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

(An Autonomous Institution affiliated to VTU, Belagavi)

Eighth Semester, B.E. - Automobile Engineering

Semester End Examination; July - 2021

Automotive Air Pollution and Control

Time: 3 hrs *Max. Marks: 100*

***Note**: Answer any **FIVE** full questions.*

1	a.	Explain the formation of nitrogen oxides that takes place during combustion. Also analyze the effect of ignition timing and humidity on the formation of nitrogen oxides.	8
	b.	Clarify the flame quenching effect on hydrocarbon emissions with the help of suitable sketch.	6
	c.	Infer the soot formation mechanisms and suggest some important reasons.	6
2	a.	Summarize the formation of crankcase blow by emissions in a vehicle and with neat sketch describe the construction and working of closed positive crankcase ventilation system.	8
	b.	Explain the reasons for evaporate emission in a petrol engine powered vehicle.	4
	c.	What is UBHC? Determine the reasons both in SI and CI engines.	8
3	a.	Recommend some measures to control the emission pollutants in SI and CI engines. Explain any two in detail.	8
	b.	Illustrate the impact of following factors to control diesel engine emissions: i) Advance injection ii) Turbulence iii) Temperature	6
	c.	What is meant by lean burn strategy and how will it helpful to avoid the pollution?	6
4	a.	Explain the exhaust gas recirculation system with supporting diagram.	8
	b.	Discuss the effect of compression ratio, variable swept volume, equivalence ratio and combustion chamber shape on emission in SI engine.	8
	c.	Brief the impact of turbo charging and electronic fuel injection systems on emission.	4
5	a.	What is pollution? What are the major pollutants and their effects on; i) Human life ii) Animals iii) Plant life iv) Environment	10
	b.	Discuss the effect of the following petrol fuel properties on emission: i) Aromatic contents ii) Viscosity and density iii) Octane number iv) Sulphur content	10
6	a.	Describe the effects of following on pollution: i) Volatility of fuels ii) Alternative fuels iii) Mis-fueling iv) Carbon content	8
	b.	Enlist the major motor gasoline properties. Summarize the effects of reformulated gasoline and lubricants on emission.	8

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	c.	Discuss the harmful effects of the following on human health: i) Lead ii) NOx	4
7	a.	Explain the construction and working of NDIR analyzer with a neat sketch.	8
	b.	What is smoke analysis? Explain any one method with the help of suitable diagram.	8
	c.	Define driving cycle. Explain European cycles in brief.	4
8	a.	With the help of neat sketch, describe the working of a FID analyzer.	8
	b.	Illustrate the Chemiluminesecent analyser with a neat sketch.	8
	c.	Discuss the emission standard for motor cycles and heavy duty vehicles.	4
9	a.	What is post combustion treatment? What is the necessity? Write a note on available options for exhaust treatment.	8
	b.	With schematic diagram, explain the working of thermal reactor for HC and CO oxidation.	8
	c.	Mention the merits and demerits of catalytic converter.	4
10	a.	With neat sketch, explain the working of ceramic honeycomb (monolith) type catalytic converter.	10
	b.	Briefly explain the diesel trap oxidizer and selective catalytic reduction with suitable sketch.	10

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