Total No. of Questions: 6 *Total No. of Printed Pages:3*

Enrollment No.....

Faculty of Engineering

End Sem (Odd) Examination Dec-2018

EN3ES03 Basic Mechanical Engineering

Programme: B.Tech. Branch/Specialisation: All

Duration: 3 Hrs. **Maximum Marks: 60**

Note: All questions are compulsory. Internal choices, if any, are indicated. Answers of Q.1 (MCQs) should be written in full instead of only a, b, c or d.

Q.1 i. Which type of surface is produced by turning operation in lathe machine? **1**

(a) Flat (b) Cylindrical (c) Taper (d) None of these

ii. Hooke's law is applicable within **1**

(a) Elastic limit (b) Plastic limit

(c) Fracture point (d) Ultimate strength

iii. What is the entropy change (dS_{iso}) of a reversible isolated (dQ=0) process? **1**

(a) $dS_{iso} = 0$ (b) $dS_{iso} > 0$ (c) $dS_{iso} < 0$ (d) None of these

iv. For the same capacity of plant, the COP of the vapour absorption refrigeration system is **1**

(a) Lower than the COP of the vapour compression refrigeration system

(b) Higher than the COP of the vapour compression refrigeration system

(c) Same as the COP of the vapour compression refrigeration system

(d) Cannot say

v. The following are the fire tube boilers except **1**

(a) Cochran (b) Lancashire

(c) Locomotive (d) Babcock and Wilcox

vi. Which of the following is not used in four stroke compression-ignition (CI) engines? **1**

(a) Fuel pump (b) Spark plug

(c) Fuel injector (d) Inlet and outlet Valves

P.T.O.

vii. Which of the following laminas do not have centroid at its geometrical centre? **1**
(a) Circle (b) Equilateral triangle
(c) Right angled triangle (d) None of these

viii. The parallel axis theorem uses the _____ of the distance. **1**
(a) Square root (b) Square (c) Cube root (d) Cube

ix. The power transmitted by a belt drive is (T_1=Tension on tight side, T_2=Tension on slack side, where v = linear velocity, ω = angular velocity) **1**
(a) (T_1-T_2) x v (b) (T_1-T_2) x ω
(c) (T_1-T_2) / v (d) (T_1-T_2) /ω

x. Which gears are used to connect two intersecting shaft axes? **1**
(a) Crossed helical gear (b) Worm and worm wheel
(c) Bevel gears (d) All of these

Q.2 i. (a) Draw Stress-Strain Diagram for mild steel. **4**
(b) Define-(I) Hardness (II) Toughness

ii. Name any four operations which can be performed on **6**
(a) Lathe Machine (b) Milling Machine
(c) Shaper

OR iii. Draw a detailed chart which shows classification of Engineering materials. Explain any two in detail. **6**

Q.3 i. Define: **3**
(a) Thermodynamic Equilibrium
(b) Polytrophic process.

ii. Explain with neat sketch working of Vapour Compression Refrigeration System. **7**

OR iii. Explain Water-Li Br vapour absorption refrigeration system. **7**

Q.4 i. Compare two stroke engines versus four stroke engines. (8 points) **4**

ii. Write function of following attachments of boiler: **6**
(a) Blow Off Cock (b) Water level indicator
(c) Fusible Plug (d) Feed Check Valve

OR iii. Write function of following parts associated with engine: **6**
(a) Connecting rod (b) Spark Plug
(c) Cam and follower (d) Flywheel.

Q.5 Attempt any two:

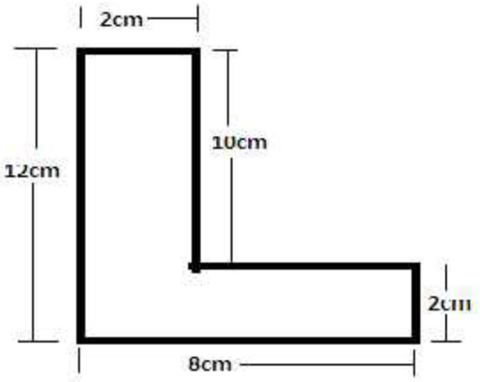
i. Derive the relation, $\frac{T_1}{T_2} = e^{\mu\theta}$ for flat –belt drive. Where T_1 and T_2 are tight side and slack side tension respectively, μ is coefficient of friction between belt and pulley and θ is angle of contact. **5**

ii. Write any three differences between a simple gear train and a compound gear train? Explain with the help of sketches. **5**

iii. Explain Law of Machine. Distinguish reversible and irreversible machine. **5**

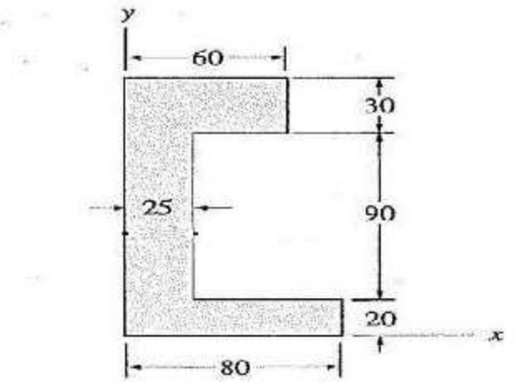
Q.6 i. State Parallel Axis Theorem. **3**

ii. Find the centre of gravity of the L-section shown in Fig.01 **7**



(Fig-01)

OR iii. Find Moment of Inertia of given section about X-axis. (Fig.02) **7**



(Fig.02)

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Marking Scheme
EN3ES03 Basic Mechanical Engineering

Q.1 i. Which type of surface is produced by turning operation in lathe machine? **1**
(b) Cylindrical (c) Taper

ii. Hooke's law is applicable within **1**
(a) Elastic limit

iii. What is the entropy change (dS_{iso}) of a reversible isolated (dQ=0) process? **1**
(a) $dS_{iso} = 0$

iv. For the same capacity of plant, the COP of the vapour absorption refrigeration system is **1**
(a) Lower than the COP of the vapour compression refrigeration system

v. The following are the fire tube boilers except **1**
(d) Babcock and Wilcox

vi. Which of the following is not used in four stroke compression-ignition (CI) engines? **1**
(b) Spark plug

vii. Which of the following laminas do not have centroid at its geometrical centre? **1**
(c) Right angled triangle

viii. The parallel axis theorem uses the _____ of the distance. **1**
(b) Square

ix. The power transmitted by a belt drive is (T_1=Tension on tight side, T_2=Tension on slack side, where v = linear velocity, ω = angular velocity) **1**
(a) (T_1-T_2) x v

x. Which gears are used to connect two intersecting shaft axes? **1**
(c) Bevel gears

Q.2 i. (a) Stress-Strain Diagram 1 mark **4**
Salient points 1 mark
(b) Define-(I) Hardness 1 mark
(II) Toughness 1 mark

ii. Name any four operations which can be performed on **6**
(a) Lathe Machine 2 marks
(b) Milling Machine 2 marks
(c) Shaper 2 marks

OR iii. Classification of Engineering materials 4 marks **6**
Explanation of any two 2 marks

Q.3 i. Define: **3**
(a) Thermodynamic Equilibrium 1.5 marks
(b) Polytrophic process. 1.5 marks

ii. Neat sketch of Vapour Compression Refrigeration System. **7**
3 marks
Function of each (compressor, condenser, evaporator. throttling)
4 marks

OR iii. Neat Sketch of vapour absorption 3 marks **7**
Function of each (absorber, condenser, evaporator. throttling)
4 marks

Q.4 i. Compare two stroke engines versus four stroke engines. (8 points) **4**
0.5 mark for each point (0.5 mark *8)

ii. Write function of following attachments of boiler: **6**
(a) Blow Off Cock 1.5 marks
(b) Water level indicator 1.5 marks
(c) Fusible Plug 1.5 marks
(d) Feed Check Valve 1.5 marks

OR iii. Write function of following parts associated with engine: **6**
Each function 1.5 marks (1.5 marks *4)
(a) Connecting rod (b) Spark Plug
(c) Cam and follower (d) Flywheel.

Q.5 Attempt any two:

i. Figure 2 marks **5**
Derivation 3 marks

ii. Any three differences b/w a simple and a compound gear train **5**
3 marks
Each Sketch 1 mark (1 mark *2)

iii. Law of Machine 2 marks **5**

Differences b/w reversible and irreversible machine 3 marks

Q.6	i.	Diagram of Parallel Axis Theorem.	1 mark	**3**
		Derivation	2 marks	
	ii.	Find the centre of gravity of the L-section		**7**
		Table	4 marks	
		$\bar{x}$	1.5 marks	
		$\bar{y}$	1.5 marks	
OR	iii.	Find Moment of Inertia of given section about X-axis.		**7**
		Centre of gravity	3 marks	
		Moment of Inertia	4 marks	

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