Sanjay Ghodawat University, Kolhapur

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2020-21

EXM/P/09/00

Year and Program: TY B.TECH	**School of Technology**	**Department: Mechanical Engineering**
Course Code: MET 306	**Course Title: Internal Combustion Engines**	**Semester : VI**
Day and Date:	**End Semester Examination**	**Time : 2 Hrs.** **Max Marks : 50**

Instructions: 1) All Questions are compulsory.

Q.1		**Answer/Solve the following (any Two)**	**Marks**	**Bloom's Level**	**CO**
	a)	Derive an expression for the efficiency of Otto cycle and comment on the effect of compression ratio on the efficiency with respect of ratio of specific heats.	8	02	306.1
	b)	A simple jet carburetor is required to supply 5 kg of air and 0.5 kg of fuel per minute. The fuel specific gravity is 0.75. The air is initially at 1 bar and 300 K. Calculate Throat Diameter of the choke for a flow velocity of 100 m/s. Velocity coefficient is 0.8. If the Pressure drop across the fuel metering orifice is 0.80 of that of the choke, calculate orifice diameter assuming, C_{df} = 0.60 and Υ = 1.4	8	03	306.2
	c)	An oil engine work on the ideal diesel cycle. The overall compression ratio is 18:1 and the constant pressure energy addition ceases at 10% of the stroke. Intake conditions are 1 bar and 20 ^{o}C. The engine uses 100 m^3 of air / hr. If ratio of specific heats is 1.4, determine : i) The maximum temperature and pressure in the cycle ii) The thermal efficiency of the engine.	8	03	306.2
Q.2		**Answer/Solve the following (any two)**			
	a)	Explain with neat sketches requirements of combustion chambers of S.I. Engines and its types.	8	02	306.3
	b)	Explain briefly the process of combustion in C.I. Engines with various stages of combustion.	8	02	306.3
	c)	Explain the phenomenon of knock in CI engines and compare it with SI engine knock.	8	02	306.3

Q.3		Answer/Solve the following (any two)			
	a)	The following observations were made during a trail of a single-cylinder, four stroke cycle gas engine having cylinder diameter of 18 cm and stroke 24 cm. Duration if trail = 30 min Total number of revolution = 9000 Total number of explosion = 4500 Mean effective pressure = 5 bar Net load on the brake wheel = 40 kg Effective diameter of brake wheel = 1 m Total gas used at NTP = 2.4 m^3 Calorific value of gas at NTP = 19 MJ / m^3 Total air used = 36 m^3 Pressure of air = 720 mm Hg Temperature of air = 17 ^oC Density of air at NTP = 1.29 kg / m^3 Temperature of exhaust gas = 1 kJ / Kg K Cooling water circulated = 80 kg Rise in temperature of cooling water = 30 ^oC Draw up a heat balance sheet and estimate the mechanical and indicated thermal efficiencies of the engines. Take R = 287 J / kg K.	9	03	306.4
	b)	Explain with neat sketch catalytic converters helps in reducing HC, CO, NO_x emissions.	9	02	306.5
	c)	An eight-cylinder, four-stroke engine of 9 cm bore and 8 cm stroke with a compression ratio of 7 is tested at 4500 rpm on a dynamometer which has 54 cm arm. During a 10 minutes test the dynamometer scale beam reading was 42 kg and the engine consumed 4.4 kg of gasoline having a calorific value of 44000 kJ / kg. Air 27 ^oC and 1 bar was supplied to the carburetor at the rate of 6 kg / min. Find i) The brake mean effective pressure ii) The brake specific fuel consumption iii) The brake specific air consumption iv) The brake thermal efficiency v) The volumetric efficiency vi) The air-fuel ratio.	9	03	306.4

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