**INDIAN MARITIME UNIVERSITY**

(A Central University, Government of India)

**End Semester Examinations - June/July 2019**

**M. Tech. (Marine Engineering and Management)**

**Semester-II**

**Design of IC Engines (PG13T1201)**

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**Date: 24-06-2019** **Maximum Marks: 60**

**Time: 3hrs** **Pass Marks: 30**

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**Answer any five questions**

Assume any data if not given with proper justifications.

1. (a) Explain the basic principles of an Internal Combustion Engine with a suitable diagram. 03
   (b) Differentiate between two stroke and four stroke engines. 03
   (c) With a neat diagram explain the principle of a Wankle engine. 06
2. With a chemical combustion equation describe the general combustion theory explaining the following:
   (a) Preparation phase of combustion
   (b) Actual burning phase of combustion
   (c) Normal combustion process
   (d) Abnormal combustion process 3 X 4=12
3. (a) What is auto ignition in a S. I. engine? Discuss thoroughly. 06
   (b) Explain the Detonation phenomena in a S.I. engine. 06
4. (a) Explain a Stratified Charge engine. 06
   (b) Explain ignition delay in C.I. engines. What are the effects of it? 06
5. Why abnormal combustion occurs in C. I. engines? To rectify the abnormal combustion explain different modern designs of c. I. engines and discuss their effectiveness with neat diagrams. 12

6. What are different designs of ignition system in S. I. engines? Explain the Battery or Coil Ignition system with a neat diagram. 12

7. The following observations were recorded in a test of one hour duration on a single cylinder oil engine working on four stroke cycle.

   Bore= 300 mm.
   Stroke= 450 mm
   Fuel used= 8.8 Kg.
   Calorific value of the fuel=41,800 KJ/Kg
   Average speed=200 R.P.M.
   Mean Effective Pressure, M.E.P. = 5.8 bar
   Brake Friction load = 1860 N
   Quantity of cooling water=650 Kg.
   Temperature rise=$22^{o}$ C
   Diameter of the Brake Dynamometer wheel = 1.22 m.
   Calculate:
   (i) Mechanical Efficiency
   (ii) Brake Thermal Efficiency
   (iii) Draw the Heat balance sheet. 12

8. Design the cylinder of an I.C. engine from the following data in connection of an oil engine working on Otto four stroke cycle:
   Brake Power=14.7 KW
   Suction Pressure=0.9 bar
   Mechanical Efficiency=80%
   Compression Ratio=5
   Index of compression curve=1.35
   Index of expansion curve=1.3
   Maximum explosion pressure=24 bar
   Engine speed=1000 R.P.M.
   Stroke (L): Bore(D)=1.5:1
   Select material of cylinder
   Find the diameter, stroke and thickness of cylinder. 12