

Code No: R09222601

R09

SET-1

**B.Tech II Year - II Semester Examinations, April-May, 2012**  
**IC ENGINES AND GAS TURBINES**  
**(MINING MACHINERY)**

**Time: 3 hours**

**Max. Marks: 75**

**Answer any five questions**  
**All questions carry equal marks**

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- 1.a) Explain the classification of I.C. Engines.  
b) List the merits and demerits of four stroke engine compared to two stroke engine. [15]
- 2.a) Mention the various assumptions made in air standard cycle analysis.  
b) What are the differences between air standard cycle and fuel-air cycle? Explain the significance of fuel-air cycle. [15]
- 3.a) What are different factors that influence flame velocity in S.I. engine?  
b) Explain the phenomenon of abnormal combustion in S.I. engine. [15]
- 4.a) What is Octane rating? Discuss its significance for a particular fuel to be used in a given engine.  
b) What are general requirements of fuels for C.I. engines? [15]
- 5.a) Explain in detail the procedure to perform Morse test. What is the objective of this test?  
b) A certain engine with a bore of 250 mm has an indicated thermal efficiency of 30%. The brake specific fuel consumption and specific power output are 0.35 Kg/ KWhr and 90 KW/m<sup>2</sup>. Find the mechanical efficiency and brake thermal efficiency of the engine. Calorific value of the fuel is 42 MJ/Kg. [15]
- 6.a) What is meant by supercharging an engine? What are the different methods of supercharging used in IC engines?  
b) What is turbo charging? What is waste gate control in the turbocharger system? [15]
- 7.a) With the aid of a neat diagram, explain the working principle of a ramjet engine.  
b) State the fundamental differences between the jet propulsion. [15]
8. Write short notes on any three of the following:
  - a) What are the advantages and disadvantages of using LPG in SI engines?
  - b) How knock emissions are caused and what are their effects on environment?
  - c) List the factors by which performance of an engine is evaluated?
  - d) Discuss about the effect of altitude on the performance of a carburetor? [15]

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- 1.a) Explain the working of a 4-stroke SI engine with a neat sketch.
- b) Compare External Combustion and Internal Combustion engines. [15]
  
2. Sketch the constructional layout of a battery ignition system and explain its working. Compare the performance of magneto and battery ignition systems. [15]
  
- 3.a) What is the difference between physical delay and chemical delay? Explain its importance.
- b) What is optimum flame travel velocity? How to achieve such condition to minimize knocking in S.I. engine? [15]
  
4. Explain the construction and working of any type of fuel injection pump. Illustrate your answer with suitable sketches. [15]
  
- 5.a) Why should we perform the Morse test on an engine at the same conditions of load and speed through out?
- b) While performing Morse test on a four cylinder, four stroke petrol engine, the following results were obtained at a particular throttle setting and speed.  
 B.P. with all cylinders working = 32.2 KW  
 B.P. with cylinder No.1 cutout = 22 KW  
 B.P. with cylinder No.2 cutout = 21.8 KW  
 B.P. with cylinder No.3 cutout = 22.2 KW  
 B.P. with cylinder No.4 cutout = 22.8 KW.  
 Determine the I.P. of engine and its mechanical efficiency. [15]
  
- 6.a) Draw the schematic diagram of a simple cycle with reheat and explain the working principle briefly. Draw P-V and T-S diagram of the cycle.
- b) A simple ideal gas turbine works with a pressure ratio of 8. The compressor and turbine inlet temperatures are 300K and 800K respectively. If the volume flow rate is 250 m<sup>3</sup>/sec, compute the net power output and cycle efficiency. [15]
  
- 7.a) Mention the advantages and disadvantages of the pulse jet engine.
- b) Write short notes on  
 i) propulsion thrust                      ii) propulsion efficiency                      iii) turbo prop. [15]
  
8. Write short notes on any three of the following:  
 a) Can alcohol be used for CI engines? Explain.  
 b) What causes engine emissions?  
 c) What are the limitations of supercharging in an IC engine.  
 d) Compare the merits and demerits of air and water cooling systems. [15]

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SET-4

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**IC ENGINES AND GAS TURBINES**

**(MINING MACHINERY)**

**Time: 3 hours**

**Max. Marks: 75**

**Answer any five questions  
All questions carry equal marks**

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- 1.a) Differentiate between SI and CI engines.
- b) Define the following:
  - i) Clearance volume
  - ii) Compression ratio
  - iii) Mean effective pressure
  - iv) Specific fuel consumption. [15]
- 2.a) Explain with neat sketches the construction and working of fuel injector.
- b) Explain the influence of air fuel ratio, maximum pressure and maximum temperature on the performance of fuel air cycle. [15]
- 3.a) Explain the influence of different operating parameters on ignition delay during combustion process in C.I. engine.
- b) Describe the phenomenon of knocking in C.I. engine and how is it different from S.I. engine detonation. [15]
4. With a neat sketch, explain the functions of MPFI system. [15]
- 5.a) What is the function of carburetor in a S.I. engine? Briefly explain with a neat sketch, the operation of a simple float type carburetor.
- b) Why do we require a rich mixture for idling? [15]
- 6.a) Differentiate between a closed cycle gas turbine and an open cycle gas turbine.
- b) Draw the schematic diagram of a simple cycle with intercooler and explain briefly the working principle. Also draw P-V and T-S diagrams of the cycle. [15]
7. With a neat sketch and T-S diagram, explain the working of turbojet engine and also derive the expression for the thrust developed. [15]
8. Write notes on any three of the following:
  - a) Explain the reasons for looking for alternate fuels for IC engines.
  - b) What are catalytic converters? How are they helpful in reducing emissions?
  - c) Explain the principle of exhaust turbocharging of a single cylinder engine.
  - d) Explain about dry sump method of engine lubrication. [15]

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