

P.T.U. Q.1
M.900
So

Total No. of Questions : 08

ADVANCED DIGITAL SIGNAL PROCESSING

M.Code : 76260

Time : 3 Hrs.

Max. Marks : 60

1. Attempt any FIVE questions out of EIGHT questions.
2. Each question carries TWELVE marks.

1. a) Write a short note on design of IIR filter by the Bilinear Transformation Method.
b) Convert the analog filter with system function

$$H(s) = \frac{s + 0.1}{(s + 0.1)^2 + 9}$$

into a digital IIR filter by means of the impulse invariance technique.

2. Discuss the concept of decimation and interpolation with suitable example. Also, discuss QMF filters in detail.
3.
 - a) What is Linear prediction? Explain in detail forward-backward linear prediction filters.
 - b) How FIR wiener filter can be used as noise cancellation?
4.
 - a) Discuss in detail about adaptive filter applications.
 - b) Describe LMS adaptive algorithm with a neat diagram.
5.
 - a) Explain the estimation of spectra from finite-duration observations of signals.
 - b) Compare Parametric and Non-Parametric methods of spectral estimation in detail.



6. a) Differentiate between FIR and IIR filters. Also, discuss the difference in their structures.
b) Discuss the application of multi-rate signal processing to sub-band coding.
7. a) Discuss Wiener filters for filtering and prediction.
b) Explain minimum mean square criterion for adaptive filters.
8. Discuss the applications of digital signal processing in radar and image processing.

NOTE : Disclosure of identity by writing mobile number or making passing request on any page of Answer sheet will lead to UMC case against the Student.



Total No. of Questions : 8

Total No. of Pages : 02

M.Tech. (ECE) (Sem.-2)

NANO ELECTRONICS

Subject Code : MTEC/PE4A/18

M.Code : 76265

Date of Examination : 25-05-2024

Max. Marks : 60

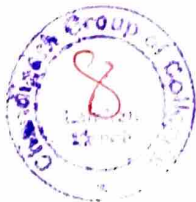
Time : 3 Hrs.

INSTRUCTIONS TO CANDIDATES :

INSTRUCTIONS TO CANDIDATES :
1. Attempt any FIVE questions out of EIGHT questions.

2. Each question carries TWELVE marks.

1. a. Draw Fermi levels related to semiconductors and conductors. 6
- b. Discuss optical, electrical, and mechanical properties of Nanomaterials. 6
2. a. Discuss the time scale and length scale developments in Nanotechnology. 6
- b. Give the advantages and disadvantages of CNT over conventional electrical material used in electronics industry. 6
3. a. Explain the structure of Single-walled Carbon Nano Tube (SWCNT) with neat diagram. Also mention the impedance parameters of SWCNT. 4+3
- b. Explain the method for generation of carbon nano tubes (CNT). 5
4. a. Discuss in detail the construction and working of double beam UV-Visible spectrophotometer. 6
- b. Explain construction and working of Arc discharge method for fabrication of Nanomaterials. 6
5. a. Explain the difference between Electron Microscopy Methods (SEM and TEM). 6
- b. Draw and explain the high electron mobility transistor. 6
6. a. Explain Photoemission Spectroscopy in detail with suitable diagrams. 6
- b. Define Bragg's law and explain working of X-RD spectroscopy. 6
7. a. Discuss the Quantum electron devices. 6
- b. What is DNA computing? Explain the structure of DNA. 6



SECTION-C

17. Case Study :

Adidas and Reebok are facing tough competition from their rival firm Nike. Nike had about 36 percent, Adidas 8.9 percent and Reebok 12.2 percent market share in the athletic footwear market in North America. In order to compete with Nike, which has very strong market share in North America and globally, Adidas announces the plan to acquire Reebok on 3rd August, 2005, and deal was finalized on 31st January, 2006.

Adidas wanted to compete with Nike in North American market. Nike leads the US market as well as global market by giving a tough competition to Adidas and Reebok, which were competing for the second and third positions. Nike was the first choice of billions of people because they offered stylish looks with quality and was famous for its fashion status, colour and combinations. While Adidas is known for its good quality and comfort goods and Reebok for its stylish look or 'hip hop' style. And therefore it seemed impossible for two brands to compete with Nike independently. Moreover, Adidas aimed to extend their global reach by aiming to expand in Asia market and to generate more revenue from Asia market. It seemed to succeed as the sales revenue from Asia market improved. In 2005 sales from Asia contributed 22.95 percent of the group total revenue which increased to 24.65 percent in 2008.

Yet another advantage was that the group aimed to reduce its annual cost and wanted to save around \$ 125 million annually with substantial operational synergies and expected to increase revenue and profit from complete coverage of all consumer segments.

However, company's main aim to compete with Nike in North America market didn't hit the target, as the revenue generated from North America went down. Although in 2006 group revenue from North America increased significantly from \$ 1561 million in 2005 to \$ 3234 million in 2006 i.e. 107 percent growth, but this was mainly due to 2006 FIFA world cup and group revenue from North America declined thereafter. Other shortfall of the acquisition can be seen from the declined sales revenue of Reebok. Reebok sales went down by 9 percent in 2006 i.e. from \$ 2718 million in 2005 to \$ 2473 million in 2006.

Answer the following questions :

- Why did Adidas wanted to merge with Reebok?
- What were the positive aspects of merger of Adidas and Reebok?
- What were the negative aspects of merger discussed in the above case?

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.



8. Discuss following :

12

- a. Single Electron Transistor
- b. Magnetic force microscope.

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.



Total No. of Questions : 8

Total No. of Pages : 01

M.Tech. (ECE) (Sem.-2)

SATELLITE COMMUNICATION

Subject Code : MTEC-PE3A-18

M.Code : 76261

Date of Examination : 15-05-2024

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

- 1. Attempt any FIVE questions out of EIGHT questions.**
2. Each question carries TWELVE marks.

1. a) Draw the block diagram for satellite communication system. Explain the function of each block. (6)
b) Explain three Kepler's laws of planetary motion. (6)
2. a) Derive the expression for the time period of satellite's orbit. (6)
b) Compare the low earth orbit and geostationary satellite systems. (6)
3. a) What are the various subsystems in the satellite? Explain the power system. (6)
b) What is Doppler frequency shift? Derive the expression for it. (6)
4. a) Discuss various modulation and multiplexing techniques used with satellite links. (8)
b) Explain the architecture of a satellite communication system. (4)
5. a) Explain the TTC&M satellite subsystem with a neat diagram. (6)
b) Explain the Altitude and Orbit Control System (AOCS) with necessary diagram. (6)
6. a) Derive the expression for system noise temperature of a satellite link. (6)
b) Compare FDMA, TDMA and CDMA techniques. (6)
7. a) Explain DBS-TV. (6)
b) Explain how satellite telephony is implemented by using LEO. (6)
8. a) Explain in detail GPS position location principles. (6)
b) Explain the multiple access technique distinguished with respect to time that is used in satellite communication systems. (6)

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.



Roll No.

Total No. of Pages : 02

Total No. of Questions : 08

M.Tech. (ECE) (Sem.-2)

ANTENNAS AND RADIATING SYSTEMS

Subject Code : MTEC/103/18

M.Code : 76259

Date of Examination : 08-05-2024

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. Attempt any FIVE questions out of EIGHT question.
 2. Each question carry TWELVE marks.
-
1. a) Derive an expression for the far field component of a half wave dipole antenna.
b) With the help of proper mathematical expressions, explain how single wire antenna radiate?
 2. a) Consider a circular loop antenna of radius 0.25 m carrying a current of 10 A at 7.5 MHz and is symmetrically placed in the x-y plane at the origin. Determine total power radiated and the magnitude of the electric field intensity in the x-y plane at a distance of 10 km.
b) Explain how the performance of single wire antenna depends on Ground effects.
 3. Consider a broad side antenna array of n elements. Each antenna element carries current of equal amplitude and phase. If the distance between each element is 'd' then derive the expression for the direction of pattern maxima, pattern minima and beam width of major lobe.
 4. a) With the help of a suitable example, explain the Dolph - Tchebyscheff method of optimization for a linear broadside array.
b) Explain the principle of Pattern multiplication.
 5. a) With the help of proper mathematical expressions and diagram, explain the radiation mechanism from a rectangular aperture antenna.
b) Derive the field components radiated from a thin slot antenna in an infinite cylinder.



6. a) What is Horn antenna? Explain the special features of various types of Horn antennas.
b) Explain the basic characteristics and feeding mechanism of Micro strip antenna.
7. Explain parabolic reflector on the basis of design consideration, working principle, directivity, Gain and efficiency.
8. **Write short notes on :**
 - a) Antenna parameters like Radiation Power Density, Directivity and Gain.
 - b) Polarization.
 - c) End fire antenna array.

NOTE : Disclosure of identity by writing mobile number or making passing request on any page of Answer sheet will lead to UMC case against the Student.

