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G.R. No.	
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**DECEMBER 2021 - ENDSEM EXAM**  
**Final Year B. TECH. (Mechanical) (SEMESTER - I)**  
**COURSE NAME: Mechanical System Design**  
**COURSE CODE: MEUA40182B**  
**(PATTERN 2018)**

Time: [1 Hour]

[Max. Marks: 30]

**(\*) Instructions to candidates:**

- 1) Answer Q.1 OR Q.2, Q.3 OR Q.4, Q.5 OR Q.6.
- 2) Figures to the right indicate full marks.
- 3) Use of scientific calculator is allowed
- 4) Use suitable data where ever required

Q.1) a) Discuss "ASME design code for pressure vessels". [4 marks]

b) Compare different types of heads used as end closures in pressure vessels. [6 marks]

**OR**

Q.2) a) Elaborate "Class of unfired pressure vessels". [4 marks]

b) A horizontal class 1 pressure vessel of inner diameter 2m is subjected to internal pressure 6.0135 bar. The shell as well as heads are made of alloy steel with yield strength of 225 Mpa. The corrosion allowance is 4mm. Estimate the thickness of cylinder shell. Also find thickness of the head and other dimensions of the head, if the head are:

- 1) Torispherical head with crown radius of 1125mm
- 2) Semi-elliptical head, with ratio of major axis to minor axis as 2
- 3) Hemispherical head [6 marks]

Q.3) a) Discuss in details design considerations for a piston. [4 marks]

b) Analyze the design procedure of piston rings. [6 marks]

**OR**

Q.4) a) Derive the expression for design of studs of cylinder head. [4 marks]

b) The cylinder of 4-stroke diesel engine has the given data: Brake power= 7.5 Kw; Speed =1400 RPM; Indicated mean effective pressure (imep) =0.35 Mpa, mechanical efficiency 80% and Maximum gas pressure= 3.5 Mpa. The inner and head are made of grey cast iron with  $S_{ut}$ = 260 Mpa and Passon's ratio= 0.25. The studs are made of plain carbon steel with  $S_{yt}$ = 380 Mpa. FOS for all parts is 6

Calculate:

- 1) Bore and length of cylinder liner
- 2) Thickness of cylinder liner.
- 3) Thickness of cylinder head. [6 marks]



Q.5) a) Discuss the functions of the suspension system.

[4 marks]

b) Elaborate "Self levelling suspension system" with neat sketch.

[6 marks]

**OR**

Q.6) a) Discuss the "Interconnected suspension system".

[4 marks]

b) Analyze hydraulic damper with neat figure.

[6 marks]