MOTILAL NEHRU NATIONAL INSTITUTE OF TECHNOLOGY ALLAHABAD
Department of Electronics & Communication Engineering
End-Semester Examination (Odd Semester-December, 2018-19)
B. Tech. VII Semester (EC 1781)
Course: Optical and Mobile Communication

Max Marks: 60 **Time: 3.00 hours**

Note: Attempt any five questions and assume suitable data if required.

1.a) Explain different types of propagation modes in optical fibers. Also define Normalized Frequency for any optical fiber communication system. (6)

b) Find out core radius, necessary for single mode operation at 820 nm for a Step Index fiber with n_1=1.48 and n_2=1.478. Also find Numerical Aperture and maximum acceptance angle. (6)

2.a) What is attenuation in optical fiber communication system? Also define transmission efficiency. Derive an expression for attenuation coefficient. (6)

b) (i) A 12 km long optical fiber link has a loss of 1.5 dB/km. What is the minimum optical power level that must be launched into the fiber to maintain an optical power output of 0.3mW at the receiver end? (3)

(ii) *3 elements having loss of -11dB, -6dB and -3dB are cascaded. Find out the total loss of combination.* (3)

3. *Define dispersion in an optical fiber communication system. Explain different types of dispersion mechanisms and find expressions for pulse broadening due to intermodal and intramodal dispersion.* (12)

4. Explain working principle of Light Emitting Diode, with suitable diagrams, for the application of optical fiber communication. Also define and derive expressions for Internal Quantum Efficiency and LED Power. (12)

5. Discuss various generations of a Mobile Communication System. Write down the important features of 5G system. (12)

6. Write short notes on any three of the following: (12)

a. Modulation bandwidth in optical communication.
b. Frequency reuse concept in Cellular Mobile Communication System.
c. Stimulated emission and lasing action.
d. Ray transmission theory in optical fiber communication.

Motilal Nehru National Institute of Technology Allahabad
Department of Computer Science and Engineering
End Semester Examination (2018), B.Tech IT VII Sem

Subject: Image Processing (CS1703) **Time: 3:00 hrs** **Max. Marks: 60**

Answer all the following Questions.
Write all the individual question answers at the same place (if not negative marking will be awarded).

1 a. Explain first order and second order derivative for following data. Discuss property and applications of both. (2 marks)

5	5	4	3	2	1	0	0	0	6	0	0	0	0	1	3	1	0	0	0	0	7	7	7	7

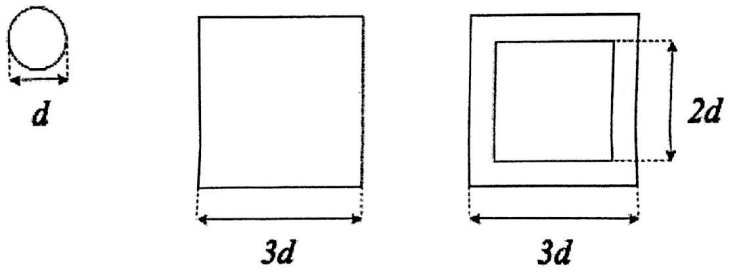
b. Explain image smoothing using ideal low pass filter and Butterworth low pass filter in detail with suitable examples. (4 marks)

c. How many type of noise models are found in digital image processing? List out them and explain in detail each one. (4 marks)

2 a. What is m-adjacency? What are the different neighbors of a pixel in a 2- D image? (2 marks)

b. Explain the convex hull algorithm with an example. (2 marks)

c. Apply the erosion, dilation, opening and closing on images 'P' and 'Q' using the structuring element 'T'. Finally draw all the resultant images with neat sketches. (6 marks)



T P Q

3 a. Explain the super pixel segmentation in detail with a suitable example. (2 marks)

b. What is an active contour model? How contours are represented using this model? (4 marks)

c. Considering the LSB embedding method embed the Image 'A' with the Secret Image 'B' and Show the following results: (4 marks)

- Embedded image.
- Decrypted image.
- Similarity among original and Embedded Image.

12	4	6	8	9
3	2	10	12	4
11	5	8	9	3
8	6	10	14	12

Cover Image 'A'

4	2	6	8	1
3	5	3	4	12
10	9	7	9	7
8	1	5	6	4
12	2	4	2	3

Secret Image 'B'

(P.T.O)

4 a. How can an image be converted from a square grid to hexagonal grid? (2 marks)

b. What is HSI color model? How can an image represented through HSI model be converted into corresponding RGB represented image? (4 marks)

c. Convert the following given RBG image to HSI. (4 marks)

186	183	183	183	182	180	180	45	44	44	44	43	44	44
185	184	184	182	182	182	182	44	43	43	43	43	43	43
186	185	184	182	182	181	181	45	44	43	43	43	42	42
189	186	185	184	183	181	181	47	45	44	43	42	42	42
188	186	185	184	183	181	180	46	45	44	43	42	42	41
186	186	186	183	182	181	181	44	44	44	42	41	40	40
184	186	185	183	182	181	181	42	44	43	42	41	40	40

R G

25	25	25	25	24	22	22
24	25	25	24	24	22	22
25	26	25	24	24	21	21
27	27	26	25	24	23	23
24	25	26	25	24	23	22
22	24	24	24	23	22	22
20	24	23	24	23	22	22

B

5 a. What is the need of error free compression? List the various coding techniques to achieve this and explain in short. (2 marks)

b. What is variable length encoding? Discuss the advantages of variable length encoding over fixed length encoding. Give two schemes where variable length encoding is used. (4 marks)

c. Encode the sequence AAABBCCDDABBA using LZW transform. The initial Dictionary is having symbols A, B, C and D with code as 1, 2, 3 and 4 respectively. (4 marks)

6 Write short notes on the following: (5*2 =10marks)

a. Object Recognition
b. SIFT Descriptor
c. K-means clustering for Image Segmentation
d. Hole filling
e. Ringing Effect

****** END ******

CSED, MNNIT Allahabad, Prayagraj

End-semester Examination, December 2018

B Tech VII Semester (CSE & IT) & MCA V Semester

Professional Ethics (CS1702,CA3503)

M.M. 60

Time Three Hours

NOTE: Questions carry equal weight. Feel free to assume any missing data but categorically mention it under the heading 'Assumptions for this question'.

1. Explain the term code of ethics. Further elaborate your views for its use in technical and professional courses so as to improve its relevance in making students honest and responsible professionals in close to 500 words.

2. Answer the following :

   (a) Explain **Whistle Blowing**. How many different kinds of these are prevalent? What procedures need to be followed by a Whistle Blower in a situation where whistle blowing is needed?

   (b) Describe all the principles of Organisation for Economic Co-operation and Development (OECD) privacy guidelines.

3. Answer the following :

   (a) Write the **Ten Commandments** of Computer Ethics along with your elaboration for each.

   (b) Explain different types of **Cyber Crime Attacks** with appropriate example for each.

4. Answer the following :

   (a) With reference to the ACM code of ethics 2018, briefly describe the general ethical principles in approximately 250 words.

   (b) What are Intellectual Property Rights (IPR)? Explain types of Intellectual Properties with appropriate example for each.

5. Case Study:

   A multi-storey building which was illegally constructed collapses and kills fifty innocent people including workers, women and children. These were poor migrants from far away places. The building was allowed to construct only three storeys, but the builder has violated the rules and raised four more storeys. The government immediately announces cash relief to aggrieved families. The builder is arrested and put under court trial.

   On the basis of above answer the following:

   (a) On whom does the ultimate blame for the death of fifty innocent lives rest, Government or builder? Justify and explain your answer in approximately 250 words.

   (b) Is it morally correct to give cash relief to the families of victim in this case? Substantiate your view in close to 250 words.

6. Write short note in approximately 125 words for each of the following:

   (a) Customer Profiling
   (b) Employee Rights
   (c) Security Risk Assessment
   (d) Moral Dilemma

Declaration

I study in **MNNIT Allahabad**. I am here to **learn**.
I value **Examination Ethics** and practice it.

Signature Name and Registration No.

END SEMESTER EXAMINATION (AY 2018-2019)

COMPUTER SCIENCE AND ENGINEERING DEPARTMENT

MOTILAL NEHRU NATIONAL INSTITUE OF TECHNOLOGY ALLAHABAD

SUBJECT: DATA WAREHOUSING AND MINING (CS-1743)

BTECH (IT) VII SEMSTER

Time: 3.0 Hrs MM: 60

Note: This paper has six questions. Attempt all the four questions legibly. Each question carries equal mark.

Q1. A) Discuss whether or not each of the following activities is a data mining task. Give proper justification. [2]

i. Computing the total quarterly sales of a company for all products under the label "Home Appliances"
ii. Predicting the future stock price of a company using historical records.
iii. Dividing the customers of a company according to their profitability.
iv. Monitoring and predicting failures in a hydropower plant

B) There are three categories of classification methods: supervised, unsupervised, and semi-supervised. Given one named method in each category with brief and proper justification. [3]

C) What is "bagging" and how is it different from "boosting?" When would you use either of these techniques? [5]

Q2. A) Precisely define a naive Bayes classifier. What is the principal assumption in the Naive Bayes' model, and when is this assumption useful? [4]

B) What are the advantages and disadvantages of a naive Bayes classifier as against the random forest algorithm? [4]

C) Draw the Bayesian network for a naive Bayes classifier. [2]

Q3. A) Explain the definition of a centroid in k-means. Specify the steps of the k-means algorithm. [4]

B) What are the advantages and disadvantages of k-means clustering as against model–based clustering? [4]

C) What objective function does the k-means algorithm minimize? Explain how you know that this algorithm will always converge. [2]

Q4. Suppose that a data warehouse for Big University consists of the following four dimensions: **student, course, semester,** and **instructor**, and two measures **count** and **avg_grade**. When at the lowest conceptual level (e.g., for a given student, course, semester, and instructor combination), the **avg_grade** measure stores the actual course grade of the student. At higher conceptual levels, **avg_grade** stores the average grade for the given combination.

i. Draw a snowflake schema diagram for the data warehouse. [5]
ii. Starting with the base cuboid [student, course, semester, instructor], what specific OLAP operations (e.g., roll-up from semester to year) should one perform in order to list the average grade of CS courses for each Big University student. [3]
iii. If each dimension has five levels (including all), such as "student < major < status < university < all", how many cuboids will this cube contain (including the base and apex cuboids)? [2]

Q5. Consider the data set shown in the Table below.

Customer ID	Transaction ID	Items Bought
1	1001	{i1,i4,i5}
1	1024	(i1,i2,i3,i5}
2	1012	(i1,i2,i4,i5}
2	1031	(i1,i3,i4,i5}
3	1015	{i2,i3,i5}
3	1022	{i2,i4,i5}
4	1029	{i3,i4}
4	1040	{i1,i2,i3}
5	1033	{i1,i4,i5}
5	1038	{i1,i2,i5}

A) Compute the support for itemsets {i5}, {i2,i4}, and {i2,i4,i5}, and subsequently compute the confidence for the association rules {i2,i4} → {i5}, {i5}→ {i2,i4} [2]

B) Repeat part A) above by treating each customer ID as a market basket. Each item should be treated as a binary variable (1 if an item appears in at least one transaction bought by the customer, and 0 otherwise.) [2]

C) Is confidence a symmetric measure? What is the maximum size of frequent itemsets that can be extracted? [2]

D) Explain FP-growth algorithm for mining association rules.

Q6. Write short notes on any **FOUR** of the following: [4 X 2.5]

A) Box plot

B) Classifier Model overfitting and underfitting

C) Linear SVM

D) Data Marts

E) Multilevel Association rules

F) OLAP and OLAM

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
MOTILAL NEHRU NATIONAL INSTITUTE OF TECHNOLOGY ALLAHABAD
End Semester Exam (Odd Semester) 2018-19
Genetic Algorithms (CS 1746)
B.Tech VII Semester (CSE+IT)

Time: 3hours **Maximum Marks:60**

Note: Attempt all questions. In case of missing data assume yourself and mention in the answer sheet.

1. **(a)** How many fronts will be there, if we apply non-dominated sorting to the following solutions? A criterion for function is represented by Max and Min where Max is Maximum and Min is Minimum. Show the solutions on each non-dominated front. **[6]**

Solutions	(F1(Max),F2(Min))
P_1	(2,1)
P_2	(2,2)
P_3	(3,4)
P_4	(5,6)
P_5	(4,3)
P_6	(7,8)

(b) State with example how Genetic Programming is different from Genetic Algorithm? **[4]**

2. **(a)** Write and Apply NSGA fitness assignment procedure on the solutions of each pareto front created in question 1 (a). **[4+4]**

(b) What is the difference between non-dominated front and pareto optimal front? **[2]**

3. **(a)** Assume we have the following function:
$f(x) = x^2 - 2 * x + 3$ where $1<=x<=4$

We wish to maximize f(x), Using a binary representation we can represent x using six binary digits.

(i) *Given the following* four chromosomes give the values for x and f(x). **[2]**

Chromosome	Binary String
P_1	010101
P_2	101010
P_3	101011
P_4	111111

(ii) If P_3 and P_2 are chosen for binary tournament selection, which solution will be selected? **[1]**

(iii) if roulette wheel selection is applied and following random numbers are selected, which two selected solutions will go in selected pool. **[2]**

Random numbers
.35
.45
.79
.76

(b) Represent following hypothesis by a binary number and apply variable length crossover :

IF $a_1=T \wedge a_2=F$ THEN c=T; if $a_2=T$ THEN c = F
IF $a_1=T \wedge a_2=F$ THEN c=T; if $a_1=F$ THEN c = F

(i) Define crossover if first hypothesis has a cut after 1st and 8th bit and second after 1st and 3rd bit. **[2]**

(ii) Which of the following cuts in h2 produce valid hypotheses <6, 8>, <3, 7>, <1, 8>. **[3]**

[P.T.O.]

4. (a) For the given table, explain how each hypothesis can be converted in binary representation and calculate the fitness of following hypothesis.

Predictors/Attributes | Target

Outlook	Temperature	Humidity	Windy	Play Tennis
Overcast	Hot	High	FALSE	Yes
Overcast	Cool	Normal	TRUE	Yes
Overcast	Mild	High	TRUE	Yes
Overcast	Hot	Normal	FALSE	Yes
Rainy	Cool	Normal	FALSE	Yes
Rainy	Mild	Normal	TRUE	Yes
Rainy	Hot	High	FALSE	No
Rainy	Hot	High	TRUE	No
Rainy	Mild	High	FALSE	No
Sunny	Mild	High	FALSE	Yes
Sunny	Cool	Normal	FALSE	Yes
Sunny	Mild	Normal	FALSE	Yes
Sunny	Cool	Normal	TRUE	No
Sunny	Mild	High	TRUE	No

(i) H1=if outlook=overcast then play tennis is yes. [3]

(ii) H2=if outlook=overcast or Sunny then play tennis is yes. [3]

(b) Define Multimodal problems. Why it is important to maintain diversity in solutions while solving multimodal problems using Genetic Algorithm? How sharing fitness approach maintains diversity in solutions? [4]

5. (a) What changes will be there in terms of exploitation and exploration in DE algorithm, if during mutation, in place of selecting three random vectors, we always add the weighted difference of two random solutions in the position of best solution? [5]

(b) What changes will be there in terms of exploitation and exploration in PSO algorithm, if we change the formula for updating position of each particle. In place of adding velocity to previous position, we add velocity to pbest of each solution. [5]

6. *Write short notes on the following:*

(i) *Applications of GA in software testing* [2.5]

(ii) *CMA-ES algorithm.* [2.5]

(iii) Difference between multi modal and multi objective problems and their algorithms. [2.5]

(iv) Population based and point to point based algorithm. [2.5]

********** End of Paper**********