Register Number:……..

KUMARAGURU
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**B.E DEGREE EXAMINATIONS: NOV/DEC 2022**

(Regulation 2018)

Seventh Semester

**AUTOMOBILE ENGINEERING**

U18AUT7002 : Automotive Emissions

**COURSE OUTCOMES**

**CO1:** Outline the impact of pollutants on global environment and its climatic change
**CO2:** Examine the emission formation mechanisms and techniques to minimize emissions
**CO3:** Describe automotive emission control technologies.
**CO4:** Familiarise about emission standard, measurement, test procedure and regulations
**CO5:** Identify the wastes produced from automobiles.
**CO6:** Explain the available disposal methods of waste.

**Time: Three Hours**

**Answer all the Questions:-**
**PART A (10 x 2 = 20 Marks)**
**(Answer not more than 40 words)**

| | | | |
|---|---|---|---|
| 1. | Differentiate between regulated and unregulated emissions of IC engines. | CO1 | [$K_2$] |
| 2. | Compare BS-VI and euro VI emission norms. | CO1 | [$K_2$] |
| 3. | Explain crevice volume in the SI engine. | CO2 | [$K_3$] |
| 4. | Define Zeldovich mechanism | CO2 | [$K_2$] |
| 5. | What is the difference between smoke and soot? | CO3 | [$K_2$] |
| 6. | If the engine speed is increased, what happens to the emission concentration? | CO3 | [$K_3$] |
| 7. | Justify why light off temperature is required for the catalytic converter. | CO4 | [$K_3$] |
| 8. | Identify the mechanism used to measure CO and $CO_2$ emissions. | CO4 | [$K_1$] |
| 9. | What do meant by electric wastes? | CO5 | [$K_1$] |
| 10. | List any four automotive wastes. | CO6 | [$K_1$] |

**Answer any FIVE Questions:-**
**PART B (5 x 16 = 80 Marks)**
**(Answer not more than 400 words)**

| | | | | | |
|---|---|---|---|---|---|
| 11. | a) | List the different types of IC engine emissions and explain their formation mechanism. | 10 | CO1 | [$K_2$] |
| | b) | Identify the hazardous effects of emissions on humans and the environment. | 06 | CO1 | [$K_2$] |

| | | | | | |
|---|---|---|---|---|---|
| 12. | | Explain in detail the operating and design variables that affect the HC and NOx formation in SI engines. Discuss the optimum operation for minimum emission. | | CO2 | [$K_3$] |
| 13. | a) | Justify the reason for higher particulate matter emission in CI engines. Also briefly explain particulate matter formation with a neat sketch | 14 | CO2 | [$K_4$] |
| | b) | List the different types of NOx emissions. | 02 | CO2 | [$K_1$] |
| 14. | a) | Explain with a neat sketch the Exhaust Gas Recirculation technique and discuss its limitations. | 12 | CO3 | [$K_2$] |
| | b) | Write a short note on DPF. | 04 | CO3 | [$K_1$] |
| 15. | a) | Illustrate with a neat sketch Chemiluminescent analyzer. Identify which emission it is used to measure. | 10 | CO4 | [$K_3$] |
| | b) | Explain with a neat sketch working of the smoke meter | 06 | CO4 | [$K_3$] |
| 16. | a) | What is tire waste? How tires can be recycled? | 06 | CO5 | [$K_3$] |
| | b) | Explain in detail any one battery recycling process. | 10 | CO6 | [$K_2$] |

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**Please indicate knowledge level ($K_1$to$K_6$) and Course Outcome level (CO1 to CO5) against each question for each subdivision.**