Printed Page:- 04 **Subject Code:-** AMTME0118

Roll. No:

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute Affiliated to AKTU, Lucknow)

M.Tech

SEM: I - CARRY OVER THEORY EXAMINATION - JUNE **2023**

Subject: Advanced I.C. Engines

Time: 3 Hours **Max. Marks: 70**

General Instructions:

IMP: *Verify that you have received the question paper with the correct course, code, branch etc.*

1. *This Question paper comprises of* **three Sections -A, B, & C.** *It consists of Multiple Choice Questions (MCQ's) & Subjective type questions.*

2. *Maximum marks for each question are indicated on right -hand side of each question.*

3. *Illustrate your answers with neat sketches wherever necessary.*

4. *Assume suitable data if necessary.*

5. *Preferably, write the answers in sequential order.*

6. *No sheet should be left blank. Any written material after a blank sheet will not be evaluated/checked.*

SECTION A **15**

1. Attempt all parts:-

1-a. In loop scavenging, the top of the piston is ..... (CO1) 1

(a) Flat

(b) Contoured

(c) Slanted

(d) Depressed

1-b. Detonation is harmful due to .....(CO2) 1

(a) Increase in the rate of heat transfer, there is a reduction in the power output and efficiency of the engine

(b) Excessive turbulence which removes most of the insulating gas boundary layer from the cylinder walls

(c) High intensity of knock causes crankshaft vibration and the engine runs rough

(d) None of the above

1-c. The operation of forcing additional air under pressure into the engine cylinder is known as (CO3) 1

(a) Supercharging

(b) Carburetion

(c) Turbulence

(d) Delay period

1-d. Pour point of fuel oil is the..... (CO4) 1

(a) Minimum temperature to which oil is heated in order to give off inflammable vapours in sufficient quantity to ignite momentarily when brought in contact with a flame

(b) Temperature at which it solidifies or congeals

(c) It catches fire without external aid

(d) Indicated by 90% distillation temperature i.e., when 90% of sample oil has distilled off

1-e. What is a dual fuel engine? (CO5) 1

(a) The engine which uses gaseous and liquid fuel

(b) The engine which uses two liquid fuels

(c) The engine which uses two gaseous fuels

(d) The engine which uses one liquid and any other fuel

2. Attempt all parts:-

2.a. A single cylinder S.I. engines use oil of CV = 42500 kJ/kg. Its brake thermal efficiency is 30% and mechanical efficiency is 80%. Find specific fuel consumption on IP and BP basis. (CO1) 2

2.b. What is the Knock Limited Parameters? (CO2) 2

2.c. What are the supercharging effects on engine performance? (CO3) 2

2.d. Write the advantage and disadvantage of alcohol as a fuel? (CO4) 2

2.e. Describe the operation of E-turbocharger. (CO5) 2

SECTION B **20**

3. Answer any <u>five</u> of the following:-

3-a. Why do multicylinder engines require richer mixture than single cylinder engine? (CO1) 4

3-b. Find the percentage loss in ideal efficiency of a Diesel engine with compression ratio 15, by delaying the fuel cut-off from 5% to 8% of the stroke. (CO1) 4

3-c. What are the requirements of a good combustion chamber is S.I. engines? (CO2) 4

3-d. Give the detailed comparison of combustion phenomenon in CI and SI engine. 4

(CO2)

3.e. Explain with the help of pressure vs crank angle diagram of different combustion stages in C. I. engine. What is the importance if ignition delays? (CO3) 4

3.f. Write a short note on carbon monoxide emissions? (CO4) 4

3.g. What is VC turbo engine? (CO5) 4

SECTION C **35**

4. Answer any <u>one</u> of the following:-

4-a. The airflow to a four-cylinder, four-stroke oil engine is measured by a 5 cm diameter orifice having a coefficient of discharge of 0.6. The engine having bore 10 cm and stroke 12 cm runs at 1200 r.p.m. Pressure drop across orifice is 4.6 cm of water and, ambient temperature and, pressure are 17^0C and 1 bar respectively. calculate the volumetric efficiency based on free air condition. (CO1) 7

4-b. A petrol engine uses a fuel of calorific value 42000 kJ/kg. The compression and expansion curves follow the law $pv^{1.3}$= constant. At 25% and 75% of the stroke on the compression curve, the pressure are found to be 2 bar and 5.2 bar respectively. If the relative efficiency of the engine on IP basis is 50% and mechanical efficiency is 75%, find the specific fuel consumption on B.P basis. (CO1) 7

5. Answer any <u>one</u> of the following:-

5-a. Classify the combustion chambers of C.I. engines. Explain with neat sketch the working of "M" combustion chamber. (CO2) 7

5-b. Enlist the methods of controlling diesel knock. Discuss any three of them.(CO2) 7

6. Answer any <u>one</u> of the following:-

6-a. Write the short notes on following- 7
(i) Mist lubrication system (ii) Crankcase ventilation. (CO3)

6-b. What are some fundamental principles or ways to increase the power output of an internal combustion engine? (CO3) 7

7. Answer any <u>one</u> of the following:-

7-a. Explain the advantages and disadvantages of Hydrogen, gasoline and methanol and how they influence the combustion and emissions. (CO4) 7

7-b. What do you understand by terms "Dopes & Additives"? Why these are using in engine fuels? (CO4) 7

8. Answer any <u>one</u> of the following:-

8-a.	Describe the concept of a HCCI system with a neat sketch. (CO5)	7
8-b.	Elaborate Gas Propulsion System with a diagram? (CO5)	7