**20ME504**

**Hall Ticket Number:**

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| **III/IV B.Tech (Regular/Supplementry) DEGREE EXAMINATION** | | | |
| **January, 2024** | **Mechanical Engineering** | | |
| **Fifth Semester** | **IC Engines & Gas Turbines** | | |
| **Time:** Three Hours | | **Maximum:** 70 Marks | |
| ***Answer question 1 compulsory.*** | | | **(14X1 = 14Marks)** |
| ***Answer one question from each unit.*** | | | **(4X14=56 Marks)** |
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|  |  |  | CO | BL | M |
| 1 | a) | Explain TDC and BDC applied to IC engine | CO 1 | L1 | 1M |
|  | b) | State the Advantages of liquid fuels | CO 1 | L1 | 1M |
|  | c) | What is the need of carburetor? | CO 1 | L2 | 1M |
|  | d) | What is the working principle of MPFI in SI engine? | CO 1 | L1 | 1M |
|  | e) | Why abnormal combustion occurs at the end of combustion in SI engines? | CO 2 | L1 | 1M |
|  | f) | What is Cetane number? | CO 2 | L1 | 1M |
|  | g) | Define specific fuel consumption? | CO 2 | L1 | 1M |
|  | h) | Define volumetric efficiency in reciprocating compressor | CO 3 | L1 | 1M |
|  | i) | Explain working principle of axial flow compressor | CO 3 | L1 | 1M |
|  | j) | Explain about choking in rotary compressors | CO 3 | L1 | 1M |
|  | k) | Write any two advantages of closed cycle gas turbine | CO 4 | L2 | 1M |
|  | l) | Define isentropic efficiency of compressor | CO 4 | L1 | 1M |
|  | m) | Define propulsive efficiency of a jet engine | CO 4 | L1 | 1M |
|  | n) | Write the working principle of rocket propulsion | CO 4 | L1 | 1M |
| **Unit-I** | | | | | |
| 2 | a) | Explain the difference between theoretical and actual valve timing diagrams of a four-stroke diesel engine with suitable diagrams | CO 1 | L2 | 7M |
|  | b) | Explain the reasons for looking for alternate fuels for IC Engins. | CO 1 | L2 | 7M |
| **(OR)** | | | | | |
| 3 | a) | Explain Air-Fuel mixture requirements in SI Engine and Explain the working of simple carburetor | CO 1 | L1 | 7M |
|  | b) | Explain CRDI system in CI engine | CO 1 | L2 | 7M |
| **Unit-II** | | | | | |
| 4 | a) | What is knocking SI engine? Discuss the factors affecting knocking | CO 2 | L1 | 7M |
|  | b) | Explain about the Turbocharger in CI engine | CO 2 | L1 | 7M |
| **(OR)** | | | | | |
| 5 | a) | Explain briefly about heat balance sheet in four stroke SI Engine | CO 2 | L2 | 7M |
|  | b) | A single cylinder 4-stroke IC engine has a bore=180 mm and stroke=260mm with an imep=8.4 bar, while running at 480 rpm. Brake Torque in the test =254 N-m, Take calorific value of fuel is 44000 kJ/kg & air fuel ratio 18. Determine 1. Mechanical Efficiency 2. Brake thermal efficiency 3. Indicated thermal efficiency 4. Brake specific fuel consumption | CO 2 | L3 | 7M |
| **Unit-III** | | | | | |
| 6 | a) | Derive the expression for optimum intermediate pressure in two-stage reciprocating compressor | CO 3 | L2 | 7M |
|  | b) | Derive the expression for indicated work of a reciprocating air compressor with clearance | CO 3 | L2 | 7M |
| **(OR)** | | | | | |
| 7 | a) | Explain the working of centrifugal compressor with a neat sketch | CO 3 | L2 | 7M |
|  | b) | Differentiate between reciprocating and rotary compressors | CO 3 | L2 | 7M |
| **Unit-IV** | | | | | |
| 8 | a) | Explain the working of intercooling in gas turbine with the help of T-s diagram | CO 4 | L2 | 7M |
|  | b) | A gas turbine takes in air at 18 °C and 1 bar. The pressure ratio is 6. The maximum temperature of the cycle is 730 °C. The efficiencies of turbine and compressor are 0.82 and 0.86 respectively. Find compressor work, turbine work, work ratio and overall efficiency. Assume γ = 1.4, Cp = 1.0 kJ/kg.K for air and γ = 1.3, Cp = 1.1 kJ/kg.K for gases, Neglect the mass of fuel | CO 4 | L2 | 7M |
| **(OR)** | | | | | |
| 9 | a) | Explain the working of turbo jet with a neat sketch | CO 4 | L2 | 7M |
|  | b) | Explain the working of any rocket propulsion with a neat sketch | CO 4 | L2 | 7M |

