

Enrolment No.....



Faculty of Engineering
End Sem (Even) Examination May-2018
EE2ES08 Basic Mechanical Engineering

Programme: Diploma

Branch/Specialisation: EE

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. A control volume refers to 1
 - (a) A fixed region in space
 - (b) A specified mass
 - (c) An isolated system
 - (d) A reversible process only
 - ii. Economizer in the boiler heats the 1
 - (a) Steam
 - (b) Air
 - (c) Feed water
 - (d) Coal
 - iii. A carburettor is used to supply 1
 - (a) Petrol, air and lubricating oil
 - (b) Air and diesel
 - (c) Petrol and lubricating oil
 - (d) Petrol and air
 - iv. A petrol engine has a compression ratio from 1
 - (a) 6 to 10
 - (b) 10 to 15
 - (c) 15 to 25
 - (d) 25 to 40
 - v. The volume of air delivered by the compressor is called 1
 - (a) Free air delivery
 - (b) Compressor capacity
 - (c) Swept volume
 - (d) None of these
 - vi. The maximum delivery pressure in a rotary air compressor is 1
 - (a) 10 bar
 - (b) 20 bar
 - (c) 30 bar
 - (d) 40 bar
 - vii. Mercury is suitable for manometers because 1
 - (a) It has high density
 - (b) It can be easily seen in tubes
 - (c) It does not stick to the tube wall
 - (d) It is less sensitive to temperature

[2]

- viii. Bernoulli's theorem deals with the principle of conservation of **1**
 (a) Energy (b) Momentum (c) Mass (d) Force
- ix. For two meshing gears, their **1**
 (a) Number of teeth must be same
 (b) Addendum must be same
 (c) Dedendum must be same
 (d) Module must be same
- x. The centrifugal tension (T_c) in the belt is given by **1**
 (a) $T_{\max} = 3m \times v^2$ (b) $T_{\max} = m \times v^2$
 (c) $T_{\max} = 2m / v^2$ (d) $T_{\max} = 3m / v^2$
- Q.2 i. Define Second law of Thermodynamics with examples. **3**
 ii. Sketch and describe Babcock and Wilcox boiler? What are its special features? **7**
- OR iii. A reversible engine is supplied heat from two constant temperature sources at 327°C and 627°C and it rejects heat to sink at 27°C . The engine develops 70 kW and rejects 53.3 kJ/s. Determine the efficiency of the engine and heat supplied by each source. **7**
- Q.3 i. Why is it possible to use higher compression ratio in Diesel engines. **2**
 ii. Compare S.I. and C.I. engines on technical parameters. **8**
- OR iii. Define with suitable examples: **8**
 (a) Indicated Power (b) Brake Power
 (c) Frictional Power (d) Mechanical efficiency
- Q.4 i. Draw p-v and T-s diagram for single stage reciprocating air compressor, without clearance. **3**
 ii. Classify air compressors. Describe the working of a single stage reciprocating air compressor. **7**
- OR iii. Explain with neat sketch the working of axial flow compressor. **7**
- Q.5 i. Derive and explain Pascal's law. **3**
 ii. Derive an expression for Bernoulli's theorem using continuity equation. Write assumptions made **7**

[3]

- OR iii. Explain working principle of hydraulic pump. Define one of its type in detail with neat sketch. **7**
- Q.6 Attempt any two:
 i. Derive a relationship tensions in simple belt drive. How can one calculate the maximum power transmitted by drive? **5**
 ii. What is gear drive? Explain any two types with neat sketch. **5**
 iii. Discuss belt drive and gear drive on technical aspects. Justify your answer with proper examples. **5**

Marking Scheme
EE2ES08 Basic Mechanical Engineering

Q.1	i.	A control volume refers to		1					
		(a) A fixed region in space							
	ii.	Economizer in the boiler heats the		1					
		(c) Feed water							
	iii.	A carburettor is used to supply		1					
		(d) Petrol and air							
	iv.	A petrol engine has a compression ratio from		1					
		(a) 6 to 10							
	v.	The volume of air delivered by the compressor is called		1					
		(b) Compressor capacity							
	vi.	The maximum delivery pressure in a rotary air compressor is		1					
		(a) 10 bar							
	vii.	Mercury is suitable for manometers because		1					
		(a) It has high density							
	viii.	Bernoulli's theorem deals with the principle of conservation of		1					
		(a) Energy							
	ix.	For two meshing gears, their		1					
		(d) Module must be same							
	x.	The centrifugal tension (T _c) in the belt is given by		1					
		(b) $T_{\max} = m \times v^2$							
Q.2	i.	Define Second law of Thermodynamics with examples		3					
		Complete explanation of law with examples							
	ii.	Sketch	3 marks	7					
		Explanation	2 marks						
		Special features	2 marks						
OR	iii.	The efficiency of the engine = 56.77 %		7					
		Heat supplied by each source = 50.1 kW and 73.2 kW							
Q.3	i.	Why is it possible to use higher compression ratio in Diesel engines.		2					
		Detail explanation with reason							
	ii.	Compare S.I. and C.I. engines on technical parameters.		8					
		At least 10 technical differences.							
OR	iii.	Equal marking for each definition		8					
		(a) Indicated Power	2 marks						
		(b) Brake Power	2 marks						
		(c) Frictional Power	2 marks						
		(d) Mechanical efficiency	2 marks						
Q.4	i.	p-v diagram for single stage reciprocating air compressor	1.5 marks	3					
		T-s diagram for single stage reciprocating air compressor	1.5 marks						
	ii.	Detail air compressors classification	3 marks	7					
		Working and figure of compressor	4 marks						
OR	iii.	Complete working of axial flow compressor	4 marks	7					
		Figure	3 marks						
Q.5	i.	Figure with Pascal's law statement	2 marks	3					
		Equation	1 mark						
	ii.	Expression for Bernoulli's theorem		7					
		Complete derivation using continuity equation	4 marks						
		Assumptions	3 marks						
OR	iii.	Working principle of hydraulic pump with figure	3 marks	7					
		Figure and explanation of one of its type	4 marks						
Q.6		Attempt any two:							
	i.	Complete derivation		5					
	ii.	Detail explanation	2 marks	5					
		Types with figures	3 marks						
	iii.	Explanation with examples and facts	3 marks	5					
		Figures	2 marks						
