

உயிரை வைத்து கூறிக் கூட (நேற வை) விழாவு, 2016 முனிசிபாலிடி கல்வியும் பொதுத் தருதாரப் பந்திர (உயர் தருப் பாரிசை, 2016 ஒக்டோபர் General Certificate of Education (Adv. Level) Examination, August 2016

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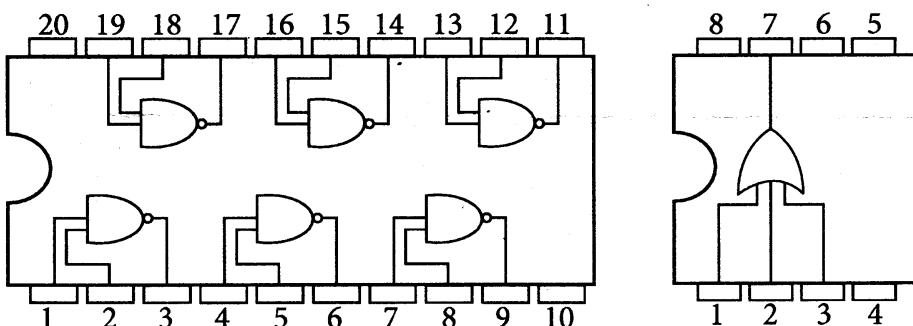
20 E II

Part B

* Answer any four questions only.

1. The top secret recipe for making milk rice at the restaurant chain SLFC is kept in an electronic safe at their head office. The lock (L) of the safe can either be in locked or unlocked states represented by logical truth values 0 and 1 respectively. This lock has three different key holes K1, K2 and K3 each with a unique key. These three keys are in the custody of three directors of SLFC. The lock opens when **at least two keys** are inserted into the corresponding key holes. The situation where the corresponding key is properly inserted into any key hole is represented by the logical truth value 1 and all the other situations are represented by the logical truth value 0.

Assuming that only the following Integrated Circuits (ICs) are available, construct a logic circuit to operate the lock (L) of the safe, by using the truth tables and Boolean algebra. Clearly show the truth tables, Boolean expressions and the Boolean algebraic rules used to construct your circuit.



2. There are two Local Area Networks (LANs) L1 and L2 which are connected only by a router R. These LANs are not connected to any other networks. Machines P and Q are connected to LANs L1 and L2 respectively. The machine P has successfully delivered an IP packet IP1 to machine Q.

In a LAN, an IP packet is sent from the source device to the destination device by inserting it into a frame, generated in the data link layer at the source device. In that LAN, source and destination devices are uniquely identified by the MAC addresses in that frame.

An IP address is recognized by the network layer but it is not recognized by the data link layer.

- (a) Draw a network diagram to depict the network described above using commonly used symbols and notations.
- (b) State whether the destination IP address of the packet IP1 is the IP address of Q or R when it is going through LAN L1. Justify your answer.
- (c) Assume that the IP packet IP1 was in a frame F2 in LAN L2. State whether the source MAC address of frame F2 is the MAC address of P or R. Justify your answer.

3. The management of the Siri Lak bank has decided to develop a web portal to deliver personalized services to its employees. The services include, access banking plans, regulations and policies, register for learning opportunities provided by the bank, quick search, weather reports, communicate with other employees and leave and loan related services. According to the chief information officer of the bank, the primary goal of developing the portal is to enable its employees to manage their personal lives more easily.

- (a) What is the e-commerce type of the services provided by the above web portal? Justify your answer.
- (b) State **two** potential benefits obtainable to the employees from the above portal.
- (c) The management of the bank expects that they could get a better service from their employees after implementing the proposed portal. Do you agree with this idea? Justify your answer.
- (d) A consultant suggests to implement a 'personal user assistant agent' based on the intelligent agent technology to improve the services of the above web portal. State **three** possible ways to improve the services of the above web portal by such an agent.

4. A canteen of a school sells 10 different types of foods. These food types are placed in a shelf. Students can select foods while walking alongside the shelf and keep them on a tray. These trays are available at the entrance of the canteen. A student, after selecting the food, should proceed to the cashier with the food tray for the payment.

You are asked to develop a computer program to calculate the payment due for a food tray. For this purpose, each food type is given a unique integer from 1 to 10.

The integer value assigned for each food type and its unit price is shown in the following table.

Food type	1	2	3	4	5	6	7	8	9	10
Unit price (Rs)	10.00	12.00	15.00	10.00	25.00	45.00	50.00	25.00	10.00	12.00

- (a) State all the inputs required for the computer program and its expected output.
- (b) Draw a flowchart to represent the algorithm required to compute the payment due for a food tray.
- (c) Transform the above flowchart into a Python program.

5. An education institute maintains a timetable to manage its lectures, practical classes and seminars. The timetable consists of two hour time periods: 8.00 a.m. - 10.00 a.m., 10.00 a.m. - 12.00 noon, 1.00 p.m. - 3.00 p.m. and 3.00 p.m. - 5.00 p.m. Lectures, practical classes and seminars are assigned to one or more time periods. A lecture is assigned to a lecturer and a practical class is conducted by a group of demonstrators. At least two lecturers are responsible for a seminar.

Draw an Entity Relationship (ER) diagram for the above system. State all your assumptions clearly.

6. Draw a context diagram to show the operations of the online assignment management system described below adhering to the standards of the Structured System Analysis and Design Methodology (SSADM). Clearly indicate external entities and data flows of your diagram. State any assumptions that you have made.

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