B.TECH.
(SEM V) THEORY EXAMINATION 2022-23
I C ENGINES FUELS & LUBRICATION

Time: 3 Hours   *Total Marks: 100*

Note: Attempt all Sections. If you require any missing data, then choose suitably.

SECTION A

1. **Attempt *all* questions in brief.**   **2x10 = 20**

   (a) Define the term Heat Engine.
   (b) Define the term swept volume.
   (c) Explain the term "Ignition Delay" in CI engines.
   (d) Explain the term "Flame Speed" in SI engines.
   (e) Discuss the injection timings.
   (f) Discuss the term "Stoichiometric Ratio".
   (g) Explain Cetane Number and Diesel Index for fuel.
   (h) Explain performance Number and HUCR for fuel.
   (i) Define stratified charge engine.
   (j) Explain working of Radiator.

SECTION B

2. **Attempt any *three* of the following:**   **10x3 = 30**

   (a) Discuss an expression for thermal efficiency of air standard Diesel Cycle. Also discuss the classification of I C engines.
   (b) Explain with diagram the stages of combustion for SI engine. And discuss about combustion chamber design for SI engine.
   (c) Evaluate the working of MPFI and its different types with the help of neat and clean diagrams.
   (d) Illustrate dopes. Classify some of the additives used for S.I. and C.I. Engines. Also give merit and demerits of additives.
   (e) Summarize the requirements of a good cooling System and compare air and liquid cooling system in brief.

SECTION C

3. **Attempt any *one* part of the following:**   **10x1 = 10**

   (a) An I.C. engine working on Diesel cycle has bore 200 mm, stroke 300 mm. if the clearance volume is 420 cc and fuel injection takes place at the constant pressure for 5% of the stroke, determine the thermal efficiency of the engine. If the cut-off is delayed from 5 to 8% what will be the percentage loss in efficiency in both cases, the compression ratio is the same?

   (b) Compare the diesel, dual and otto cycles for following cases
       (i) Same heat input and compression ratio
       (ii) For constant maximum pressure and same heat input
       (iii) For same maximum pressure and temperature

4.   Attempt any *one* part of the following: **10 x1 = 10**

   (a)   Demonstrate phenomenon of knock in S.I. Engine. Discuss the effects of knock in S.I. engines and methods reduce the detonation.

   (b)   Demonstrate combustion process and its phases in CI engine with neat sketch. Also enlist the affecting factors of flame speed.

5.   Attempt any *one* part of the following: **10x1 = 10**

   (a)   Derive an expression for the calculation of exact A-F ratio when air is considered as incompressible.

   (b)   Derive an expression for the quantity of fuel to be injected per cylinder per cycle for a four-stroke engine in terms of brake specific fuel consumption, B.P. and rpm. Determine the velocity of injection of fuel in solid injection system when the difference in oil pressure and cylinder pressure is 75 bar. Assume the specific gravity of fuel as 0.905 and coefficient of discharge for orifice is 0.86.

6.   Attempt any *one* part of the following: **10x1 = 10**

   (a)   Discuss the alternative fuels for IC engines also discuss the rating for SI engine fuel.

   (b)   Discuss EGR system also demonstrate the working of catalytic convertor with neat sketch.

7.   Attempt any *one* part of the following: **10x1 = 10**

   (a)   Explain the function of lubricants in I.C. Engines. Explain different wet lubricating system with neat sketch.

   (b)   Explain the working of Magneto ignition system with neat sketch also discuss the types of electronic ignition system.