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PRESIDENCY UNIVERSITY BENGALURU

SCHOOL OF ENGINEERING

Summer Term

SUMMER TERM END TERM EXAMINATION – August 2024

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| **Semester : Summer term** | **Date : 08-08-2024** |
| **Course Code : MEC4009** | **Time : 1.00 PM to 4.00 PM** |
| **Course Name : I C Engines and Fuels** | **Max Marks : 100** |
| **Program : B.Tech.** | **Weightage : 50%** |

**Instructions:**

1. *Read all questions carefully and answer accordingly.*
2. *Question paper consists of 3 parts.*
3. *Scientific and non-programmable calculator are permitted.*
4. *Do not write any information on the question paper other than Roll Number.*

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| **PART A** | | | |
| **ANSWER ANY 5 QUESTIONS 5Q X 4M=20M** | | | |
| 1 | What is Air/fuel and fuel/air ratio.? Explain the significance of these ratios. | (CO 1) | [Knowledge] |
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| 2 | List any eight advantages of alternate fuels. | (CO 2) | [Knowledge] |
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| 3 | List all the factors affecting flame propagation. | (CO 3) | [Knowledge] |
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| 4 | What is pollution? Explain with examples. | (CO 4) | [Knowledge] |
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| 5 | Why modern day petro engines don’t have a carburetor? Explain. | (CO 1) | [Knowledge] |
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| 6 | What is abnormal combustion? List the different types of abnormal combustion in SI engines. | (CO 3) | [Knowledge] |
| 7 | Differentiate between Bharath and Euro norms. | (CO 4) | [Knowledge] |
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| **PART B** | | | |
| **ANSWER ANY 5 QUESTIONS 5Q X 10M=50M** | | | |
| 8 | During the trial of a single cylinder four stroke oil engine the following observations were made.  bore = 300 mm, stroke = 400 mm,  speed = 200 rpm, Duration of trial = 60 min,  fuel consumption = 7.05 kg calorific value = 44,000 kJ/kg.  area of indicator diagram = 322 mm2  length of indicator diagram = 62 mm  Spring index = 1.1 bar/ mm  Net load on brakes = 1325 N  Brake drum diameter = 1600 mm  Determine, (i) Brake power (ii) Indicated power (iii) Brake thermal efficiency (iv) Mechanical efficiency and (V) Indicated thermal efficiency. | (CO 1) | [Application] |
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| 9 | Vegetable oils are thicker than neat diesel and hence they will create problems for injection system. Hence reducing its viscosity is an important requirement. Explain Transesterification process with a neat diagram. | (CO 2) | [Comprehension] |
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| 10 | Combustion should happen in a particular pattern for smooth functioning of engines. Explain how combustion happens in SI engines with the help of P-thita diagram. | (CO 3) | [Application] |
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| 11 | Explain the formation of CO, UBHC, Particulate matter and NOx with equations. | (CO 4) | [Comprehension] |
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| 12 | Alternate fuels are very essential for the sustainability of energy. Explain how Ethanol can be produced from sugar can be with a flow diagram. | (CO 2) | [Comprehension |
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| 13 | Abnormal combustion occurs in both SI and CI engines but their phenomenon is different. Draw P- ϴ diagram for both and compare the phenomenon of knocking in SI and CI engines. | (CO 3) | [Comprehension] |
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| 14 | Explain how a Thermal Reactor Package helps in achieving the goal of reducing pollution to environment. | (CO 4) | [Application] |
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| **PART C** | | | |
| **ANSWER ANY 2 QUESTIONS 2Q X 15M=30M** | | | |
| 15 | Among different types of fuels, gaseous alternate fuels have certain advantages. With a neat sketch explain how Gobar / bio gas is produced. | (CO 2) | [Application] |
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| 16 | Proper combustion is an important requirement of engines. Explain how combustion happens in CI engines with the help of pressure – crank angle diagram.  Also give a note on its knocking. | (CO 3) | [Application] |
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| 17 | Harmful gases are emitted by engines through their exhaust. Efforts are made to nullify the effects of these emissions in many ways. With proper diagram explain how a catalytic converter functions. | (CO 4) | [Application] |