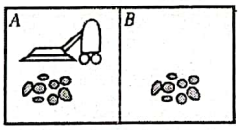
INSTITUTE OF INFORMATION TECHNOLOGY
JAHANGIRNAGAR UNIVERSITY
4TH YEAR 1ST SEMESTER FINAL EXAMINATION-2018

COURSE CODE: IT- 4101 **COURSE TITLE: Artificial Intelligences & Neural Networks**
TOTAL MARKS: 60 **TIMES: 3 HOURS**

ANSWER ANY FIVE (5) QUESTIONS

1. a) What is Knowledge in the domain of Artificial Intelligence? **3**
   b) How many knowledge discover methods are there to explore knowledge in AI? **3**
   c) Write the following statements in AI rules. **6**
   i. I tomorrow is a holiday, then we shall revise the AI syllabus.
   ii. I shall buy a text book on AI if my father sends me additional money.
   iii. I four CGPA is HIGH and graduation thesis is Good quality, then you may apply for a foreign scholarships.

2. a) This is a vacuum-cleaner world with just two locations A and B. Write down the agent program and build the agent function table using precept sequence and actions. **5**



   b) "A rational agent is one that does the right thing.", if you agree prove it using an example. **2.5**
   c) What is rational/logical at any given time depends on four things, what are they? **2.5**
   d) Draw the state space for the vacuum world. **2**

3. a) What is meant by PEAS? Why these terms are important for a rational agent? **2**
   b) Explain properties of following task environments (any **four**) **8**
   i. Fully observable vs. partially observable
   ii. Deterministic vs. stochastic
   iii. Episodic vs. sequential
   iv. Static vs. dynamic
   v. Discrete vs. continuous
   vi. Single agent vs. multiagent
   c) Write the PEAS description of the task environment for an automated taxi. **2**

4. a) Solve with crypto-arithmetic: BASE + BALL = GAMES 4

b) Draw a search tree for the solution mentioned in the problem 4(a). 4

c) What is heuristics search and mention certain application of heuristics search. 2

5. a) "A problem is defined by four items", what are they? Describe a well-defined problem. 5

b) Briefly explain route finding problem using any example. Is it a goal-based problem? If yes formulate the problem 5

c) How does the following system (Figure A) work? What are the measurement vectors? Is single perceptron enough? Can you make the system self-learning?

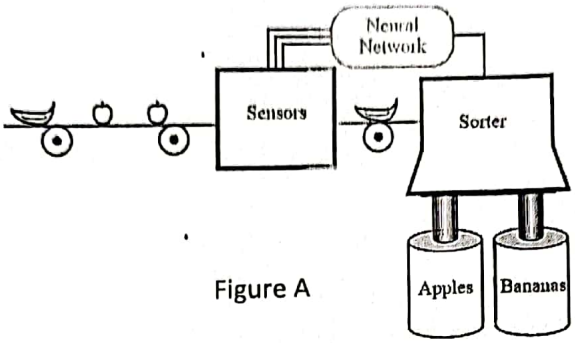


Figure A

6. a) What is meant by overfitting? What constitutes a good training set? 2

b) For a single perceptron with 5 inputs a(1-5)=1,0,1,0,1 with initial wait of w(1-5)= 0.2,0.4,0.5,0.4,0.6. Assume desired output 1.5 what will be the new w(1-5)? Also assume learning rate =1. 5

c) State back-propagation algorithm for updating weights in a multilayer network step by step. 5

7. a) Write down the advantage and disadvantage of feed forward neural network vs recurrent neural network. 4

b) Draw real neuron vs artificial neuron. Compare their work strategies. Can artificial neuron work like real neuron? Why and why not? 4

c) What is the significance of activation function in NN? Briefly explain each type of them. 4

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4TH YEAR 1ST SEMESTER B.Sc.(HONS) FINAL EXAMINATION-2018

COURSE CODE: IT- 4103 **COURSE TITLE: TELECOMMUNICATION SYSTEM**
TOTAL MARKS: 60 **TIMES: 3 HOURS**

ANSWER ANY FIVE (5) QUESTIONS

1. a) What is the function of Tandem exchange in multi-exchange service area? 4
   b) A local loop is made of 22 American Wire Gauge (AWG) wire and is 18,000 feet long. The connected telephone has an internal DC resistance of 200Ω. Assuming the Exchange voltage of -48V. Calculate the amount of DC voltage the telephone will actually will see. 4
   c) Crosstalk is the unwanted coupling between signal paths. There are essentially three causes of crosstalk, Mention those causes. How does the transmission bridge remove the crosstalk? 4

2. a) Define the terms *direct link*, *point-to-point link* and *multi-point link* with necessary figure. 3
   b) What is the bandwidth in data transmission? Show that a digital pulse train contains infinite bandwidth. 3
   c) Why amplifying is not suitable for digital data transmission? How the problem can be solved? 3
   d) Given that MTBF = 2000 hrs and MTTR = 4 hrs. Calculate the unavailability for single and dual processor systems for 10 years and 30 years. 3

3. a) What is the channel capacity in data transmission? In Shannon Capacity Formula: $C = B \log_2(1+SNR)$, describe the function of SNR in determining channel capacity C. 4
   b) Suppose the spectrum of a channel is between 10 MHz and 11 MHz, and $SNR_{dB} = 24dB$. If we want to achieve this limit, how many signaling levels are required at least? 4
   c) What is attenuation in signal transmission? How does equalizer resolve the attenuation problem? 4

4. a) What do you understand by fiber dispersion? Differentiate between chromatic dispersion and modal dispersion. 4
   b) Describe the reasons why LASER diode is the better transmitter than Light Emitting Diode (LED) for optical fiber communication. 4
   c) What is Inter Symbol Interference (ISI) in fiber optic communication? How does ISI determine the maximum length/bandwidth of an optical fiber? 4

5. a) What is the function of focal point of an ellipse in Kepler's first law and the meaning $t_1 = t_2$ or $A_1 = A_2$ in Kepler's second law for satellite operation?

b) Define the terms ascending node, descending node and inclination. With a neat figure, describe the look angle.

c) Discuss the problem of delay in speech telephone circuits traversing a geostationary satellite. Will there be any problem with data and signaling circuits?

6. a) Why is the PSTN digital network not compatible with data bit streams? 2

b) Derive the expression of blocking probability, B_n for the limited trunk telephone network. 5

c) A network of infinite trunk experiences an average call arrival rate of 1.5 calls/min. Find the probabilities of ***no call arrival***, ***3 calls arrival*** and ***at least 4 calls arrival*** in 6 minutes. 5

7. a) Why concentration and expansion concept is used in communication trunks between two cities? 2

b) Write down the advantages of using multistage space switch. Design a 3 stage 100x100 space switch, where each stage contains 5 blocks. Compare the number of cross points with single stage case. 5

c) Design a Space-Time-Space (S-T-S) switch, in which data packets are transmitted in **TS** 2 by a sender and data packets are received in **TS** 28 by its intended receiver. 5

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4TH YEAR 1ST SEMESTER B.Sc.(HONS) FINAL EXAMINATION-2018

COURSE CODE: IT- 4105 **COURSE TITLE: MANAGEMENT INFORMATION SYSTEM**
TOTAL MARKS: 60 **TIMES: 3 HOURS**

ANSWER ANY FIVE (5) QUESTIONS

1. a) What are the characteristics of MIS? How do MIS differ from TPS? 3
   b) What are different types and resources of information system (IS)? 4
   c) The Internet has changed competitive forces and competitive advantage – explain how. 5

2. a) Define ethics and netiquette with examples. Differentiate between computer ethics and law. 3
   b) Briefly describe three actions that can be taken while creating IT usage policy. 4
   c) What do you mean by PAPA? Write about any one element of PAPA. 3
   d) List some key technologies that raise ethical issues. 2

3. a) What are the organizational culture, politics and environment for MIS? Show that environments and organizations have a reciprocal relationship. 4
   b) List and describe the organizational management and technology dimension of information system. 4
   c) Digital content and services can lead to significantly lower costs – justify the reasons. 4

4. a) State the prominent characteristics of e-commerce. Differentiate between e-commerce and e-business. 3
   b) What are the various modes of e-commerce? Give examples of B2B and B2C e-commerce. 3
   c) Identify the key steps of an Internet business life cycle? What step is the most critical and why? 3
   d) List some advertising techniques for promoting web business. Why the home page of your website should be simple and easy to navigate? 3

5. a) Describe four key types of organizational changes produced by building new information system. 4
   b) What do you mean by business process management (BPM)? List the key steps in BPM. Why BPM uses various types of tools? 4
   c) List the core activities used for building an information system. Briefly describe the main conversion strategies for changing the old system to the new system. 4

6. a) What is a project? Describe the major constraints involved in a project.

b) What do you mean by project management? Mention the activities that are associated with a project.

c) Briefly describe the objectives of project management. 3

d) Discuss three factors which determine the level of risk in an information system. 3

7. a) Define security. What layers of security a successful organization should have? 3

b) Differentiate among threat, vulnerability, attack and control with illustration. 3

c) List some attacking tools used by criminals and malicious individuals. Briefly describe any one of them. 3

d) Classify attacks according to various criteria. Differentiate between active and passive attacks. 3

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4TH YEAR 1ST SEMESTER FINAL EXAMINATION-2018

COURSE CODE: IT- 4107 **COURSE TITLE: PARALLEL & DISTRIBUTED SYSTEM**

TOTAL MARKS: 60 **TIMES: 3 HOURS**

ANSWER ANY FIVE (5) QUESTIONS

1. a. If you are planning to design a distributed system where the computers will be resided in different geographical locations what consequences you must be considered? 3

   b. How grid system differs from cluster system in distributed environment? 2

   c. Describe the challenges that any designer who is planning to design a distributed system must consider before start designing the system. 5

   d. How the traditional client-server model can be modified in distributed system? 2

2. a. Suppose you want to design a visa processing system where the visa application form will be displayed in the client's browser but the original processing will be done in server side. Which variation of client-server model will support your design issue and how? 3

   b. What is parallel system? Describe different types of parallelism with example. 5

   c. The INFO service manages a potentially very large set of resources, each of which can be accessed by users throughout the Internet by means of a key (a string name). Suggest how the INFO service can be implemented so as to avoid performance bottlenecks when the number of users becomes very large. 4

3. a. What is the main purpose of security model in distributed system. 2

   b. Suppose you are designing a hospital management system with each object will have an unique id. In your system any doctor can access the medical record of any patient with the condition that the patient must give authentication first. In how many ways you can secure such system so that no one can hack the system easily. 5

   c. Suppose you are going to a picnic where you need to upload your pictures to facebook but at the same time while uploading you need to delete it from your mobile due to lack of storage. But due to connectivity problem you are not getting continues net connection. What solution you have for such problem? 5

4. a. Programming a multicomputer system is multiprocessor system. Why? How this problem can be solved? Explain.

   b. What were the problems that the designers were facing with DOS and NOS. How these problems were solved finally? 2

   c. What is RPC? How it works? 4

5. a. What is remote object invocation? What was the major challenge of DCE RMI model faces initially? 3

   b. Briefly describe the general architecture of message queuing model. 5

   c. Briefly describe the working principle of IBM MQ series. 4

6. a. Consider a URL as www.mail.yahoo.com/mail/inbox.html . A name resolver may resolve the name using either iterative or recursive way. Which one is better in your opinion? Justify why 4

   b. Why global clock cannot be imposed in distributed system? What alternate solution did Lamport provide regarding this problem? Explain. 4

   c. Make a brief comparison among mutual exclusion algorithms. 4

7. a. Why is replication needed? What is the major problem of data-centric consistency model? 6

   b. Suppose you have developed a social website which suddenly gets huge popularity and is accessed throughout the world which causes a huge hit in your server and your server cannot handle all requests. What options you have to deal with such situation? Discuss each option.. 6

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COURSE CODE: IT- 4109 COURSE TITLE: MULTIMEDIA SYSTEMS AND APPLICATIONS
TOTAL MARKS: 60 **TIMES: 3 HOURS**

ANSWER ANY FIVE (5) QUESTIONS

1. a) How does the human eye sense color? What characteristics of the human visual system can be exploited for the compression of color images and video? 4

   b) Different color models are often used in different applications. What is the CMYK color model? Given a color represented in RGB color space as R = 0.2, G = 0.6, B = 0.3, what is its representation in the CMYK color model? 4

   c) What is a color look-up table and how is it used to represent color? How do you convert from 24-bit color to an 8-bit color lookup table representation? 4

2. a) Why is data compression, including file compression, highly desirable for Multimedia activities? 2

   b) Suppose the alphabet is [A, B, C], and the known probability distribution is $P_A = 0.5$, $P_B = 0.4$, $P_C = 0.1$. For simplicity, let us also assume that both encoder and decoder know that the length of the messages is always 3, so there is no need for a terminator. 3+3=6

      i. How many bits are needed to encode the message BBB by Huffman coding?
      ii. How many bits are needed to encode the message BBB by Arithmetic coding?

   c) Given the following string as input, /TAN/HAN/HAN/AN/, with the initial dictionary below, encode the sequence with the LZW algorithm, showing the intermediate steps. 4

Index	Entry
1	/
2	H
3	A
4	N
5	T

Table 1: Initial dictionary for LZW algorithm

3. a) What is chroma subsampling? What is the benefit of doing chroma subsampling? For the following array of color values, give chroma subsampling results with 4:2:2, 4:2:0 schemes. 5

90	100	96	42
80	18	82	78
44	62	52	38
28	23	48	22

b) Briefly outline, with the aid of suitable diagrams, the JPEG compression pipeline and state each of the algorithms employed at each stage in the pipeline 5

c) Briefly explain why JPEG compression is not always suitable for compression of images that contain sharp edges or abrupt changes of intensity (such as black text on a white background). 2

4. a) Compute the discrete cosine transform (DCT) of the following signal x(n). 3

$x(n)$	1	0	0	1	1	0	0	1
n	1	2	3	4	5	6	7	8

b) Given the following portion from a block (assumed to be 4x4 pixels to simplify the problem) from an image after the Discrete Cosine Transform stage of the compression pipeline has been applied: 3*2=6

132	143	1	193
129	7	193	199
139	201	73	194
203	78	139	135

i) What is the result of the quantization step of the MPEG video compression method assuming that a constant quantization value of 32 is used?

ii) What is the output of the following zig-zag step being applied to the resulting quantized block?

iii) Apply Run length encoding on the output of zig-zag step and write the results.

c) What is meant by the Quality of Service of a multimedia application? What major factors affect the Quality of Service of a multimedia application? 3

5

a) Real time periodic tasks with their associated arrival times, computational times/activation and periods are given in table 2. 3

Task	Arrival Time	CPU Usage per period	Period
Task A	0	1	4
Task B	0	2	5
Task C	0	1	7
Task D	0	1	8

Table 2: Real time periodic tasks' information

Would it be possible to schedule these jobs with Rate Monotonic Scheduling (RMS)? How about Earliest Deadline First (EDF)? Explain.

b) Show the scheduling order for these processes given in table 2 using EDF and RMS. 5

c) Briefly explain the working principle of Real Time Streaming Protocol (RTSP) in multimedia system. 4

6. a) Explain about multimedia. Is multimedia simply a collection of different types of media? Justify your answer. 4

b) The task is to think about the transmission of smell over the Internet. Suppose we have a smell sensor at one location and wish to transmit the Aroma Vector (say) to a receiver to reproduce the same sensation. You are asked to design such a system List three key issues to consider and two applications of such a deliver system 6

c) Discuss the relation between multimedia and hypermedia. 2

7. a) How many principal modes does JPEG have? What are their names? 5

b) What are the two methods used to decode only part of the information in a JPEG file, so that the image can be coarsely displayed quickly and iteratively increased in quality? 5

c) Could we use wavelet-based compression in ordinary JPEG? How? 2