

**P.E.S. College of Engineering, Mandya - 571 401***(An Autonomous Institution affiliated to VTU, Belagavi)***Fifth Semester, B.E. - Automobile Engineering****Semester End Examination; Feb. - 2021****Automotive Fuels and Combustion**

Time: 3 hrs

Max. Marks: 100

Course Outcomes*The Students will be able to:**CO1: Explain available energy sources for I.C. Engines & discuss their advantages and limitation; Explain refining process of petroleum and their by-products and their properties.**CO2: Determine A/F ratio for any given fuel & Rating of SI and CI Engine fuels.**CO3: Analyze the combustion phenomena of SI & CI Engine.**CO4: Explain recent developments in the field of I.C. Engines.**CO5: Explain the constructional and working principle of multi and dual fuel Engine and their advantages and limitation.***Note: I) PART - A is compulsory. Two marks for each question.****II) PART - B: Answer any Two sub questions (from a, b, c) for Maximum of 18 marks from each unit.**

Q. No.	Questions	Marks	BLs	COs	POs
I : PART - A		10			
I a.	Briefly explain the various forms of coal.	2	L2	CO1	PO1
b.	Illustrate the structure of the <i>n</i> butane and iso octane with their general formula.	2	L2	CO2	PO2
c.	List the detection of detonation methods.	2	L1	CO3	PO3
d.	List the knock control methods in a dual fuel engines.	2	L1	CO4	PO1
e.	What are the methods of charge stratification?	2	L2	CO5	PO2
II : PART - B		90			
UNIT - I		18			
1 a.	Draw the <i>P-V</i> and <i>T-S</i> diagram for Otto cycle and derive an expression for thermal efficiency.	9	L2	CO1	PO1
b.	Discuss the need of renewable sources of energy and explain in brief any two types.	9	L1	CO1	PO1
c.	Compare the Otto, Diesel and Dual Combustion cycle.	9	L4	CO1	PO1
UNIT - II		18			
2 a.	Describe the process of petroleum refining.	9	L1	CO2	PO2
b.	Discuss briefly the following properties of fuels:				
	i) Calorific value	9	L2	CO2	PO1
	ii) Specific gravity				
	iii) Cloud and Pour point				
c.	Discuss the carbon residue, diesel index Ash content determination of fuels.	9	L2	CO2	PO2

UNIT - III**18**

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| 3 a. | What is Octane number? Explain the Octane Number Requirement (ONR). | 9 | L2 | CO3 | PO3 |
| b. | Explain the stage of combustion in SI Engine with neat sketch. | 9 | L2 | CO3 | PO2 |
| c. | What is meant by delay period? Explain in detail, the variables affecting the delay period in CI engine. | 9 | L2 | CO3 | PO2 |

UNIT - IV**18**

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| 4 a. | With neat sketch, explain the construction and working of dual fuel engine. | 9 | L2 | CO4 | PO3 |
| b. | Explain the different characteristics of multi fuel engine. | 9 | L2 | CO4 | PO2 |
| c. | List the advantages of dual fuel engines over a diesel engine. | 9 | L3 | CO4 | PO1 |

UNIT - V**18**

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|------|---|---|----|-----|-----|
| 5 a. | List the advantages and disadvantages and applications of VCR engine. | 9 | L1 | CO5 | PO1 |
| b. | Sketch and explain the prechamber stratified charge engine. | 9 | L3 | CO5 | PO2 |
| c. | Write a short note on multi cycle engines. | 9 | L2 | CO5 | PO1 |

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