Tertiary and Vocational Education Commission

Automobile Technology- Part I

NCT Equivalence Examination

Instructions:

01. This paper consists of 05 questions.
02. Each question has part A and Part B.
03. Answer only one part (Part A or Part B) of each question.

01. Part A

    a. What do you expect from a skilled (competent) technician?   (Marks: 1x5)

    b. Explain Deming's (PDCA) cycle.   (Marks: 5)

    c. 'Meetings' are a regular function in workplace communication.

        i.   State four advantages which could be gained by having meetings.   (Marks: 0.5x4)

        ii.   Describe briefly, four of the factors which should be considered before conducting a meeting.   (Marks: 0.5x4)

    d. Explain briefly, three of the important rules which should follow in Letter/memo writing.
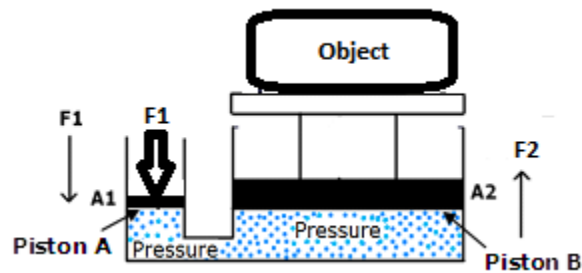
        (Marks: 2x3)

Part B

    a. What are the key areas to be considered when planning a job?   (Marks: 1x4)

    b. Organizations conduct "Market Research" to collect information. What are the basic steps to be carried out in a market research?   (Marks: 1x6)

    c. A manager addresses his employees to explain about new tax regulations involving with their salaries and other payments. After communicating, manager feels that the employees did not understand the message properly. State four possible reasons for the message not getting across effectively.   (Marks: 1x4)

    d. State four different situations where written communication is being used in your workplace.

        (Marks: 1x6)

02. Part A

    a. What information's are given in a Material Safety Data Sheet (MSDS)?   (Marks: 1x4)

    b. Briefly explain the purpose of conducting fire drills.   (Marks: 4)

    c. Draw the systematically working Diagnosis procedure chart.   (Marks: 4)

d. In Figure, find the weight of the metal object in N, if the area of piston A is $0.0006m^2$, the area of piston B is $0.0105 m^2$, and the force applied on piston A is 500 N. (Marks: 8)

Part B

a. Explain the purpose of carrying out a Risk Assessment (HIRA). (Marks: 4)

b. Explain the purpose of the General Register of Factories. (Marks: 2x3)

c. State four damages occur by environmental pollution due to the automotive operations and wastage. (Marks: 4)

d. If the weight of the metal object is 10,000 N, the diameter of piston A is 0.01 m, and the force applied on piston A is 250 N. Calculate the area of piston B. (Marks: 3x2)
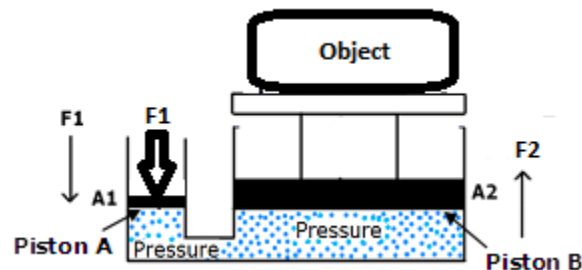

03. Part A

a. A vehicle is accelerated uniformly at $1.5ms^{-2}$ from a speed of $27kmh^{-1}$. Calculate,

   i. The time required to attend a speed of $81kmh^{-1}$. (Marks: 4)

   ii. The distance travelled in this time. (Marks: 4)

b. If the vehicle from previous example is brought to rest with a uniform retardation from the speed of $81kmh^{-1}$ in a further distance of 225m, calculate the retardation and time taken. (Marks: 2x2)

c. Classify engineering materials into their main groups indicating 03 examples for each. (Marks: 1x3, 1x3)

d. What is meant by mechanical forming? (Marks: 2)

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Part B

a. Velocity-time graph for a train moving between two stations is given in figure.

i. Draw acceleration-time graph over this time interval (Marks: 4)

ii. Find distance between the stations. (Marks: 3)

iii. Find average speed. (Marks: 3)
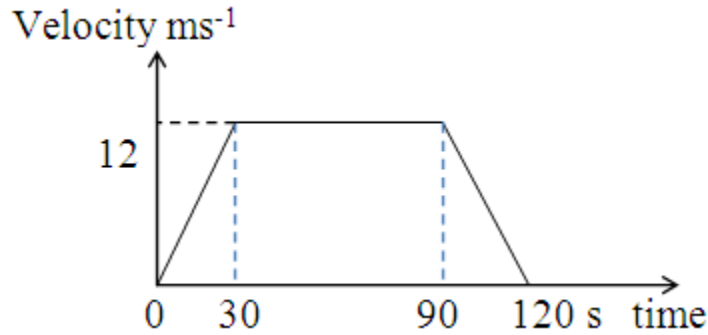
b. Briefly explain

i. Work Done (Marks: 2)

ii. Potential Energy (PE) (Marks: 2)

iii. Kinetic Energy (KE) (Marks: 2)

c. What is meant by "Toughness"? (Marks: 2)

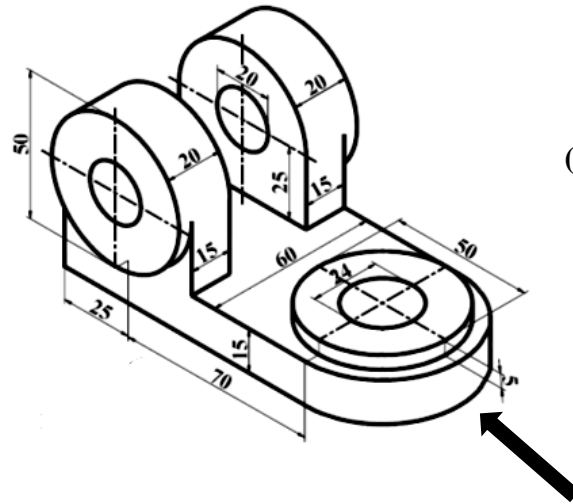d. Why is required "Heat Treatment" process? (Marks: 2)

04. Part A

a. Draw Front view, side view and plan (use first angle projection method). (Marks: 5x3)

b.   Do the dimension as per standard figure. (Marks: 5)

(Use A4 paper and instrument box)

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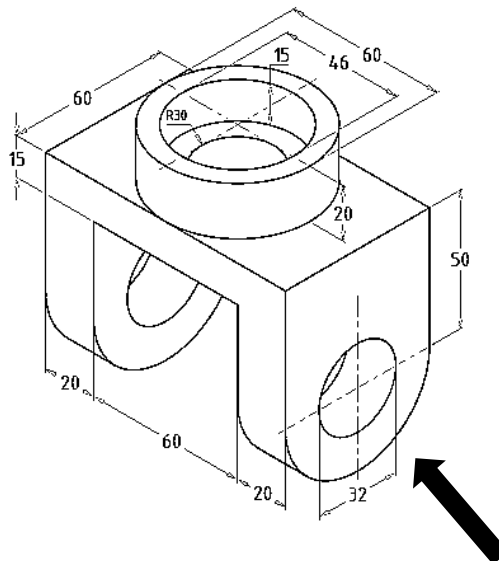
Part B

a. Draw Front view, side view and plan (use first angle projection method). (Marks:5x3)

b. Do the dimension as per standard figure. (Marks: 5)

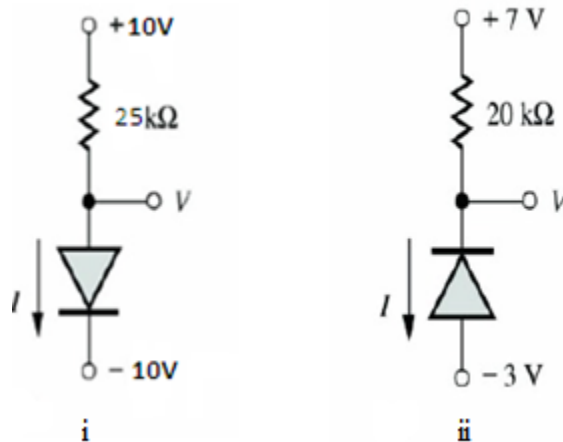**(Use A4 paper and instrument box)**

05. Part A

a. Using Kirchhoff's Voltage Law (KVL) to calculate the magnitude and direction of the current through all resistors in this resistor network: (Marks: 2x5)

Note: All current arrows point in the direction of conventional flow
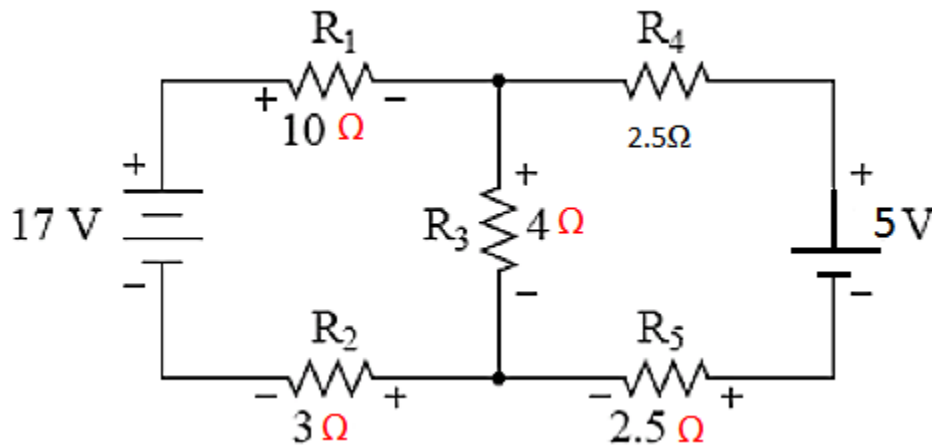
b. Find I and V in the two circuits in below Figure using the ideal diode model. (Marks: 1.5x4)

c. Simplify the following logic functions using Boolean algebra. (Marks: 2x2)
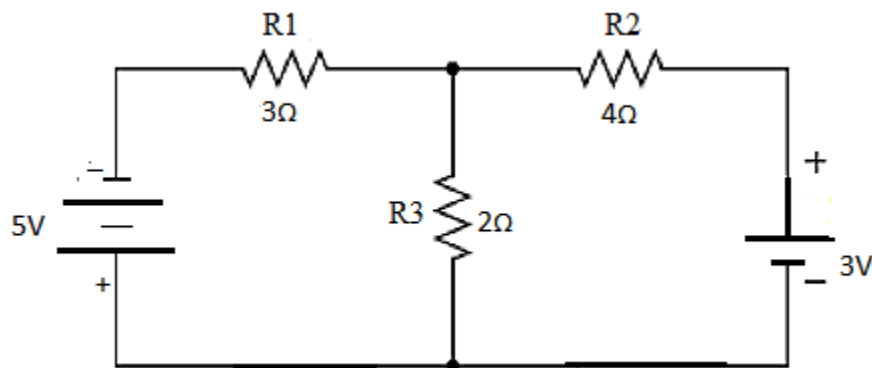
$$\text{i.} \quad \overline{AC} + B\overline{C} + \overline{A}BC + AB\overline{C}$$

$$\text{ii.} \quad \overline{AB}D + AB\overline{C}\overline{D} + ABC\overline{D} + \overline{A}B\overline{D} + \overline{A}BC\overline{D}$$
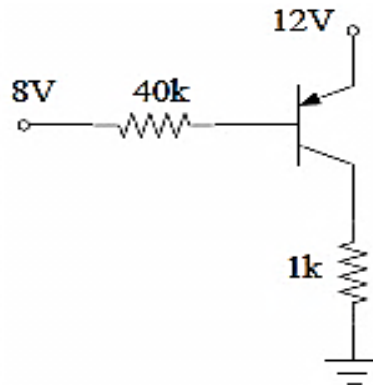
Part B

a. Using Kirchhoff's Current Law (KCL) to calculate the magnitude and direction of the current through all resistors in this resistor network: (Marks: 2x4)

   Note: All current arrows point in the direction of conventional flow.

b. Compute transistor parameters (I_B, I_C, I_E and V_{CE}) for below circuit (Si BJT with $\beta = 100$). (Marks: 2x4)

c. Simplify the following logic functions using Boolean algebra. (Marks: 2x2)

$$\text{i.} \quad \overline{AC} + B\overline{C} + \overline{A}BC + AB\overline{C}$$

$$\text{ii.} \quad \overline{AB}D + AB\overline{C}\overline{D} + ABC\overline{D} + \overline{A}B\overline{D} + \overline{A}BC\overline{D}$$

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