# 17529

**21718**

**3 Hours / 100 Marks** Seat No. | | | | | | | | |

***Instructions :*** *(1)* ***All*** *questions are* ***compulsory****.*
*(2) Answer* ***each*** *next main question on a* ***new*** *page.*
*(3) Illustrate your answers with* ***neat*** *sketches* ***wherever*** *necessary.*
*(4) Figures to the* ***right*** *indicate* ***full*** *marks.*
*(5)* ***Assume*** *suitable data,* ***if necessary****.*
*(6)* ***Use*** *of Non-programmable Electronic Pocket Calculator is* ***permissible****.*
*(7) Mobile Phone, Pager and any other Electronic Communication devices are* ***not permissible*** *in Examination Hall.*
*(8)* ***Use*** *of Steam tables, logarithmic, Mollier's chart is* ***permitted****.*

**Marks**

**1.** A) Attempt **any three** of the following : **12**

a) Draw P-V and T-S diagram for Diesel cycle. Name the processes involved in it.

b) Define :

i) Brake thermal efficiency

ii) BSFC related to I.C. Engine.

c) Give the classification of air-compressors.

d) Explain with neat sketch working principle of Lobe compressor.

B) Attempt **any one** of the following : **6**

a) State different methods of determining frictional power of I.C. engine and explain any one method.

b) Explain with neat sketch working principle of any one type of catalytic converter.

**2.** Attempt **any two** of the following : **16**

a) Following observations were recorded during a trial on single cylinder four stroke oil engine :

Cylinder bore = 15 cm

Length of stroke = 25 cm

Mean effective pressure = 7.35 bar

Engine speed = 400 rpm

Brake torque = 225 N.m.

Fuel consumption = 3 kg/hr

**P.T.O.**

**Marks**

Calorific value of fuel = 44200 kJ/kg
Determine :

i) Mechanical efficiency

ii) Brake thermal efficiency

iii) Brake specific fuel consumption.

b) Explain construction and working of single stage reciprocating air compressor with neat sketch. Also represent it on P-V diagram.

c) Explain working principle of simple vapour absorption refrigeration system. Represent it on the block diagram.

**3.** Attempt **any four** of the following : **16**

a) Draw turning moment diagram for four stroke petrol engine and explain it in brief.

b) What is supercharging ? State advantages of supercharging.

c) State effects of pollutants in exhaust gases of petrol engine.

d) Explain with neat sketch working principle of Ram jet engine.

e) Represent wet compression and dry compression on T-S and P-H diagram and name all processes involved in it.

**4.** A) Attempt **any three** of the following : **12**

a) What are the effects of detonation in I.C. engine ?

b) Define :

i) Mechanical efficiency

ii) Volumetric efficiency related to I.C. engine.

c) State advantages of closed cycle gas turbine.

d) State advantages of jet propulsion over other systems.

B) Attempt **any one** of the following : **6**

a) Explain with neat sketch working principle of four stroke petrol engine.

b) The following data is collected during a trial of four stroke four cylinder petrol engine.
B.P. with all cylinders working = 14.7 kW
B.P. with cylinder no. 1 cut off = 10.14 kW
B.P. with cylinder no. 2 cut off = 10.3 kW
B.P. with cylinder no. 3 cut off = 10.36 kW
B.P. with cylinder no. 4 cut off = 10.21 kW
Find mechanical efficiency of engine.

**Marks**

**5.** Attempt **any two** of the following : **16**

a) i) Compare reciprocating and rotary compressors (any four). **4**

ii) Write any four applications of compressed air. **4**

b) List the methods to improve thermal efficiency of gas turbine and explain any one of them in detail.

c) Explain with neat sketch working principle of Ice plant.

**6.** Attempt **any four** of the following : **16**

a) State any four types of sensors used in I.C. engine.

b) Define :

i) Isothermal efficiency.

ii) Volumetric efficiency with respect to air compression.

c) Explain with neat sketch working principle of turbo jet engine.

d) Define :

i) DBT

ii) WBT

iii) DPT

iv) Relative humidity.

e) Give the classification of air conditioning systems.

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