CBCS SCHEME

18EC71

Seventh Semester B.E. Degree Examination, Feb./Mar. 2022
Computer Networks

Time: 3 hrs.

Max. Marks: 100

Note: *Answer any FIVE full questions, choosing ONE full question from each module.*

Module-1

1 a. Describe significant services of all layers in TCP/IP protocol suite along with the encapsulation and decapsulation processes with necessary figures. **(16 Marks)**
  b. List different performance criteria of a network. **(04 Marks)**

OR

2 a. Explain different physical structures and networks topologies with the help of diagrams. **(16 Marks)**
  b. Distinguish TCP/IP model with OSI model. **(04 Marks)**

Module-2

3 a. Describe various fields in the format of an ARP packet and explain how ARP sends request and response messages. **(12 Marks)**
  b. Write short notes on implementation of standard Ethernet topologies. **(08 Marks)**

OR

4 a. Describe the concept of bit stuffing and byte stuffing. **(10 Marks)**
  b. Explain CSMA/CD working with the help of flowchart. **(06 Marks)**
  c. List the characteristics of wireless LANs. **(04 Marks)**

Module-3

5 a. Explain working of DHCP [Dynamic Host Configuration Protocol]. **(08 Marks)**
  b. Inspect the following MAC addresses and categories them as unicast, multicast and broadcast.
  i)   4A : 30 : 10 : 21 : 10 : 1A
  ii) 47 : 20 : 1B : 2E : 08 : EE
  iii) EF : FF : 10 : 01 : 11 : 00
  iv) FF : FF : FF : FF : FF: FF **(04 Marks)**
  c. Explain IPV4 datagram format with a neat diagram. **(08 Marks)**

OR

6 a. Explain a simple implementation of Networks Address Translation (NAT). **(10 Marks)**
  b. Explain distance vector routing algorithm using Bellman ford equations. **(10 Marks)**

Module-4

7 a. Describe connectionless and connection – oriented services provided by the transport layer. **(14 Marks)**
  b. Describe the general services provided by UDP. **(06 Marks)**

OR

8 a. Explain working of Go-back-N protocol. **(10 Marks)**
  b. Describe sending and receiving buffers in TCP, and explain how segments are created form the bytes in the buffers. **(10 Marks)**

Module-5

9 a. Explain the architecture and format of electronic mail. **(10 Marks)**
  b. Distinguish Local Logging and Remote Logging. **(10 Marks)**

OR

10 a. Explain persistent and non-persistent connections in HTTP. **(10 Marks)**
   b. Write a short note on DNS recursive and iterative resolutions. **(10 Marks)**

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Seventh Semester B.E. Degree Examination, Feb./Mar. 2022
VLSI Design

Time: 3 hrs.   Max. Marks: 100

Note: *Answer any FIVE full questions, choosing ONE full question from each module.*

Module-1

1 a. With necessary circuit diagram, explain the operation of tristate inverter. Also realize a 2 : 1 multiplexer using tristate inverter.   (08 Marks)
   b. Implement a D flipflop using transmission gates and explain its operation with necessary timing diagram.   (08 Marks)
   c. Realize CMOS compound gate for the function $Y = \overline{A(B+C) + DE}$.   (04 Marks)

OR

2 a. Explain the operation of MOSFET with necessary diagrams. Also derive the equation for drain current in linear and saturation region of operation.   (10 Marks)
   b. Draw the circuit of CMOS inverter and explain its DC transfer characteristics.   (06 Marks)
   c. Explain the following non-ideal effects channel length modulation, mobility degradation.
                                                                                         (04 Marks)

Module-2

3 a. Explain CMOS n-well fabrication process with necessary diagrams.   (12 Marks)
   b. What is scaling. Compute drain current, power, current density and power density for constant field and constant voltage scaling.   (08 Marks)

OR

4 a. Draw the layout of $Y = \overline{(A + B + C)D}$ and estimate the area.   (08 Marks)
   b. Mention different types of MOSFET capacitances and explain with necessary diagrams and equations.   (06 Marks)
   c. With neat diagram, explain lambda based design rules for wires and contacts.   (06 Marks)

Module-3

5 a. Develop the RC delay model to compute the delay of the logic circuit and calculate the delay of unit sized inverter driving another unit inverter.   (08 Marks)
   b. Explain Cascode Voltage Switch Logic (CVSL). Also realize two input AND/NAND using CVSL.   (06 Marks)
   c. Explain linear delay model. Compare the logical efforts of the following gates with the help of schematic diagrams :
       i) 2-input NAND gate   ii) 3-input NOR gate.   (06 Marks)

OR

6 a. Explain : i) pseudo nMOS   ii) ganged CMOS with necessary circuit examples.   (06 Marks)
   b. Estimate t_{pdf} and t_{pdr} of a 3-input NAND gate if the output is loaded with h identical gates. Use Elmore delay model.   (08 Marks)
   c. Explain skewed gates with an example.   (06 Marks)

Module-4

7   a. With necessary circuit diagrams, explain resettable latches with
      i) synchronous reset
      ii) asynchronous reset.   (08 Marks)

   b. Compute the output voltage V_{out} in the following pass transistor circuits. Assume $V_t = 0.7$. (Ref. Fig.Q7(b)).
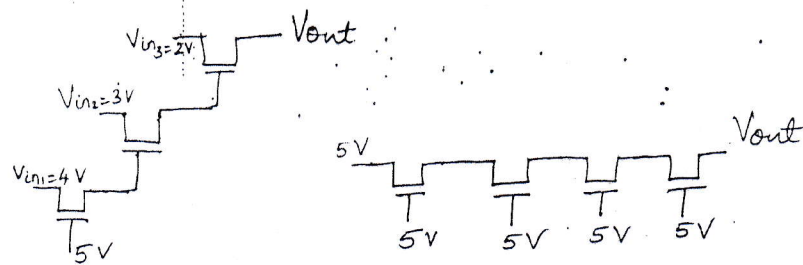

Fig.Q7(b)   (06 Marks)

   c. With necessary diagram, explain a D flipflop with two-phase non-overlapping clocks.
                                                                    (06 Marks)

OR

8   a. With necessary circuit diagram explain 3-bit dynamic shift register with depletion load.
                                                                    (08 Marks)

   b. Realize $F = \overline{A_1 A_2 A_3 + B_1 B_2}$ using dynamic CMOS logic. Also explain the cascading problem in dynamic logic with necessary example.   (08 Marks)

   c. Explain the general structure of ratioless synchronous dynamic logic with relevant diagram.
                                                                    (04 Marks)

Module-5

9   a. With necessary circuit diagram, explain the operation of three transistor DRAM cell.
                                                                    (08 Marks)

   b. Explain full CMOS SRAM cell with necessary circuit topology.   (08 Marks)

   c. Explain the terms :
      i)   Observability
      ii) Controllability
      iii) Fault coverage.   (04 Marks)

OR

10 a. What is a fault model? Explain stuck-at model with examples.   (07 Marks)

   b. Mention the approaches used in design for testability. Explain scan based testing using necessary diagrams.   (07 Marks)

   c. Draw the circuit of 3-bit BIST register and explain.   (06 Marks)

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Seventh Semester B.E. Degree Examination, Feb./Mar.2022
Satellite Communication

Time: 3 hrs.   Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. Outline the Kepler's laws of planetary motion. Also derive expressions for orbital period.
                                                                    (08 Marks)
   b. The apogee and perigee distances of a satellite orbiting in an elliptical orbit are respectively, 45,000 km and 7000 km. Determine the following :
      (i)   Semi-major axis of the elliptical orbits.
      (ii) Orbit eccentricity.
      (iii) Distance between the centre of earth and the centre of elliptical orbit.   (06 Marks)
   c. Interrupt any six orbital parameters required to illustrate a satellite orbit.   (06 Marks)

OR

2 a. Define and Infer the significance of Azimuth angle and elevation angle on earth station.
                                                                    (06 Marks)
   b. An earth station is located at 30°W longitude and 60°N latitude. Determine the earth station azimuth and elevation angles with respect to a geostationary satellite located at 50°longitude. The orbital radius is 42164 km (Assume radius of earth to be 6378 km).   (06 Marks)
   c. Explain briefly the following:
      (i)   Orbital perturbations.
      (ii) Spin Stabilization.
      (iii) Three axis stabilization.   (08 Marks)

Module-2

3 a. Explain the solar energy driven power supply system of a satellite.   (10 Marks)
   b. Describe about the following satellite subsystem briefly:
      (i)   Altitude and orbital control.
      (ii) Payload.   (10 Marks)

OR

4 a. Summarize about the different types of earth station leased on services provided and also depending on their usages.   (10 Marks)
   b. With a neat diagram, briefly describe each of the following earth station hardware components:
      (i)   Antenna.
      (ii) Up/Down converters   (10 Marks)

Module-3

5 a. Explain the typical TDMA frame structure.   (08 Marks)
   b. Explain the commonly used forms of MCPC and SCPC systems.   (12 Marks)

OR

6   a. Explain Faraday effect and Scintilation with respect to propagation considerations in satellite link design. **(07 Marks)**
    b. With usual notations, derive satellite transmission equations. **(07 Marks)**
    c. A geostationary satellite at a distance of 36000 km from the surface of the earth radiates a power of 10 W in the desired direction through an antenna having a gain of 20 dB. What would be the power density at a receiving site on the surface of earth and also the power received by an antenna having an effective aperature of 10 m^2. **(06 Marks)**

Module-4

7   a. Explain communication related application of satellite and also list the frequency brands used in satellite communication. **(10 Marks)**
    b. With a neat diagram, explain VSAT's network and VSAT topologies. **(10 Marks)**

OR

8   a. Discuss the advantages and disadvantages of satellite over terrestrial network. **(10 Marks)**
    b. With a neat diagram, explain about the satellite cable television and direct broadcasting services. **(10 Marks)**

Module-5

9   a. Explain the weather forecasting applications. **(10 Marks)**
    b. Classify satellite remote sensing systems on the basis of radiation and spectral region used for data acquisition. Explain any two methods briefly. **(10 Marks)**

OR

10 a. Describe the working principle of GPS s/m. **(10 Marks)**
    b. Write a short note on : (i) Visible images   (ii) IR images. **(10 Marks)**

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CBCS SCHEME

18EC733

Seventh Semester B.E. Degree Examination, Feb./Mar. 2022
Digital Image Processing

Time: 3 hrs.   Max. Marks: 100

Note: *Answer any FIVE full questions, choosing ONE full question from each module.*

Module-1

1 a. Explain with block diagram the fundamental steps used in digital image processing.
                                                                                (10 Marks)
   b. Explain the image acquisition using sensor strips and sensor arrays.   (10 Marks)

OR

2 a. What is digital image processing? Explain the applications of image processing.   (06 Marks)
   b. With the help of neat diagram, explain the components of a general purpose image processing system.   (08 Marks)
   c. How image is formed in eye? Explain visual perception of eye.   (06 Marks)

Module-2

3 a. Explain the process of image sampling and quantization in the digital image formulation.
                                                                                (08 Marks)
   b. With necessary graphs explain the log and power law transformation used for spatial image enhancement.   (08 Marks)
   c. Compute the lengths of the shortest 4, 8 and M path between p and q in the image segment shown in Table Q3(c) by considering $v = \{2, 3, 4\}$.

$$
\begin{array}{ccccc}
3 & 4 & 1 & 2 & 0 \\
0 & 1 & 0 & 4 & 2 \quad (q)\\
2 & 2 & 3 & 1 & 4 \\
(p)\ 3 & 0 & 4 & 2 & 1 \\
1 & 2 & 0 & 3 & 4 \\
\end{array}
$$

Table Q3(c)   (04 Marks)

OR

4 a. Explain the adjacency, connectivity, regions and boundaries between pixels with examples.
                                                                                (10 Marks)
   b. What do you mean by histogram processing? Explain histogram equalization.   (10 Marks)

Module-3

5 a. Explain smoothing of images in frequency domain using ideal, Butterworth and Gaussian low pass filter.   (12 Marks)
   b. Explain the properties of 2-dimensional DFT.   (08 Marks)

OR

6 a. Explain the basic steps of filtering in frequency domain. Explain one method of sharpening frequency domain filters.   (10 Marks)
   b. Discuss the homomorphic filtering approach for image enhancement.   (10 Marks)

Module-4

7 a. Explain the importance of image restoration process in image processing with the basic model diagram. Explain any four noise probability density functions. **(10 Marks)**

b. Explain Weiner filtering and inverse filtering in image processing. **(10 Marks)**

OR

8 a. Explain the following methods to estimate the degradation function, used in image restoration.
   i) Estimation by image observation
   ii) Estimation by experiment
   iii) Mathematic modelling. **(10 Marks)**

b. Discuss the importance of adaptive filters in image restoration system highlight its working of adaptive median filter. **(10 Marks)**

Module-5

9 a. Explain the following morphological operations :
   i) Erosion
   ii) Dilation
   iii) Opening
   iv) Closing. **(12 Marks)**

b. Explain the RGB color model. **(08 Marks)**

OR

10 a. What is pseudo color image processing? Explain intensity slicing as applied to pseudo color image processing. **(10 Marks)**

b. Explain HSI color model and conversion from HSI to RGB colors. **(10 Marks)**

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CBCS SCHEME

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Seventh Semester B.E. Degree Examination, Feb./Mar. 2022
IoT and Wireless Sensor Networks

Time: 3 hrs.   Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. What is IoT? Explain conceptual framework of IoT with necessary equations and explain the reference model suggested by CISCO. **(08 Marks)**
   b. What are three architectural domain functionalities in m2M architecture? Compare IoT with M2M. **(08 Marks)**
   c. Explain Constrained Application Protocol (CoAP) for IoT/M2M. **(04 Marks)**

OR

2 a. Explain modified OSI model for the IoT/M2M systems with appropriate figures. **(08 Marks)**
   b. Explain Message Queuing Telemetry Transport (MQTT) protocol with Pub/Sub model with proper figures. **(08 Marks)**
   c. Write and explain four layer architectural framework developed at CISCO for a smart city. **(04 Marks)**

Module-2

3 a. Explain about cloud service and cloud development models with examples. **(08 Marks)**
   b. Explain Internet Protocol version 4 (IPv4) and IP addressing in IoT. **(06 Marks)**
   c. Explain HTTPs protocol. **(06 Marks)**

OR

4 a. Explain IoT cloud based data collection, storage and computing services using Nimbits. **(06 Marks)**
   b. What is Cloud Computing? Explain the cloud service models with necessary figures. **(08 Marks)**
   c. Explain 6LoWPAN with necessary figures. **(06 Marks)**

Module-3

5 a. Explain the importance of security in IoT. Explain briefly the security models used in IoT. **(08 Marks)**
   b. Write a short note on IoT Security Tomography and explain layered attacker model. **(08 Marks)**
   c. Write a short note on Arduino programming for IoT. **(04 Marks)**

OR

6 a. Explain about the security and threat analysis in IoT/M2M using neat figure. **(08 Marks)**
   b. Explain layered attacker model with possible attacks and suggest the steps for mitigating attacks. **(08 Marks)**
   c. Explain how data is read from sensors and devices. **(04 Marks)**

Module-4

7 a. Write a short note on operational states of a sensor node with different power consumptions with figure. (10 Marks)

   b. Write a detailed note on Optimization goals and figure of merit for wireless sensor networks. (10 Marks)

OR

8 a. Write a note on embedded operating system suitable for WSN and explain about different programming paradigms. (10 Marks)

   b. Explain the single node architecture with necessary hardware components. (10 Marks)

Module-5

9 a. Explain the crucial points influencing the physical layer of WSN. (08 Marks)

   b. Explain Mediation Device Protocol with advantages and disadvantages. (06 Marks)

   c. Explain the CSMA protocol with proper flow diagram. (06 Marks)

OR

10 a. Explain the S-MAC protocol and explain how it handles the major sources of energy inefficiency in WSN. (08 Marks)

   b. What is geographical routing and explain about Greedy Perimeter Stateless Routing for wireless networks with proper figure. (08 Marks)

   c. Explain Leach protocol with necessary figure. (04 Marks)

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Seventh Semester B.E. Degree Examination, Feb./Mar. 2022
Cryptography

Time: 3 hrs.   Max. Marks: 100

Note: *Answer any FIVE full questions, choosing ONE full question from each module.*

Module-1

1 a. Draw the model of symmetric cryptosystem and explain in detail.   (08 Marks)
    b. Using Hill Cipher technique encrypt and decrypt the plain tent "Pay more money".

Using the key. $\begin{bmatrix} 17 & 17 & 5 \\ 21 & 18 & 21 \\ 2 & 2 & 19 \end{bmatrix}$ (12 Marks)

OR

2 a. Explain Euclidean algorithm for determining of GCD. If a = 24140, b = 16762 solve using Euclidean algorithm to find GCD (a, b).   (08 Marks)
    b. Mention the modular arithmetic operation properties and prove the same.   (08 Marks)
    c. Find 11^7 mod 13 using modular Arithmetic.   (04 Marks)

Module-2

3 a. With a neat diagram, explain fiestal encryption and decryption model.   (08 Marks)
    b. With a neat diagram, explain DES encryption algorithm.   (08 Marks)
    c. List the design features of fiestal network.   (04 Marks)

OR

4 a. Explain with a neat diagram AES encryption and decryption process.   (08 Marks)
    b. Explain AES key expansion algorithm write the Pseudo code for the same.   (08 Marks)
    c. Describe the AES shift Rows Transformation.   (04 Marks)

Module-3

5 a. What are Groups? Explain in detail with respect to its properties.   (06 Marks)
    b. Write a note on finite field of the form GF (P).   (06 Marks)
    c. Find the additive and multiplicative inverse of GF (8).   (08 Marks)

OR

6 a. State and prove Fermat's Theorem. Also find 7^{18} mod 19 using it.   (08 Marks)
    b. With suitable explanation prove Euler's Theorem.   (07 Marks)
    c. Explain discrete logarithms for modular Arithmetic.   (05 Marks)

Module-4

7   a.   With a neat diagram, explain public-key cryptosystem secrecy and Authentication. (10 Marks)
    b.   Explain the steps involved for encryption and Decryption for RSA Algorithm.   (06 Marks)
    c.   Perform encryption using RSA algorithm for p = 5, q = 11, e = 3, m = 9.   (04 Marks)

OR

8   a.   Explain Diffie-Hellman key exchange algorithm.   (07 Marks)
    b.   Explain Elliptic curve over real numbers.   (07 Marks)
    c.   Explain Elliptic curve cryptography.   (06 Marks)

Module-5

9   a.   Write an explanatory note on Liner Feedback shift registers.   (10 Marks)
    b.   Explain the following with necessary diagrams :
         i)   Generalized Geffe Generator
         ii) Threshold Generator
         iii) Alternating stop and go generator.   (10 Marks)

OR

10 a.   Explain Additive Generators. Also explain fish and pike Additive Generator.   (10 Marks)
    b.   With a neat diagram, explain the concept of Gifford.   (06 Marks)
    c.   Write a short note on A5.   (04 Marks)

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CBCS SCHEME

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18EC745

Seventh Semester B.E. Degree Examination, Feb./Mar. 2022
Machine Learning with Python

Time: 3 hrs.   Max. Marks: 100

Note: *Answer any FIVE full questions, choosing ONE full question from each module.*

Module-1

1 a. Identify the basic design issues and approaches to machine learning. **(10 Marks)**
   b. Consider the Enjoysport concept and instances given below. Identify the general and specific hypothesis using candidate – Elimination learning algorithm.

Instance	Sky	Air Temp	Humidity	Wind	Water	Fore cost	Enjoy sport
1	Sunny	Warm	Normal	Strong	Warm	Same	Yes
2	Sunny	Warm	High	Strong	Warm	Same	Yes
3	Rainy	Cold	High	Strong	Warm	Change	No
4	Sunny	Warm	High	Strong	Cool	Change	Yes

(10 Marks)

OR

2 a. Illustrate the candidate elimination algorithm with suitable example. **(10 Marks)**
   b. Explain the following terms :
      i)   Version space
      ii) Concept learning
      iii) General boundary, G
      iv) Specific boundary, S
      v)   LMS weight update rule. **(10 Marks)**

Module-2

3 a. Identify appropriate problems for decision tree learning. **(06 Marks)**
   b. Calculate Information gain of attribute "wind" for the given context.
      Let values (wind)= {weak, strong}
      $S = [9+, 5-]$
      $S_{weak} = [6+, 2-]$
      $S_{strong} = [3+, 3-]$ **(08 Marks)**
   c. Write a python program for decision tree classifier. **(06 Marks)**

OR

4 a. Explain inductive bias in decision tree learning. **(04 Marks)**
   b. Explain the impact of reduced error pruning on the accuracy of the decision tree. **(06 Marks)**
   c. Build decision trees to represent the following Boolean functions :
      i) A XOR B   ii) A && ¬ 8. **(10 Marks)**

Module-3

5 a. Derive an expression for Gradient descent rule. **(06 Marks)**
   b. Explain how a single perceptron can be used to represent AND Boolean function. **(08 Marks)**
   c. Identify the issues in Gradient descent algorithm. **(06 Marks)**

OR

6 a. Derive back propagation rule considering training rule for output unit weights. **(10 Marks)**

b. What Artificial Neural Network? Explain appropriate problems for Neural network learning with its characteristics. **(10 Marks)**

Module-4

7 a. Explain Baye's Theorem maximum likelihood hypothesis. **(10 Marks)**

b. Identify how maximum likelihood hypothesis can be used for predicting probabilities. **(10 Marks)**

OR

8 a. Explain Naïve Baye's classifier with an example. **(08 Marks)**

b. 8% of the entire population has a particular types of cancer. The medical screening test return a current positive result in 98% of the cases in which the disease is actually present and a correct negative result in 97% of the cases in which disease is not present. Determine whether the patient has cancer or not using MAP hypothesis. **(10 Marks)**

c. List two practical difficulties in applying Bayesian methods. **(02 Marks)**

Module-5

9 a. List out the advantages and disadvantages of Instance based learning. **(06 Marks)**

b. Explain the Q function and Q learning algorithm assuming deterministic rewards and actions with example. **(10 Marks)**

c. Briefly explain Binomial distribution. **(04 Marks)**

OR

10 a. Explain Reinforcement learning problem characteristics. **(06 Marks)**

b. Define the following terms :
   i) Estimation bias
   ii) Variance
   iii) Standard deviation. **(06 Marks)**

c. Explain CADET system using Case Based Reasoning (CBR). **(08 Marks)**

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CBCS SCHEME

USN ☐☐☐☐☐☐☐☐☐☐   **18TE71**

Seventh Semester B.E. Degree Examination, Feb./Mar. 2022
Optical Communication

Time: 3 hrs.   Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1. a. Discuss the advantages/disadvantages of optical fiber communication. **(06 Marks)**
   b. Derive the equations of Numerical Aperture considering the ray path for meridonial ray in optical fiber communication. **(08 Marks)**
   c. A relative refractive index difference for an optical fiber is 1%. Estimate the numerical aperture and solid acceptance angle in air for the fiber when the core index is 1.46. Calculate the critical angle at the interface. **(06 Marks)**

OR

2. a. Discuss photonic crystal fibers and explain index guided microstructures and photonic bandgap fibers with suitable diagrams. **(08 Marks)**
   b. With neat schematic, explain refractive index profile and ray transmission in multi-mode step index and graded index. **(08 Marks)**
   c. Determine the cut off wavelength for a step index fiber for single mode operation when the core refractive index and radius are 1.46 and 4.5 μm, with relative index difference being 0.25%. **(04 Marks)**

Module-2

3. a. Explain the linear and Non-Linear scattering losses with suitable equations. **(10 Marks)**
   b. A 6km optical link consists of multimode step index fiber with core refractive index of 1.5 and relative refractive index difference of 1%. Estimate:
      i) The delay difference between the slowest and fastest modes at fiber output.
      ii) The rms pulse broadening due to intermodal dispersion on link.
      iii) The maximum bit rate.
      iv) The Bandwidth-Length product. **(10 Marks)**

OR

4. a. Discuss the Fusion and Mechanical fiber splices. **(08 Marks)**
   b. Explain the significance of fiber connectors and with schematics, discuss cylindrical ferrule connectors. **(06 Marks)**
   c. A graded index fiber has a parabolic refractive index profile ($\alpha = 2$) and core diameter of 50μm. Estimate the insertion loss due to 3μm lateral misalignment at fiber joint when there is index matching and assuming.
      i) There is uniform illumination of all guided modes only.
      ii) There is uniform illumination of all guided and leaky modes. **(06 Marks)**

Module-3

5 a. Explain the electron recombination and associated photon emission for direct and indirect bandgap materials with relevant diagrams. **(08 Marks)**

   b. Explain and derive the equations for quantum efficiency and LED power. **(06 Marks)**

   c. With neat schematic, explain the basic methods for achieving current confinement in laser diodes. **(06 Marks)**

OR

6 a. Explain the generic structure of front end amplifiers in optical receiver. **(08 Marks)**

   b. Discuss Double-Heterostructure photodiodes. **(04 Marks)**

   c. In InGaAs in photodiode has following parameters at wavelength of 1300nm, I_D = 4nA, η = 0.90, R_L = 1000Ω, surface leakage current is negligible. The incident optical power is 300nW (-35dBm) and receiver bandwidth is 20MHZ. Find: i) Photocurrent   ii) Shot-noise current   iii) Dark current   iv) Thermal noise. **(08 Marks)**

Module-4

7 a. Explain in detail the polarization independent isolators and 3 port circulators with relevant diagrams. **(10 Marks)**

   b. Explain in detail the operational principles and implementation of WDM network with optical amplifiers. **(07 Marks)**

   c. The input wavelength of 2×2 silicon Mach-Zender interferometer multiplexer are separated by 10GHZ (i.e $\Delta\lambda$ = 0.08nm at 1550nm) with η_{eff} = 1.5. Determine waveguide length difference. **(03 Marks)**

OR

8 a. Write a short note on FBG applications. **(05 Marks)**

   b. Discuss three methods of adjusting the wavelength of tunable Bragg grating of Tunable optical fibers. **(07 Marks)**

   c. Explain the amplification mechanism of Erbium-Doped fiber amplifiers. **(08 Marks)**

Module-5

9 a. Explain optical networking node elements and Optical Cross Connect (OXC) with neat diagrams. **(08 Marks)**

   b. Explain Broadcast and select network and wavelength routing in wavelength. **(08 Marks)**

   c. Describe the different implementation schemes for IP over WDM/DWDM. **(04 Marks)**

OR

10 a. Explain the optical circuit switched network with suitable diagram. **(05 Marks)**

    b. Describe the waveband switching network architecture employing a Multi Granular Optical Cross Connect (MG-OXC). **(07 Marks)**

    c. Write short notes on optical fiber access networks and local area networks. **(08 Marks)**

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Seventh Semester B.E. Degree Examination, Feb./Mar. 2022
Wireless Communication

Time: 3 hrs. 　　　　　　　　　　　　　　　　　　Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1　a.　Derive an expression for Pathloss in free space propagation. (10 Marks)
　　b.　Assume a receiver is located 10 km from a 50 W transmitter. The carrier frequency is 900 MHz, free space propagation is assumed, $G_t = 1$, and $G_r = 2$. Find:
　　　　(i)　The power at the receiver
　　　　(ii)　The magnitude of the E-field at the receiver antenna
　　　　(iii)　The rms voltage applied to the receiver input assuming that the receiver antenna has a purely real impedance of 50 Ω and is matched to the receiver. (10 Marks)

OR

2　a.　Explain three basic propagation mechanisms in mobile radio communication. (06 Marks)
　　b.　Discuss practical link budget design in path loss models. (04 Marks)
　　c.　Describe Okumura-Hata Model in outdoor propagation models. (10 Marks)

Module-2

3　a.　List and explain factors that influencing Small Scale fading. (06 Marks)
　　b.　Explain types of Small Scale fading. (04 Marks)
　　c.　Describe Spread Spectrum channel impulse response measurement system with suitable block diagram. (10 Marks)

OR

4　a.　What is channel assignment strategies? Discuss Handoff strategies in mobile communication. (10 Marks)
　　b.　Define the following:
　　　　(i) Blocked call 　　　　(ii) Traffic Intensity 　　　　(iii) Load
　　　　(iv) Grade of Service 　　(v) Request rate (10 Marks)

Module-3

5　a.　Compare FDMA and TDMA in detail. (12 Marks)
　　b.　Discuss Packet Radio ALOHA Protocol. (08 Marks)

OR

6　a.　Define capacity of cellular system. Derive an expression for maximum radio capacity with suitable assumptions. (10 Marks)
　　b.　Explain three popular capacity improvement techniques is cellular systems. (10 Marks)

Module-4

7　a.　Discuss GSM system overview with a suitable block diagram. (10 Marks)
　　b.　Explain the structure of GSM frames used for traffic channels. (05 Marks)
　　c.　List and discuss available services in GSM. (05 Marks)

OR

8 a. With a neat step call flow, explain handover between two cells belonging to different BS Controller but the same MSC. (10 Marks)
   b. With a figure, discuss structure of time slots used in GSM. (10 Marks)

Module-5

9 a. Highlight the system overview of IS95 and discuss Air Interface activities in IS95. (10 Marks)
   b. Explain with suitable block diagram of an IS-95 mobile station transmitter. (10 Marks)

OR

10 a. Discuss IS-95 spreading and modulation in the downlink with a block diagram. (10 Marks)
    b. Explain all logical and physical channels in IS95. (10 Marks)

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