جـامـعة المنصـورة

كليــة الهندســة

قسم هندسة الحاسبات والنظم

امتحـان مـادة : قياسـات واختبـارات

الفرقـة الثالثة — حاسبات ونظم (قديم)

الزمن : ثلاث ساعات — ينـاير ٢٠١٢

1-a Write short notes about:-

Elements of instrumentation system.

Selecting points of transducers.

Functions of measurement systems.

Basic components of DAS.

Loading error effect.

Hall effect transducer.

1-b A strain gauge has a resistance of 120 Ω and Poisson's ratio of 0.5 . This strain gauge is connected in series with a ballast resistance of 120 Ω across 6 V supply .

    i- Drive an expressions for both the voltage sensitivity of the circuit, and gauge factor of the strain.

    ii- Calculate the voltage sensitivity and change in output voltage when the gauge is subjected to a pressure of 240 MN/m^2, the modulus of elasticity is 200 GN/m^2.

2-a Explain the function and theory of operation of the following:-

Pressure sensing elements.

Flow Rate sensing elements.

Mechanical sensing elements.

LVDT.

Liquid level transducers.

Temperature transducers.

2-b A steel cantilever is 0.25 m long , 20 mm wide and 4 mm thick , The modulus of elasticity for steel is 200 GN/m^2 . An LVDT is used as a secondary transducer, an output of 2mV appears across the terminals of the LVDT when the core moves through a distance of 0.5mm. The output of the LVDT is connected to a 10 V voltmeter whose scale has 100 divisions , through an amplifier whose gain is 250.

A force of 25 N is applied at the free end for the cantilever .

    i- Calculate the value of deflection at the free end .

    ii- Calculate the overall sensitivity of the measurement system in V/N.

3-a Write the differences between:-

Deflection & Null Instruments.

Active & Passive Transducers.

Inductive & Capacitive Transducers.

Analog & Digital Instruments.

Primary & Secondary Transducers.

Eddy current & Toothed Rotor Tachometer.

3- b A barium titanate Piezo-electric crystal has the dimensions of 6mm x 6mm x 1.5mm. and voltage sensitivity is 0.012 Vm/N , relative permittivity is 1400, the modulus of elasticity is 12×10^{10} N/m^2 . The force acting on the crystal is 10 N , $\varepsilon_0 = 8.854 \times 10^{-12}$.

    i- Drive a mathematical expression for the output voltage .

    ii- Calculate output voltage, charge sensitivity, and capacitance of the crystal.

4-a What is Telemetry?. Explain with drawing the basic components of telemetry system, and discuss the concepts and applications of it.

4-b A capacitive transducer is made up of two concentric cylindrical electrodes with 25 mm length , the inner diameter of outer cylindrical electrode is 4.2 mm and the outer diameter of the inner electrode is 4.0 mm.

    i- Drive a mathematical expression for the transducer sensitivity.

    ii- Calculate the change in capacitance for a displacement of the inner electrode of 2.5 mm. Also find the electric stress when a voltage of 150 V is applied across the electrodes.

Mansoura University
Faculty of Engineering
Computers Eng. & Systems Dept

First Semester
Date: 27-1-2012
Time allowed: 3 hours
Total Marks: [90]

Exam of: Artificial Intelligence (CSE 3315) **For** 3rd yr Computers Eng. & Systems Dept. Students

Answer All of The Following Questions

Question1:   <u>Supply in the missing words</u>   **[30 marks]**

1-………………………… is a computer program capable of performing at the level of a human expert in a narrow problem area.

2-The ………………of a node denotes how many moves away from the initial state in order to reach a solution.

3-Property inheritance is easily implemented in frames that are……………………………………………

4-When ELIZA find two different match rules it chooses between them by………………………….

5-The …………………………..is someone who is capable of designing, building and testing an expert system.

6-Real-world planning and decision-making problems should be ……………………………………… and ……………………………… to be dealt with A.I.

7-It's advisable to use ………………………… knowledge representational scheme to represent knowledge of a problem suffering from rapid changing phenomenon.

8-In ELIZA the user's sentence is searched for ………………………….. that are either ……………………………………………………… or used to:……………………………………………

9-Network representational Scheme has a special property which is ………………………. with the advantage of………………………………………………………………………

10- Frames extend…………………………..to include structured, hierarchical knowledge.

11-If ……………….. is used, the knowledge engineer can easily encode the knowledge into the expert system and thus eliminate the need for the programmer.

12-To decide using forward or backward reasoning, we need to take into considerations……………………… ,……………………… and ……………………………………

13-……………………..is needed to draw conclusions about a domain of interest when dealing with complete knowledge.

14-………………………….assumes statistical data on the relationships between hypothesis and evidence are known.

15-……………………… Method can list each possible candidate solution and check to see if it satisfies the constraints, either stop if an acceptable goal state is reached or keep track of the best solution.

Question2:   <u>Answer (√) or (X) and correct the wrong words :</u>   **[20 marks]**

1- No need to check consistency when adding information related to the truth of knowledge when dealing with non-monotonic reasoning. ( )

2- Branching factor is the distance from root of the tree to the leaves. ( )

3- If left most branch in a tree was long but include solution it's advantageous to use breadth first search algorithm. ( )

4- Heuristics may deceive, as to progress toward goal; we may get temporarily away from it. ( )

5- In Hill climbing search, when choose to follow a node, it continues to do so in depth first way. ( )

6- The A* algorithm always finds the optimal solution path. ( )

7- Forgetful hill climbing needs backtracking to keep track of current node. ( )

8- Some expert shells use a combination of forward and backward chaining inference techniques. ( )

9- In breadth first search algorithm, children nodes are added to the open list as a stack. ( )

10-Best first search algorithm is prepared to back track if the studied path lead to a dead end. ( )

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Question 3: [20 marks]

(A) Consider the search tree shown in fig.1, trace the tree for a solution using both **hill climbing** and **best first** search algorithms (Tabulate your answer). Lower value of heuristics represents better solution and 99 represents no solution.
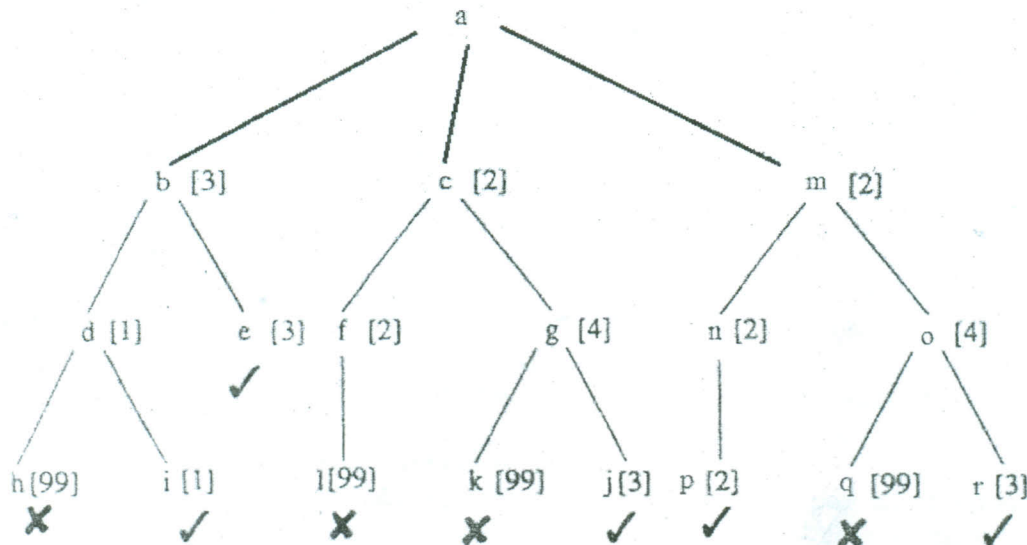

Fig.1

(B) What problems do nodes (f, b, g) lead to in hill climbing method?

(C) Which is the suitable search method to find the best solution i[1]? How?

Question 4: [20 marks]

(a) Draw the complete structure of a rule based expert system explaining the function of its components (**in a table**).

(b) Mention the advantages of the rule based expert systems over conventional systems.

Best Wishes, Jan2012

Dr. Amira Yassien