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P.E.S. College of Engineering, Mandya - 571 401

(An Autonomous Institution affiliated to VTU, Belagavi)
Fourth Semester, B.E. - Automobile Engineering
Semester End Examination; August - 2023
Automotive Engines and Components

Time: 3 hrs   *Max. Marks: 100*

Course Outcomes

The Students will be able to:
CO1: Classify Heat engine and Analyze actual working principle of Heat engines.
CO2: Analyze engine block and its auxiliaries and Determine major dimensions of the same.
CO3: Analyze Piston-rings-pin and Determine major dimensions of the same.
CO4: Analyze Connecting rod, crank shaft & Flywheel. Determine major dimensions of the same.
CO5: Analyze valve operating mechanism and Determine major dimensions of the same. Study of engine components of state of the art technologies.

<u>*Note:*</u> *I) PART - A is compulsory. Two marks for each question.*
  II) PART - B: Answer any <u>Two</u> sub questions (from a, b, c) for a Maximum of 18 marks from each unit.
  III) Use of Design Data Hand Book is permitted.

Q. No.	Questions	Marks	BLs	COs	POs
	I : PART - A	**10**			
1 a.	A Two stroke cycle engine _____ as compared to a Four stroke cycle engine of the same size because there will be _____ for each _____.	2	L1	CO1	PO1
b.	Interiors of the engine manifolds are generally made _____, but more of this _____ shall increase _____ to the mixture flow.	2	L1	CO2	PO1
c.	Two types of the rings in the piston are_____ and _____ and Gudgeon pin in a piston is held in position by a _____.	2	L1	CO3	PO1
d.	In a _____ forged Connecting rod, length between _____ and _____ axis is the proper measurement of the Connecting rod length.	2	L1	CO4	PO1
e.	In a four stroke cycle engine, usually, each cylinder has a minimum of _____ and _____ valves and a maximum of _____ and _____ valves.	2	L1	CO5	PO1
	II : PART - B	**90**			
	UNIT - I	**18**			
2 a.	Explain with simple sketches, the ACTUAL working principle of a 4 stroke CI Engine, duly mentioning the actual valve timing diagram and P-V diagram.	9	L2	CO1	PO1
b.	Explain with simple sketches, the working principle of a 2 stroke 3 port engine, duly mentioning the port timing diagram and P-V diagram.	9	L1		PO1

c.	Compare SI and CI Engines based on; Basic cycle, Fuel and Introduction of fuel, ignition, Compression Ratio Range, Speed, Efficiency, Weight, Combustion, Two Stroke operation, A/F Ratio, Very high power, Super Charging.	9	L2	PO1

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UNIT - II   **18**

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3 a.	Explain with neat sketch,				
	i) Cylinder wear due to abrasion, erosion and corrosion	9	L2		PO1
	ii) Guarding Against Cylinder Distortion				
b.	Sketch and explain the following:				
	i) Separate and integral cylinder heads	9	L1	CO2	PO1
	ii) Dry liner and wet liner				
c.	What are the general types of Mufflers used in automobiles? Sketch and explain, the construction and working of any one type of exhaust mufflers used in an automobile	9	L1		PO1

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UNIT - III   **18**

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4 a.	What do you mean by piston slap and piston clearance? With neat sketches, explain any one method each for preventing the same.	9	L2	PO1
b.	Sketch and explain about typical temperature distribution in pistons.	9	L2	PO1
c.	Design a cast iron piston for a single acting IC Engine from the following data, Assume Missing data, if any			

Diameter of cylinder Bore = 250mm

Maximum explosion pressure = $4.91 N/mm^2$

Permissible stress for CI Engine = $39.24 N/mm^2$

Permissible stress for piston ring = $98.1 N/mm^2$

Radial wall pressure = $0.04 N/mm^2$

Permissible bearing pressure for pin = $19.62 N/mm^2$

Permissible bending stress in pin = $63.77 N/mm^2$

CO3	
9 L3	PO1,2

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UNIT - IV   **18**

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5 a	Explain with neat sketches,			
	i) Different arrangements of connecting piston and connecting rod	9	L1	PO1
	ii) Construction and function of a vibration damper.			
b.	Design a connecting rod for four stroke petrol engine with the following data:		CO4	
	Diameter of piston = 88 mm;	9	L3	PO1,2
	Stroke =125 mm;			

Weight of reciprocating parts = 15.696 N

Length of connecting rod centre to centre = 300 mm;

R.P.M. = 2200 with possible over speed of 3000

Compression ratio = 6.8:1,

Probable maximum explosion pressure (assumed shortly after dead centre, say when, =3°) = 3.4335 N/mm^2

Assume any further data required for the design.

c   A force of 117.720kN acts tangentially on the crankpin of an overhang crank. The axial distance between the centre of the crankshaft journal and the crankpin is 400 mm and the crank is 500 mm long. Determine,

(i) Diameter and length of the crankpin journal,

(ii) Diameter of the shaft journal, from the following data:

9	L3	PO1,2

Safe bearing pressure   = 5.91N/mm^2

Bending stress   = 63.77N/mm^2

Principal stress in the shaft journal = 63.77N/mm^2

UNIT - V   **18**

6 a.   Classify Mechanisms with side camshaft and and Mechanisms with overhead camshaft. Sketch and briefly explain any one in each group.   9   L1   PO1

   b.   Explain with sketch, the different Camshaft drives along with their limitations and benefits.   9   L1   CO5   PO1

   c.   Why is the Morse test not suitable for a single cylinder engine? Describe the method of finding friction power using Morse test?   9   L1   PO1

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