ISLAMIC UNIVERSITY OF TECHNOLOGY (IUT)
ORGANISATION OF ISLAMIC COOPERATION (OIC)

DEPARTMENT OF MECHANICAL AND PRODUCTION ENGINEERING

Mid Semester Examination   Winter Semester, A. Y. 2022-2023
Course No.: ME 4781   Time: 1 Hours 30 Min(s)
Course Title: Automobile Engineering   Full Marks: 75

There are 3 (Three) questions. Answer all the questions.
Marks of each question and corresponding CO and PO are written in brackets.
Do not write on this question paper.

1. a) Write down the definition of an Automobile? Discuss the general layout of an all-wheel   (10)
        drive automobile.   (CO1)
                                                                                                    (PO1)

    b) All modern gas-powered automotive engines use fuel injectors to deliver fuel to the   (15)
        combustion chamber. The typical injector pulse width for an idling engine at normal   (CO1)
        operating temperature is between 2 to 4 milliseconds. How does a fuel injector work to   (PO2)
        deliver the fuel in such a short time? Explanation needs to be based on its conventional
        mechanism with necessary diagram.

2. a) Draw the actual valve timing diagram for both diesel and gasoline engines. Also, answer   (20)
        the following question based on your diagram.   (CO1)
                                                                                                    (PO2)
        i)   Why aren't the valve opening and closing events precisely at TDC (Top Dead
              Center) or BDC (Bottom Dead Center) in the valve timing diagram for both diesel
              and gasoline engines?
        ii)   What factors influence the exact timing of valve events in relation to TDC or
              BDC in these engines?
        iii) Can you explain the concept of valve overlap, and why is it important in the
              operation of both diesel and gasoline engines?
        iv)   How do variations in valve timing affect engine performance, efficiency, and
              emissions in diesel and gasoline engines?

    b) Describe the effects of compression ratio on engine performance? What is the   (5)
        compression ratio of an engine with 63.75-cu.in. displacement in one cylinder   (CO1)
        and a combustion chamber volume of 8.5 cu. in.?   (PO2)

3. a) Draw and explain the construction of a manual five speed transmission gearbox (five   (20)
        forward speeds and one reverse speed). Explain the necessary connecting arrangement for   (PO2)
        achieving the followings:
        i)   Maximum speed
        ii)   Minimum speed
        iii) Reverse speed

    b) Explain the difference among direct drive, under drive and overdrive?   (5)
                                                                                                    (CO2)
                                                                                                    (PO2)