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M.E. / M.TECH. DEGREE EXAMINATIONS, MAY/JUNE 2017

FIRST SEMESTER

INTERNAL COMBUSTION ENGINEERING

IC16001 – ENGINE POLLUTION AND CONTROL

(Regulation 2016)

Q. Code: 741743

Time: Three Hours

Maximum : 100 Marks

Answer ALL questions

PART A - (10 X 2 = 20 Marks)

1. What is photochemical smog?
2. State the causes of “white smoke” from I.C.Engines.
3. How does “surface to volume ratio” in S.I.Engine combustion chamber affect HC and NO_x formation?
4. Define “Diesel NO_x – Particulate Trade off”.
5. Expand the following acronym with regard to engine pollution measurement:
(i) CVS (ii) FID
6. Define “Smoke Opacity”.
7. State how does valve overlap affects S.I.Engine NO_x and HC emissions.
8. What is SCR in diesel engine emission control? Give an example.
9. What is a driving cycle? Give its significance in emission measurement.
10. Give the two different units of engine emissions and state why are these two units followed?

PART B - (5 X16 = 80 Marks)

11. (a) Present an overview of atmospheric pollution by automotive engines, (16)
stationary engines and gas turbines.

(OR)

- (b) Discuss in detail the effect of following engine emissions on health and environment:

- (i) Carbon monoxide (8)
- (ii) Nitrogen Oxides (4)
- (iii) Ozone (4)

12. (a) Explain the formation of HC emissions in S.I.Engines by the following sources:
- (i) Flame quenching (8)
 - (ii) Lubricating oil film (4)
 - (iii) Post flame Oxidation (4)
- (OR)**
- (b) Discuss in detail the effect of following engine design variables on emissions from diesel engines.
- (i) EGR (6)
 - (ii) Fuel injection characteristics (5)
 - (iii) Combustion chamber type (5)
13. (a) Explain the construction and working of chemiluminescence analyzer with a neat sketch. (16)
- (OR)**
- (b) With neat sketches, discuss in detail how CO and CO₂ emissions are measured. (16)
14. (a) Explain control of S.I.engine emissions by the following exhaust after treatment.
- (i) Thermal reactor. (4)
 - (ii) Catalytic converter. (12)
- (OR)**
- (b) Discuss in detail the construction and working of diesel particulate filters and its regeneration systems. (16)
15. (a) Explain how an automobile is tested in chassis dynamometer and how emissions are measured. (16)
- (OR)**
- (b) (i) Explain how Euro and BS norms differ on Driving cycle and year of implementation. (10)
- (ii) Give the BS-IV norms for passenger cars and 2 & 3 wheelers, powered by petrol. (6)