00222

DIPLOMA IN ELECTRICAL AND MECHANICAL ENGINEERING

Term-End Examination

June, 2010

BME-033 : HEAT POWER TECHNOLOGY

Time : 2 hours *Maximum Marks : 70*

Note : *Answer **five** questions in all. Question number 1 is **compulsory**. Answer **four** more questions from remaining **six** questions. Use of calculator is permitted.*

1. Select the correct answer from four given alternatives for following questions. **14x1=14**

(a) Nominal size of a part is :

(i) measured dimensions mean

(ii) maximum of all measured sizes of part

(iii) minimum of all measured sizes of part

(iv) calculated size of part

(b) Flywheel in an engine is mounted on crankshaft :

(i) to avoid engine stopping at high load

(ii) to maintain speed of crankshaft rotation at its mean level

(iii) to maintain smooth combustion of fuel in the cylinder

(iv) to increase power output from same amount of fuel

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(c) A governor which hunts :

(i) produces large difference between maximum and minimum speed

(ii) is less sensitive to engine speed variation

(iii) will change the fuel supply by too large amount

(iv) will occupy any position between two extreme positions.

(d) In a simple gear train :

(i) each shaft carries one gear

(ii) only intermediate shaft carries two gears

(iii) the first shaft carries two gears

(iv) the velocity ratio is never a fraction

(e) In a belt drive the elastic creep of belt will cause :

(i) driving pulley and driven pulley to rotate at speed ratio which is equal to ratio of diameters

(ii) driving pulley to receive greater length and deliver smaller length

(iii) driving and driven pulleys to receive and deliver same belt length

(iv) the change in tension in tight side of belt

(f) A V-belt in a groove of grooved pulley is so fitted that :

(i) its bottom does not touch the bottom and top is below the top of the groove

(ii) its bottom touches the bottom of the groove and top is below the top of the groove

(iii) the top of the belt and top of the groove are flush

(iv) the top of the belt is above the top of the groove

(g) Which one is not the inversion of double slider-crank chain ?

(i) Oldham's coupling

(ii) Scotch yoke

(iii) Toggle mechanism

(iv) Elliptical trammel

(h) The motion of a piston in a cylinder is example of :

(i) incompletely constrained motion

(ii) partially constrained motion

(iii) sliding and rotating motion

(iv) completely constrained motion

(i) Which is not the component of S. I. engine :

(i) injector

(ii) crankshaft

(iii) ignition system

(iv) turbocharger

(j) In comparison with four stroke engine, a two stroke engine :

(i) consumes less fuel per unit power

(ii) consumes more lubricant

(iii) requires larger flywheel

(iv) same number of power stroke per revolution

(k) Identify component of injector in a C. I. engine :

(i) Choke

(ii) Economizer system

(iii) Nozzle

(iv) Idling system

(*l*) The volumetric efficiency of an engine is an indicator of :

(i) power lost in friction

(ii) temperature of cooling water

(iii) viscosity of lubricant

(iv) power produced by engine

(m) Supercharger in an I. C. engine helps improve :

(i) density of the charge

(ii) volume of the charge

(iii) cooling of the engine

(iv) lubrication between piston and cylinder

(n) In a magneto ignition system which is not required :

(i) capacitor

(ii) spark plug

(iii) battery

(iv) contact breaker

2. (a) Classify I. C. engines and sketch two types based on cylinder arrangement. **9+5=14**

(b) Name any eight engine components, describe head.

3. A single cylinder 4 stroke engine has stroke = cylinder diameter = 80 mm. The engine running at 500 rpm produces a torque of 60 Nm at the crankshaft. The indicated mean effective pressure is 2.1 N/mm^2. What is the mechanical efficiency of the engine ? Also find friction power. **14**

4. (a) Sketch an electronic ignition system for an I. C. engine and bring out differences with battery ignition system. **7+4+3=14**

(b) explain why cooling is needed in an engine and what happens if engine is over cooled.

(c) Name modes of heat transfer and correlate them with engine parts.

5. (a) What is constrained motion. Sketch system with constrained motion and incompletely constrained motion. **7+7=14**

(b) Classify kinematic pairs according to relative motion and type of contact.

6. (a) What are different types of power transmission systems and what are their characteristics ? **8+6=14**

(b) Draw two pulleys of different diameters connected by a belt. With θ = angle of contact on small pulley, diameters of smaller and larger pulleys as D_1 and D_2 and C as the centre distance of pulleys find expression for open belt drive length.

7. (a) What are different types of fits ? Describe basic limit system. **5+9=14**

(b) A journal of nominal diameter 81 mm is supported by a bearing of same nominal diameter. The upper and lower deviations in hole diameters are respectively 0.05 mm and 0.01 mm. The upper and lower deviations for shaft are -0.02 mm and -0.06 mm. Calculate :

(i) extreme diameters of hole and shaft

(ii) tolerance for hole and shaft and indicate if they are unilateral or bilateral

(iii) maximum and minimum clearance.