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Name of Examination : **Winter 2020** - (Preview)

Course Code & Course Name : **ME304UB - Professional Elective-I-Internal Combustion Engine**

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Maximum Marks : **60**   Duration : **3 Hrs**

`Edit` `Print` `View Answer Key` `Close` **Answer Key Submission Type:** Marking scheme with model answers and solutions of numerical

Instructions:

1. *All questions are compulsory.*
2. *Illustrate your answer with suitable figures/sketches wherever necessary.*
3. *Assume suitable additional data; if required.*
4. *Use of logarithmic table, drawing instruments and non programmable calculators is allowed.*
5. *Figures to the right indicate full marks.*

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1) a) Derive an expression for efficiency of Otto Cycle and comment on the effect of compression ratio on the efficiency with respect to the ratio of specific heats. [4]

    b) A perfect gas at 1 bar and 290 K temperature undergo an ideal Diesel cycle. The maximum pressure of the cycle is 50 bar. The volume at the beginning of compression is 1 m^3 and after constant pressure heating is 0.1 m^3. Determine the temperature at all salient points of the cycle and also find out cycle efficiency. Take ratio of specific heats as 1.4 for the gas. [6]

    c) i. Define, 1) indicated thermal efficiency, 2) volumetric efficiency. **OR** [2]

       ii. State various losses in the actual cycle as compared to air-standard cycles. [2]

2) a) Explain the construction and operation of a simple carburettor with the help of a neat diagram. [6]

    b) List different types of the nozzle. Explain any two of them with neat sketch. [3]

    c) i. What are the requirements of fuel injection system in CI engines? **OR** [3]

       ii. Describe the valve timing of a four-stroke SI engine with the help of neat sketch. [3]

3) **Solve any four.**

    a) What is the necessity of cooling in IC engines? State different types of liquid cooling systems used in IC engines. [3]

    b) Draw a neat sketch of the Battery Ignition System showing all components. [3]

    c) What is basic difference between wet sump and dry sump lubrication system? Where dry sump lubrication is preferred and why? [3]

    d) What are the purposes of supercharging in IC engines? [3]

    e) Describe the working of 'Centrifugal Advance Mechanism' with neat sketch. [3]

4) **Solve any three.**

    a) Desribe the stages of combistion in CI engines with the help of pressure-crank angle diagram. [4]

    b) List out the requirements of good combustion chamber in SI engines [4]

    c) What are the factors which affect ignition delay period in CI engines? Elaborate. [4]

    d) What are the causes of knock in CI engines? During which part of the combustion process it occurs? How does it can be compared with the timing of knock in SI engine combustion process? [4]

5) **Solve any two**

    a) What is brake power, indicated power and frictional power? List any one method of measurement of each of these. [6]

    b) The following observations were made during the test on an oil engine. [6]

       B.P. of the engine =31.5 kW, Fuel used =10.5 kg/hr., C.V. of fuel = 43000 kJ/kg, Jacket circulating water = 540 kg/hr., Rise in temperature of cooling water = 56° C.

       Exhaust gases are passed through the exhaust gas calorimeter for finding the heat carried away by exhaust gases.

       Water circulated through exhaust gas calorimeter =454 kg/hr.

       Rise in temperature of water passing through exhaust gas calorimeter =36° C.

       Temperature of exhaust has leaving the exhaust gas calorimeter =82° C.

       A/F ratio = 19 : 1, Ambient temperature =17° C, C_p for exhaust gases = 1 kJ/kg-K.

       Draw up the heat balance sheet on minute and percentage basis.

    c) Write short notes on i) BHARAT and EURO Norms, ii) Exhaust Gas Recirculation [6]

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