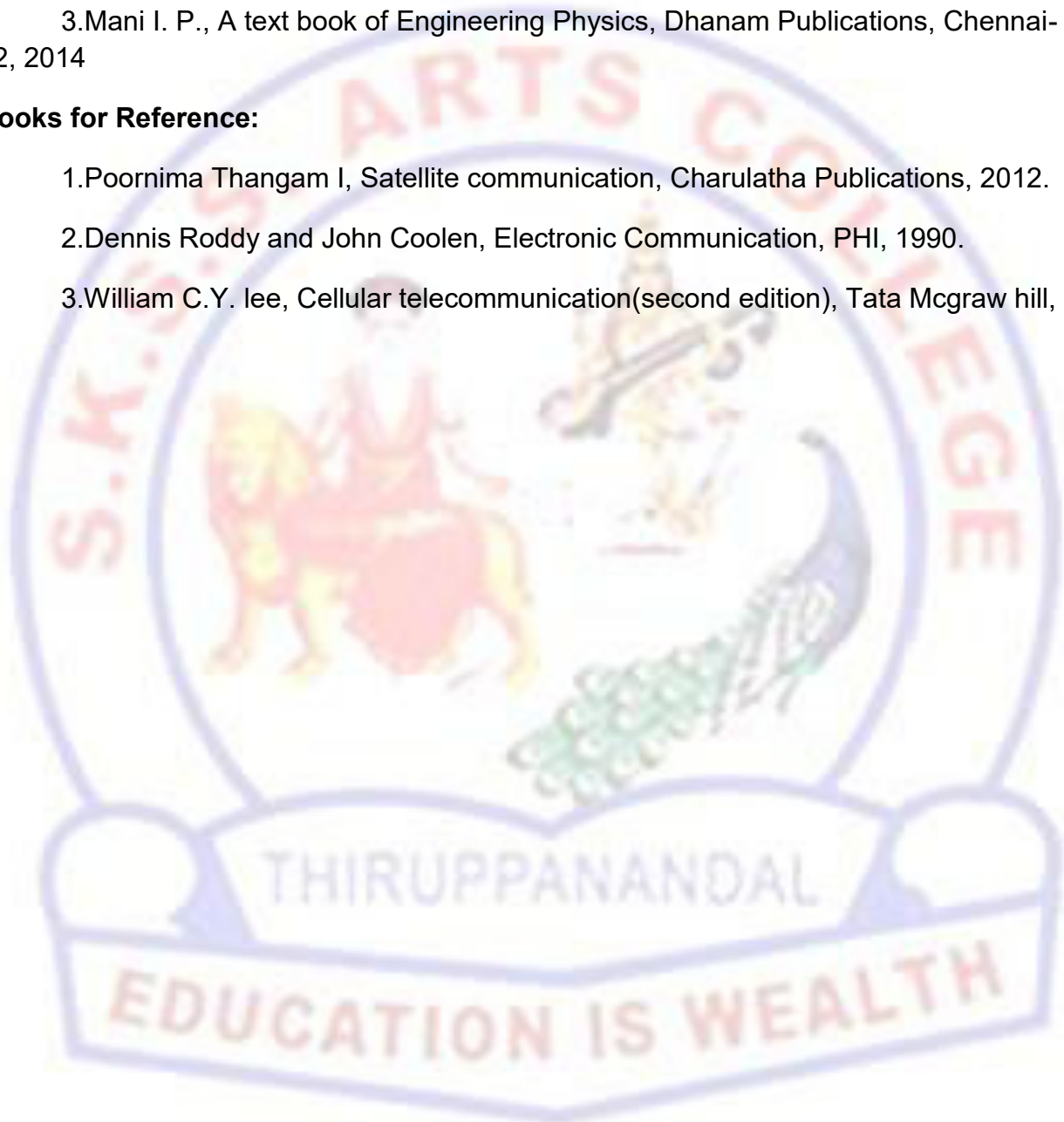
GSM – mobile services- concept of cell – system architecture – radio interface – logical channels and frame hierarchy – protocols – localization and calling – Handover-facsimile (FAX) – application – VSAT (very small aperture terminals) – Modem – IPTV (internet protocol television) – Wi-Fi - 3G (Basic ideas only).

Books for Study:

1. Metha V.K., Principles of Electronics, S. Chand & Company Ltd., 2013
2. Anokh Singh and Chopra A.K., Principles of communication Engineering, S. Chand & Company PVT. Ltd., 2013.
3. Mani I. P., A text book of Engineering Physics, Dhanam Publications, Chennai-42, 2014

Books for Reference:

1. Poornima Thangam I, Satellite communication, Charulatha Publications, 2012.
2. Dennis Roddy and John Coolen, Electronic Communication, PHI, 1990.
3. William C.Y. Lee, Cellular telecommunication(second edition), Tata Mcgraw hill,



III B.Sc (PHYSICS)
MAJOR BASED ELECTIVE- III
COMMUNICATION PHYSICS

UNIT- I

(RADIO TRANSMISSION AND RECEPTION)

Choose the correct answer:

1. Modulation is done in _____
 - A) Transmitter
 - B) Radio receiver
 - C) Between transmitter and radio receiver
 - D) None of the above
2. In a transmitter, _____ oscillator is used
 - A) Hartley
 - B) RC phase shift
 - C) Wien bridge
 - D) Crystal
3. In, India, _____ modulation is used for radio transmission.
 - A) Frequency
 - B) Amplitude
 - C) Phase
 - D) None of the above
4. In an AM wave, useful power is carried by _____
 - A) Carrier
 - B) Side bands
 - C) Both side band and carrier
 - D) None of the above
5. In amplitude modulation, bandwidth is _____ the audio signal frequency
 - A) Thrice
 - B) four times
 - C) Twice
 - D) none of the above
6. In amplitude modulation, the _____ of carrier is varied according to the strength of the signal.
 - A) Amplitude
 - B) Frequency
 - C) Phase
 - D) None of the above

7. over modulation (amplitude) occurs when signal amplitude is _____ carrier amplitude
- A) Equal to
 - B) Greater than
 - C) Less than
 - D) None of the above
8. In an AM wave, the majority of the power is in _____
- A) Lower sideband
 - B) Upper side band
 - C) Carrier
 - D) None of the above
9. At 100% modulation, the power in each sideband is _____ of that of carrier
- A) 50%
 - B) 40%
 - C) 60%
 - D) 25%
10. over modulation result in _____
- A) Weakening of the signal
 - B) Excessive carrier power
 - C) Distortion
 - D) None of the above

ANSWERS:

1.(A) 2.(D) 3.(B) 4.(B) 5.(C) 6.(A) 7.(B) 8.(C) 9.(D) 10.(C)

TWO MARKS

- 11. Define R.F amplifier stage.
- 12. What is mixer stage?
- 13. State that straight radio receiver.
- 14. What are A.M. radio receivers?
- 15. Write about you advantages of frequency modulation.
- 16. What is frequency modulation?
- 17. Define noisy reception.
- 18. Define lack of audio quality.
- 19. What is wireless?
- 20. What is transmitter?

FIVE MARKS

- 21. Explain the general principles of radio broadcasting, transmission and reception.
- 22. What is modulation? Why is modulation necessary in communication system?

23. Explain amplitude modulation. Derive the voltage equation of an AM wave.
24. What do you understand by modulation factor? What is its significance?
25. Draw the waveform of AM wave for the following values of modulation factor:

i) 0 ii) 0.5 iii) 1 iv) 1.5

26. What do you understand by side band frequencies in an AM wave?
27. Derive an expression for the fraction of total power carried by the sideband in amplitude modulation.
28. What is the limitation of amplitude modulation?
29. What do you understand by frequency modulation? Explain its advantages over amplitude modulation.
30. What is demodulation? What are essentials in demodulation?

TEN MARK

31. Draw the diode detector circuit and explain its action.
32. What is superhetrodyne principle? Explain the function of each stage of superhetrodyne receiver with the help of a block diagram.
33. What is transmission of radio wave? Explain the function of radio broadcasting, transmission and reception.
34. State that modulation. Explain do you understand needs for modulation.
35. Explain about modulation factor and amplitude.
36. Explain do you understand side band frequencies in AM wave.
37. Detailed explain working of transistor AM modulator.
38. Explain do you understand limitations of amplitude modulation.
39. Explain the frequency modulation with advantages.
40. What is Demodulation? Explain performance of A.M. diode detector and A.M radio receivers.



UNIT-II

(FIBER OPTIC COMMUNICATION)

Choose the correct answer:

1. Fiber mostly suited in single- wavelength transmission in O-band is
 - A) low-water-peak non dispersion-shifted fibers.
 - B) Standard single mode fibers
 - C) Low minimized fibers
 - D) Non-zero dispersion- shifted fibers.
2. Standard single mode fibers (SSMF) are utilized mainly for operation in
 - A) C-band
 - B) L-band
 - C) O-band
 - D) C-band and L-band
3. A fiber which is referred as non-dispersive shifted fiber is
 - A) Coaxial cables
 - B) Standard single mode fiber.
 - C) Standard multimode fiber
 - D) Non zero dispersion shifted fiber.
4. Single mode fibers allow single mode propagation; the cladding diameter must be at least
 - A) Twice the core diameter
 - B) Thrice the core diameter
 - C) Five times the core diameter
 - D) Ten times the core diameter
5. The fibers mostly not used now days for optical fiber communication system are
 - A) Single mode fiber
 - B) Multimode step fibers
 - C) Coaxial cables
 - D) Multimode graded index fibers
6. In single mode fibers, the most beneficial index profile is
 - A) Step index
 - B) Graded index
 - C) Step & graded index
 - D) Coaxial cable
7. Multimode step index fibers have a bandwidth of
 - A) 2 to 30 MHz km
 - B) 6 to 50 MHz km

- C) 10 to 40 MHz km
D) 8 to 40 MHz km
8. Multimode step index fiber has
A) Large core diameter & large numerical aperture
B) Large core diameter & small numerical aperture
C) Small core diameter & large numerical aperture
D) Small core diameter & small numerical aperture
9. A multimode step index fiber has a large core diameter of range
A) 100 to 300 μm
B) 100 to 300nm
C) 200 to 500 μm
D) 200 to 500nm
10. For a sine wave, the frequency is represented by the cycle's per ____
A) Second
B) Minute
C) Hour
D) None of the above

ANSWERS:

1. (B) 2. (C) 3. (B) 4. (D) 5. (A) 6. (B) 7. (B) 8. (A) 9. (A) 10. (A)

TWO MARKS

11. Define refraction.
12. Define reflection.
13. What do you mean by ray?
14. What is an optical network?
15. What are the advantages of optical communication?
16. How do you minimize optical losses at the interface?
17. Define polarization maintaining fiber (PMF)?
18. What is M-C-fiber?
19. Mention the losses responsible for attenuations in optical fibers.
20. Define endoscope bending.

FIVE MARKS

21. Explain the basic concept of fiber optic communication.
22. Describe reflection and refraction.
23. Write short notes following questions
i) Dispersion

ii) Diffraction

24. Write short notes following questions

i) Absorption

ii) scattering

25. Write do you understand the optical fiber and fiber cables.

26. Explain characteristics and classification of fiber.

27. Explain: fiber optic components and systems.

28. Write do you understand following questions

i) Light wave

ii) the optical link

29. Explain perform manufacturing lathe.

30. Explain performance of optical fiber and drawing tower.

TEN MARKS

31. Detailed explain the fiber optic endoscope.

32. Explain the performance of temperature sensor.

33. Detailed explain following questions

i) Reflecting sensor

ii) Temperature sensor.

34. Detailed explain block diagram of fiber optical communication.

35. Explain classifications of optical fiber based on materials.

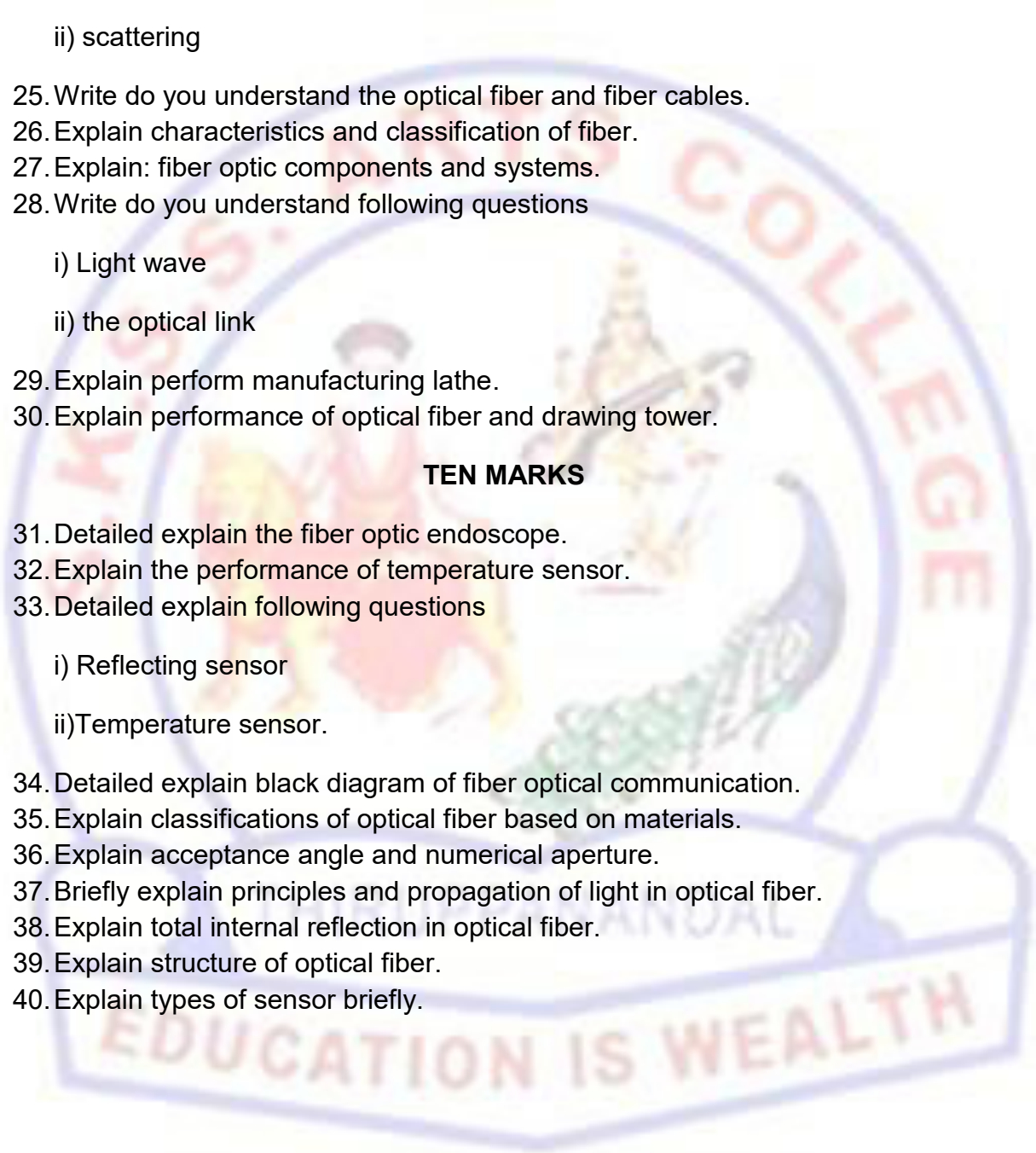
36. Explain acceptance angle and numerical aperture.

37. Briefly explain principles and propagation of light in optical fiber.

38. Explain total internal reflection in optical fiber.

39. Explain structure of optical fiber.

40. Explain types of sensor briefly.



UNIT- III

(RADAR COMMUNICATION)

Choose the correct answer:

1. The Doppler frequency is large if
 - A) The transmitted frequency is small
 - B) The relative velocity of target with respect to radar is large.
 - C) The size of the antenna is large
 - D) The relative velocity of target with respect to radar is small.
2. If peak transmitted power in a radar system is increased 16 times, its maximum range will be increased by a factor of
 - A) 2
 - B) 4
 - C) 8
 - D) 16
3. Radar range primarily depends upon
 - A) Peak transmitted power.
 - B) Average transmitted power.
 - C) Independent of transmitted power.
 - D) Distance between ends
4. In a radar transmitter the function of modulator is to
 - A) Allow the use of same antenna for transmission and reception
 - B) Switch the tube OFF and ON as required
 - C) Control pulse repetition frequency (PRF)
 - D) Increase maximum range of the radar
5. The resolution of pulsed radar can be improved by
 - A) Increasing pulse width
 - B) Decreasing pulse width
 - C) Increasing the pulse amplitude
 - D) Decreasing the pulse repetition frequency
6. A _____ determines the target range by measuring the round trip time of a pulsed microwave signal.
 - A) Pulse radar
 - B) Doppler radar
 - C) Cross section radar
 - D) none of the mentioned
7. Higher pulse repetition frequency (PRF) in radar will
 - A) Increase the range of the radar
 - B) Make weak signal discernible
 - C) Improve the signal-to-noise ratio of the system

- D) All of the above
8. The minimum range of detection by pulse radar depends on
- A) Pulse width
 - B) average transmitter power
 - C) Beam width of the antenna
 - D) All the above
9. A duplexer is a
- A) Signal side band filter
 - B) Transmit-receive switch
 - C) Balanced mixer
 - D) If-log amplifier
10. The A-scope of a radar displays
- A) No grass
 - B) target position and range
 - C) Target range but not position
 - D) Target position but not range

ANSWERS:

1.(B) 2.(A) 3.(A) 4.(B) 5.(B) 6.(A) 7.(C) 8.(A) 9.(B) 10.(C)

TWO MARKS

- 11. How does Ultrasonic testing work?
- 12. What is wavelength?
- 13. What is 3D radar?
- 14. What is PRT?
- 15. What is phase?
- 16. What is vertical scanning?
- 17. What is video signal?
- 18. What is Doppler Effect?
- 19. What are the factors that affect radar performance?
- 20. Define basic radar system?

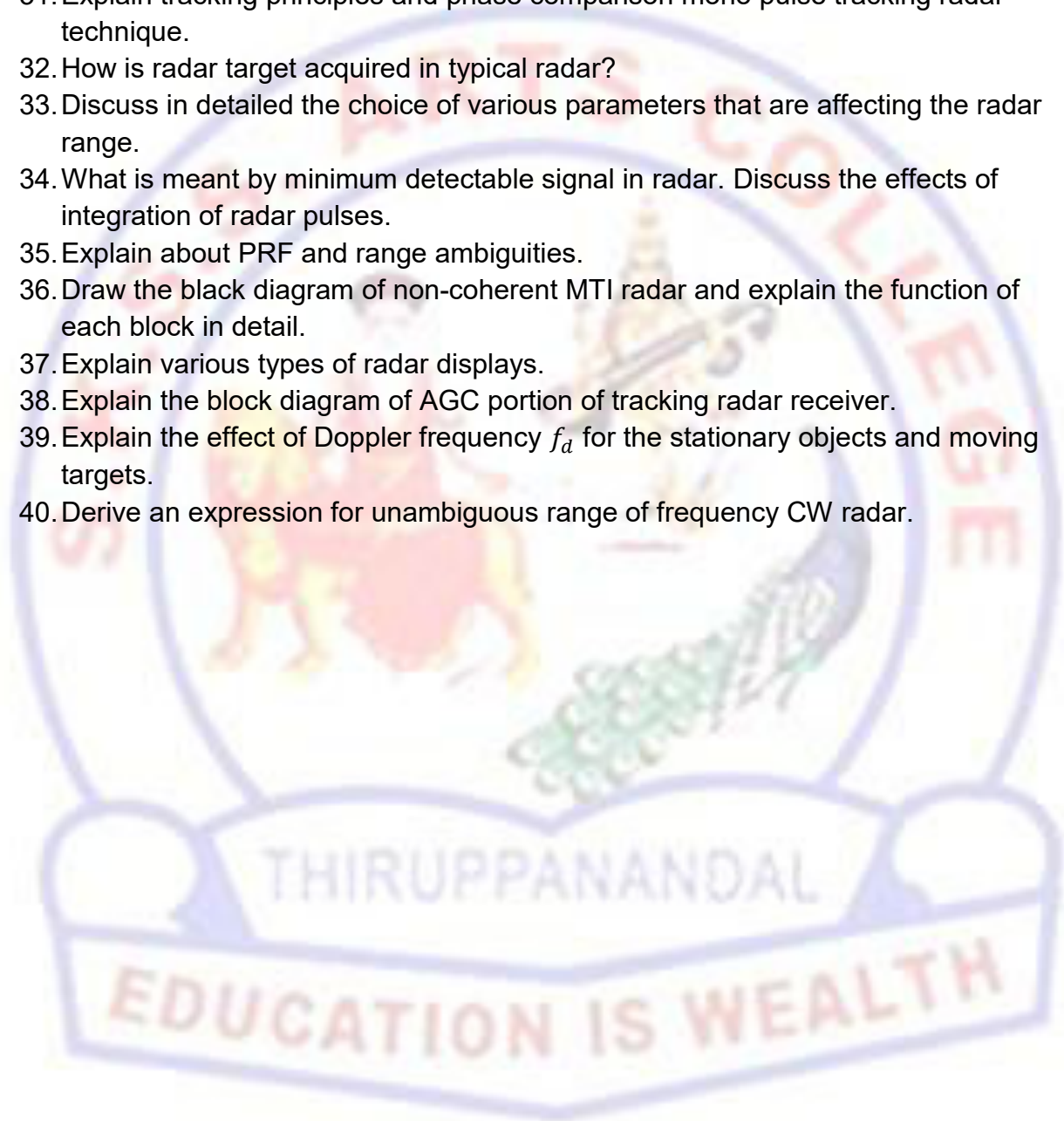
FIVE MARKS

- 21. What is radar? Explain the basic ideas of radar.
- 22. Define six major parts of a radar system.
- 23. Write do you understand pulsed radar.
- 24. Detailed explain two types of pulsed radar.
- 25. Explain: What do you understand the continuous wave radar.
- 26. Explain you about radar applications in 5 Areas.
- 27. Explain about the frequencies used for radar.

28. Detailed explain Doppler Effect.
29. Explain operation of CW radar with neat block diagram.
30. Explain the advantages of non-coherent MTI radar.

TEN MARKS

31. Explain tracking principles and phase comparison mono pulse tracking radar technique.
32. How is radar target acquired in typical radar?
33. Discuss in detailed the choice of various parameters that are affecting the radar range.
34. What is meant by minimum detectable signal in radar. Discuss the effects of integration of radar pulses.
35. Explain about PRF and range ambiguities.
36. Draw the block diagram of non-coherent MTI radar and explain the function of each block in detail.
37. Explain various types of radar displays.
38. Explain the block diagram of AGC portion of tracking radar receiver.
39. Explain the effect of Doppler frequency f_d for the stationary objects and moving targets.
40. Derive an expression for unambiguous range of frequency CW radar.



UNIT- IV

(SATALLITE COMMUNICATION)

Choose the correct answer:

1. The satellite that is used as a relay to extend communication distance is called as ____
 - A) Relay satellites
 - B) Communication satellites
 - C) Repeater satellites
 - D) Geosynchronous satellites
2. The transmitter-receiver combination in the satellite is known as a ____
 - A) Relay
 - B) Repeater
 - C) Transponder
 - D) Duplexer
3. What is the reason for carrying multiple transponders in a satellite?
 - A) More number of operating channels
 - B) Better reception
 - C) More gain
 - D) Redundancy
4. Name India's first satellite and when it was launched?
 - A) Bhaskara, 7 June 1979
 - B) Aryabhata, 19 April, 1975
 - C) Rhine, 25 April, 1975
 - D) INSAT, 10 April, 1978
5. Which satellite is known as Earth observation satellite that was launched on 5 may, 2005?
 - A) HAMSAT
 - B) CARTOSAT-1
 - C) INSAT-4A
 - D) RESOURCESAT-1
6. India's first Pico-satellite?
 - A) GSAT-4
 - B) INSAT
 - C) stud sat
 - D) ANUSAT
7. What is the full form of IRNSS-1B satellite and when it was launched?
 - A) Indian Regional Network satellite, 5 January, 2014
 - B) Indian Regional Navigation satellite system, 4 April, 2014
 - C) Indian Reterological Navigation satellite, 8 April, 2014

- D) None of the above
8. The mass orbiter mission informally known as
- A) Mangalyan
 - B) Gaganyaan
 - C) Prithviyan
 - D) None of the above
9. Which satellite was developed by India and France?
- A) Jugnu
 - B) SRMSAT
 - C) Megha-Tropiques
 - D) Youthsat
10. For which purpose SCATSAT-1 satellite was launched on 1 September, 2016?
- A) To provide weather forecasting
 - B) Cyclone prediction
 - C) Tracking services to India
 - D) All the above

ANSWERS:

1.(B) 2.(C) 3.(A) 4.(B) 5.(B) 6.(C) 7.(B) 8.(A) 9.(C) 10.(D)

TWO MARKS

- 11. What are the types of satellite?
- 12. How do you interpret visible satellite picture?
- 13. What is Anti-satellite weapon?
- 14. What is space observatory?
- 15. What is Biosatellite?
- 16. What is communications satellite?
- 17. What is miniaturized satellite?
- 18. What is earth observation satellite?
- 19. What is space station?
- 20. What is satellite meteorology?

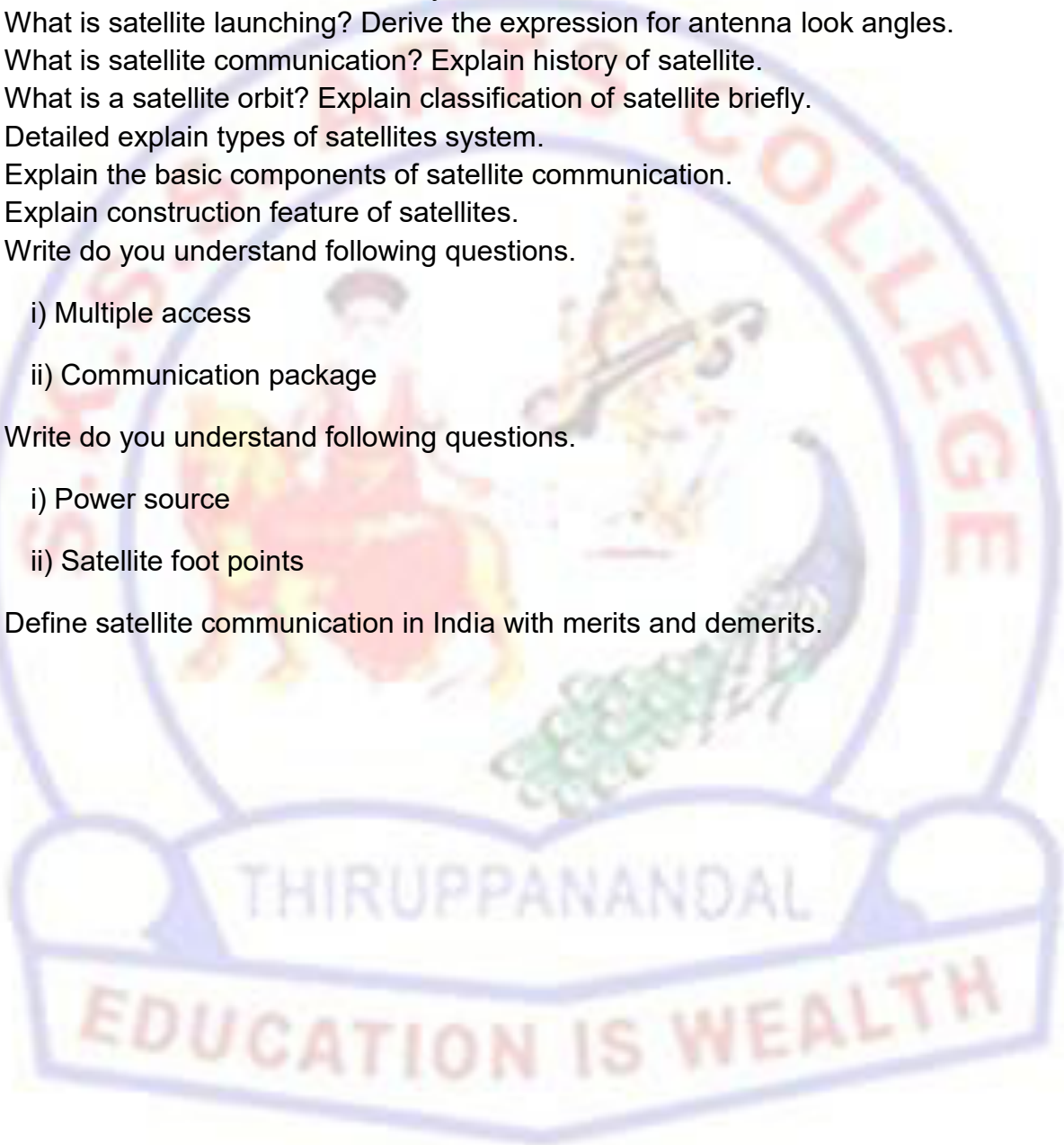
FIVE MARKS

- 21. What is satellite orbit? Explain term of earth orbit satellite.
- 22. What is Geostationary orbit? Explain Geostationary satellite?
- 23. Explain the orbital plane. Draw it neat diagram.
- 24. What are the different applications of satellite systems? Explain it.
- 25. Define polar-orbiting satellites. What is a polar antenna?
- 26. Describe the spin stabilized satellites.
- 27. Write the advantages and disadvantages of satellite communication.

28. Explain the three Kepler's law with relevant diagrams.
29. Explain orbital perturbations in detail.
30. Distinguish between Geosynchronous and geostationary orbits.

TEN MARKS

31. Define orbital elements and sun synchronous orbit.
32. What is satellite launching? Derive the expression for antenna look angles.
33. What is satellite communication? Explain history of satellite.
34. What is a satellite orbit? Explain classification of satellite briefly.
35. Detailed explain types of satellites system.
36. Explain the basic components of satellite communication.
37. Explain construction feature of satellites.
38. Write do you understand following questions.
 - i) Multiple access
 - ii) Communication package
39. Write do you understand following questions.
 - i) Power source
 - ii) Satellite foot points
40. Define satellite communication in India with merits and demerits.



UNIT- IV

(MOBILE COMMUNICATION)

Choose the correct answer:

1. 5MHz to 40 GHz frequency
 - A) Amplitude modulation
 - B) Frequency modulation
 - C) ASK
 - D) FSK
2. ____ introduced frequency modulation for mobile communication systems in 1935.
 - A) Edwin Armstrong
 - B) Albert Einstein
 - C) Galileo Galilei
 - D) David Bohn
3. The early FM push-to-talk telephone systems were used in
 - A) Simple mode
 - B) Half duplex mode
 - C) Full duplex mode
 - D) None of the above
4. World's first cellular system was developed by
 - A) Nippon telephone and telegraph (NTT)
 - B) Bell core and Motorola
 - C) AT & T Bell Laboratories
 - D) QUALCOMM
5. Carrier frequency of a TV remote control is in the range.
 - A) Of infra-red
 - B) <100MHz
 - C) <1GHz
 - D) <2GHz
6. Half Duplex system for communication has
 - A) Communication in single direction
 - B) Communication in single direction at a time
 - C) Communication in both directions at the same time
 - D) None of the above.
7. MIN stands for
 - A) Mobile identification number
 - B) Mobile internet
 - C) Mobility in network
 - D) None of the above
8. 3G-CDMA is also known as

- A) UMTS
 - B) DECT
 - C) DCS-1800
 - D) ETACS
9. Commonly used mode for 3G networks is
- A) TDMA
 - B) FDMA
 - C) TDD
 - D) FDD
10. Advantage of using dynamic channel assignment is
- A) Blocking is reduced
 - B) Capacity of the system is increased
 - C) Both A & B
 - D) None of the above

ANSWERS:

1.(B) 2.(A) 3.(B) 4.(A) 5.(A) 6.(B) 7.(A) 8.(A) 9.(D) 10.(C)

TWO MARKS

- 11. List any four advantages of third generation (3G) mobile network.
- 12. What is cell splitting?
- 13. What is GSM?
- 14. Draw the architecture for GSM signaling protocol.
- 15. List the services of GSM.
- 16. Why are electromagnetic waves with very low frequency not used for data transmission in computer network?
- 17. What is channel assignment? What are the types?
- 18. What is SDMA?
- 19. Write the disadvantages of cellular system.
- 20. Write about mobile IP and its requirement.

FIVE MARKS

- 21. Explain three Tier architecture of mobile computing.
- 22. What is Mobile IP? Explain discovery, registration and tunneling with mobile IP.
- 23. Explain Bluetooth protocol stack in detail.
- 24. What is Handover? Explain GSM architecture with suitable diagram.
- 25. What is frequency reuse? Explain frequency allocation in GSM.
- 26. Compare GSM and CDMA.
- 27. What is WAE? Draw its model with client gate way and sever.
- 28. Explain Wi-Fi and Wi-Max technology.

29. Explain the uses of two ray model to explain mobile radio path loss effect?
30. Explain space wave propagation.

TEN MARKS

31. How RAKE receiver improves S/N ratio in CDMA also explain why power control on the reverse channel is essential?
32. Explain: What do you understand Wi-Fi and 3G basic ideas.
33. Explain internet protocol television briefly.
34. Define GSM. Draw architecture for GSM. Explain its protocol.
35. Detailed explain the basic concept of cell.
36. Explain do you understand system architecture briefly.
37. Detailed explain radio interface.
38. Explain logical channel and frame hierarchy.
39. Write do you understand following questions.
- i) Handover
 - ii) FAX & its application
40. Write does you about following questions.
- i) VSAT
 - ii) Modem
 - iii) IPTV





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