Total No. of Questions: 6 *Total No. of Printed Pages:3*

Enrollment No.....

Faculty of Engineering

End Sem (Even) Examination May-2022

ME3CO15 I. C. Engines

Programme: B.Tech. Branch/Specialisation: ME

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

Note: All questions are compulsory. Internal choices, if any, are indicated. Answers of Q.1 (MCQs) should be written in full instead of only a, b, c or d.

Q.1 i. If the temperature of intake air in internal combustion engine increases, then its efficiency will- **1**

(a) Remain same (b) Decrease (c) Increase (d) None of these

ii. The mean effective pressure obtained from engine indicator indicates- **1**

(a) The maximum pressure developed

(b) The minimum pressure

(c) The instantaneous pressure at any instant

(d) The average pressure

iii. What happen when cooling water temperature in petrol engine is increased? **1**

(a) Knocking tendency decrease

(b) Knocking tendency remains unaffected

(c) Knocking tendency increases

(d) Unpredictable

iv. For a petrol engine of a vehicle, the air-fuel ratio for maximum power generation is of the order of- **1**

(a) 8:1 (b) 12:1 (c) 16:1 (d) 20:1

v. The probability of knocking in diesel engines is increased by- **1**

(a) High self- ignition temperature (b) Low volatility

(c) Higher viscosity (d) All of these

vi. The factors affecting combustion in CI engine are- **1**

(a) Ignition quantity of fuel

(b) Injection pressure of droplet size

(c) Injection advance angle

(d) All of these

P.T.O.

vii. Which of the method(s) is(are) used to measure friction power of engine? **1**
(a) Willian's line method (b) Motoring Test
(c) Both (a) and (b) (d) None of these

viii. Choose the correct method(s) for the measurement of emission is/are- **1**
(a) Flame ionisation detector (b) Gas chromatography
(c) Spectroscopic analysers (d) All of these

ix. The centrifugal type of supercharger is preferable only for- **1**
(a) Low speeds (b) High speeds
(c) High pressure (d) None of these

x. Cooling after compression is necessary to- **1**
(a) Increase the density of air
(b) Reduce engine operating temperatures
(c) Both (a) and (b)
(d) Increase exhaust temperature

Q.2 i. Define the following: **2**
(a) Homogeneous charged Engine
(b) Heterogeneous charged engine

ii. Give any three differences between air standard cycle and fuel air cycle. **3**

iii. What is the effect of % change in the efficiency of Otto cycle having a compression ratio of 7, if the specific heat at constant volume increased by 1%? **5**

OR iv. An air standard Otto cycle CR of 8 and temperature and pressure at the beginning of compression are 20^{o} C and 1 Bar respectively. The constant volume heat addition is 1800 kJ/kg. Calculate the maximum temperature and pressure for the cycle and the temperature at the end of the expansion process. What is the efficiency and mean effective pressure of the cycle? **5**
Take $C_v = 0.718$ and $C_p / C_v = 1.4$.

Q.3 Attempt any two:

i. Explain any five effect of engine variable on flame propagation. **5**

ii. Discuss any five effect of engine variable on ignition lag. **5**

iii. Discuss stages of combustion of SI engine in detail with diagram. **5**

Q.4 i. Define the following: **2**
(a) Physical delay (b) Chemical delay

ii. Explain the phenomena of knocking in diesel engine. Compare the knocking of petrol and diesel engine (any four). **8**

OR iii. What do you mean by DI and IDI engine? Why pre-combustion chambers are used in diesel engine. Support your answer with proper explanation and diagram. **8**

Q.5 i. Explain the Morse test and Motoring test. **4**

ii. Write the name of any four performance parameters of an engine and explain any one of them. **6**

OR iii. A four-stroke cycle petrol engine has six single acting cylinders of 7.5 cm bore and 9 cm stroke. The engine is coupled to a brake having a torque arm radius of 38 cm. at 3300 rev / min, with all cylinders operating the net brake load is 324 N. When each cylinder in turn is rendered inoperative, the average net brake load produced at the same speed by the remaining five cylinders is 245 N. estimate the indicated mean effective pressure of engine. **6**
With all cylinders operating the fuel consumption is 0.3 Kg/min, fuel calorific value is 42000 kJ/kg; the jacket water flow rate and temperature rise are 65 kg/ min. and 12^{o} C. on test, the engine is enclosed in a thermally and acoustically insulated box, through which the output drive, water, fuel, air and exhaust connections pass. Ventilating air blown up through the box at the rate of 14 kg/min enters at 10^{o} C and leaves at 55^{o} C. Draw up a heat account of the engine, stating the items as a percentage of the fuel.

Q.6 i. Give the brief explanation of the effect of supercharging on performance of the engine. **4**

ii. Draw the main four types of arrangement of supercharging and explain any one of them. **6**

OR iii. Explain the Vanes blower and Roots Blower with neat diagram. **6**

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Marking Scheme - ME3CO15 I. C. Engines

Q.1	i.	If the temperature of intake air in internal combustion engine increases, then its efficiency will- (b) Decrease		**1**
	ii.	The mean effective pressure obtained from engine indicator indicates- (d) The average pressure		**1**
	iii.	What happen when cooling water temperature in petrol engine is increased? (c) Knocking tendency increases		**1**
	iv.	For a petrol engine of a vehicle, the air-fuel ratio for maximum power generation is of the order of- (b) 12:1		**1**
	v.	The probability of knocking in diesel engines is increased by- (d) All of these		**1**
	vi.	The factors affecting combustion in CI engine are- (d) All of these		**1**
	vii.	Which of the method(s) is(are) used to measure friction power of engine? (c) Both (a) and (b)		**1**
	viii.	Choose the correct method(s) for the measurement of emission is/are- (d) All of these		**1**
	ix.	The centrifugal type of supercharger is preferable only for- (a) Low speeds		**1**
	x.	Cooling after compression is necessary to- (c) Both (a) and (b)		**1**
Q.2	i.	Define the following:		**2**
		(a) Homogeneous charged Engine	1 mark	
		(b) Heterogeneous charged engine	1 mark	
	ii.	Any three differences, 1 mark for each	(1*3) marks	**3**
	iii.	As per solution & explanation	5 marks	**5**
OR	iv.	As per solution & explanation	5 marks	**5**
Q.3		Attempt any two:		
	i.	Any five effect of engine, 1 mark each	(1*5) marks	**5**
	ii.	Any five effect of engine variable	(1*5) marks	**5**
	iii.	Stages of combustion of SI engine	3 marks	**5**
		Diagram	2 marks	
Q.4	i.	Define the following:		**2**
		(a) Physical delay	1 mark	
		(b) Chemical delay	1 mark	
	ii.	Explain the phenomena of knocking	4 marks	**8**
		Any 4 points for compare	4 marks	
OR	iii.	Mean by DI and IDI engine	(2+2) marks	**8**
		Pre-combustion chambers - explanation	2 marks	
		Diagram	2 marks	
Q.5	i.	Explain the Morse test	2 marks	**4**
		Explain the Motoring test	2 marks	
	ii.	At least four performance parameters	2 marks	**6**
		Explain any one of them	4 marks	
OR	iii.	As per solution & explanation	6 marks	**6**
Q.6	i.	Any 4 parameters and explanation	(1*4) marks	**4**
	ii.	Main four types of arrangement	(1*4) marks	**6**
		Explain any one of them	2 marks	
OR	iii.	Vanes blower		**6**
		Explanation	2 marks	
		Diagram	1 mark	
		Roots Blower		
		Explanation	2 marks	
		Diagram	1 mark	

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