**Benha University Shoubra Faculty of Engineering Mechanical Eng. Dept. (Power) 4thyear (2016-2017)**

**Internal Combustion Engines Sheet No. (2)**

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1. In a four stroke cycle S.I. engine the cam shaft runs
2. at the same speed as crank shaft (b) at half the speed of crank shaft

(c) at twice the speed of crank shaft (d) at any speed irrespective of crank shaft speed

2) Explain with suitable sketches the working of a four stroke Otto engine.

3) Explain the following terms as applied to I.C. engine:

Bore, stroke, T.D.C., B.D.C., clearance volume, swept volume, compression ratio and piston speed

4) Discuss the difference between ideal and actual valve timing diagrams of petrol engine

5) Define compression ratio. What is its range for S.I. and C.I. engines? What factors limit the compression ratio in each type of these engines?

6) Show by suitable sketches the following types of cylinder arrangements indicating their principal applications

a) In-line engines b) “*V”* engines c) Opposed piston engines d) Radial engines

7) Classify the internal combustion engine with respect to:

a) cycle of operation b) type of ignition c) cylinder arrangements

d) type of fuels used e) method of charging the cylinder f) type of cooling

8) Compare S.I. and C.I. engines with respect to:

a) basic cycle b) fuel used c) introduction of fuel d) ignition

e) compression ratio f) speed g) efficiency h) weight

9) Define the following efficiencies:

a) indicated thermal efficiency b) brake thermal efficiency c) mechanical efficiency

d) relative efficiency e) volumetric efficiency

10) Choose the appropriate answer

1-Engines of different cylinder dimensions, power and speed can be compared on the basis of

a*) maximum pressure* b*) fuel consumption* c)*mean effective pressure* d)*unit power*

2-Thermal efficiency of C.I. engine is higher than that of S.I engine due to

1. *fuel used* b) *higher compression ratio* c) *constant pressure heat addition* d) *none of the above*

3- S.I. engines are of

a) *light weight* b) *high speed* c) *homogeneous change of fuel and oil* d) *all of the above*

4-Compressin ratio in diesel engine is of the order of

a) 5-7 b) 7-10 c) 10-12 d) 14-20

5- The volumetric efficiency of the S.I. engine is comparatively

a) *lower than C.I. engine*  b) *higher than C.I. engine* c) *will the same as C.I. engine* d) *none of the above*

11) The brake thermal efficiency for S.I. engine varies from:

a)40-50% b)45-60% c)25-30% d)15-25%

12) In a 4- stroke S.I. engine

a) the exhaust valve opens at 50o before *bdc* and closes 15o after *bdc*

b) the inlet valve opens about 25o before *tdc* and closes 15o after *bdc*

c) the exhaust valve opens 10o after *bdc* and closes 25o after *tdc*

d) the inlet valve opens 50o before *tdc* and closes 15o after *bdc*

13) The indicated thermal efficiency of 4-stroke S.I. engine producing 500 kW, mechanical efficiency 0.8 and fuel consumption 300kg/hr (HHV=400MJ/kg)is

a) 0.12 b) 0.1875 c) 0.2 d) 0.2175

14) The volumetric efficiency of a 4-stroke engine (stroke volume 30 liters) running at 4000 rpm. producing 50 kW and consuming 3000kg/hr of air at 1 bar and 300 K is

a) 60% b) 71.8% c) 75% d) 80%

15) The b.mep of a passenger car running on diesel fuel in comparison with the b.mep of a petrol engine is

a) more b) equal c) less d) dependent on compression ratio

16) The volumetric efficiency of an internal combustion engine will depend upon

**1**-period of valve overlap **2**-density of fresh charge **3**-pressure of residual gas **4**-design of intake manifold

Of these statements:

1. 1,2,3 are correct b)2,3,4 are correct c)all are correct d)1,3,4 are only correct

17) Engine cylinders arranged in the form of the letter” V” are

1-perfectly balanced 2-produce more power than in-line arrangement

3-easy to manufacture 4-having smaller crankshaft than in-line ones

Of these statements:

a) all are correct b) only 2 is wrong c) only 4 is correct d) only 1 and 2 are correct

18) Select the suitable engine for the following purposes indicating the reasons for your selection.

1-engine power 70kW and its speed 200 rpm used for driving pump to raise crude oil from oil wells

2-engine drive passenger car with variable speed its power 30kW at 4000 rpm

3-Trucks engine, variable speed its power 90kW at 2500 rpm

4-marine engine its power 10000kW at 150 rpm

5-stationary engine used for electrical generation its power 8000kW at 7000 rpm

19) What is meant by “quantity control” and “quality control” engines? Compare between these engines.