



# 17408

11718

3 Hours / 100 Marks

Seat No.

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- Instructions :**
- (1) *All questions are compulsory.*
  - (2) *Illustrate your answers with neat sketches wherever necessary.*
  - (3) *Figures to the right indicate full marks.*
  - (4) *Assume suitable data, if necessary.*
  - (5) *Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.*

**Marks**

1. Attempt **any six** of the following :

**12**

- a) i) Define : i) Swept volume ii) Piston stroke  
ii) Write the name of ports used in two stroke engine.  
iii) Why is a diesel engine is also called CI engine ?  
iv) Define : i) Clearance volume ii) Compression ratio.  
v) State the need of cooling system.  
vi) Define : i) Brake power ii) Indicated power  
vii) Why speed of camshaft is half of the crankshaft in 4 stroke engine ?  
viii) State the air fuel ratio limit for SI and CI engines.

b) Attempt **any two** of the following :

**8**

- i) With neat sketch explain working of four stroke spark ignition engine.
- ii) Write the engine specification of any two wheeler. (minimum eight parameters)
- iii) State two merits and two demerits of horizontal engines.

2. Attempt **any four** of the following :

**16**

- a) Compare two stroke and four stroke engine on the basis of
  - i) Power output
  - ii) Pollution
  - iii) Lubrication system
  - iv) Application
- b) Draw a neat sketch of crankshaft for 4 cylinder engine and label it.
- c) Name the materials for the following engine components
  - i) Cylinder block
  - ii) Exhaust manifold
  - iii) Camshaft
  - iv) Piston pin
- d) Draw a neat sketch of overhead valve operating mechanism and explain its working.
- e) Compare dry liners and wet liners (any four points)
- f) State the functions of piston rings. Why a minimum two compression rings are required ?

**P.T.O.**



3. Attempt **any four** of the following : 16
- a) Draw and explain valve timing diagram for 4 stroke CI engine.
  - b) List the various fuel supply system in petrol engine and explain any one.
  - c) Draw a neat sketch of SU electrical fuel pump and explain its working.
  - d) Describe working of simple carburettor with neat sketch.
  - e) Explain fuel metering in inline fuel injection pump.
  - f) Draw a neat sketch of fuel injector and explain its working.
4. Attempt **any four** of the following : 16
- a) Compare battery and magneto ignition system on the basis of
    - i) Source
    - ii) Starting of engine
    - iii) Space required
    - iv) Applications
  - b) State the importance of firing order in IC engine and write the firing order of 4 cylinder engine.
  - c) List the various types of Mufflers and explain any one with neat sketch.
  - d) Differentiate between air cooling and water cooling system (minimum four points)
  - e) List four components of water cooling system and state function of each.
  - f) State the necessity of thermostat valve in engine cooling system. Describe the working of any one thermostat.
5. Attempt **any four** of the following : 16
- a) Explain any eight properties of lubricating oil.
  - b) Explain any four additives used in oil.
  - c) Draw a neat sketch of externally mesh gear type oil pump and explain its working.
  - d) Explain splash lubrication system with neat sketch.
  - e) Define :
    - i) Mechanical efficiency
    - ii) Volumetric efficiency
    - iii) Brake thermal efficiency
    - iv) Specific fuel consumption
  - f) Explain rope brake type dynamometer with neat sketch.



6. Attempt **any two** of the following :

16

- a) i) Explain Morse test for finding out frictional power.  
ii) Explain any one method for measurement of fuel consumption.
- b) The following readings were taken on a single cylinder 4 stroke diesel engine running at full

load. Area of indicator =  $3 \text{ cm}^2$ , length of diagram = 4 cm, spring constant =  $10 \frac{\text{bar}}{\text{cm}^2}$ .cm,

speed of engine = 400 rpm, load on brake = 380 N, spring reading = 50 N, Diameter of the brake drum = 120 cm, fuel consumption = 2.8 kg/hr, calorific value of fuel = 42000 kJ/kg, Diameter of the cylinder = 16 cm, stroke = 20 cm. Find i) I.P. ii) B.P. iii) Mechanical efficiency iv) Brake Thermal efficiency.

- c) The following observations are made during a trial on an oil engine.

- 1) RPM = 1750
- 2) Brake Torque = 327.5 Nm.
- 3) Fuel used = 15 kg/hr.
- 4) Air supplied = 4.75 kg/min.
- 5) CV of fuel = 42 MJ/kg
- 6) Room Temp. = 20.8°C
- 7) Quantity of cooling water = 16 kg/min.
- 8) Outlet temp. of cooling water = 65.8°C
- 9) Exhaust gas temperature = 400°C

Take  $C_{p_w} = 4.2 \text{ KJ/kg}^\circ\text{K}$  and

$$C_{p_g} = 1.25 \text{ KJ/kg}^\circ\text{K}$$

Draw a heat balance sheet on KW basis and percentage basis.

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