

Code No: R41272

R10**Set No. 1**

IV B.Tech I Semester Supplementary Examinations, February/March - 2018

OIL AND GAS PROCESSING PLANT DESIGN

(Petroleum Engineering)

Time: 3 hours**Max. Marks: 75**

Answer any FIVE Questions
All Questions carry equal marks

- 1 a) Enunciate the criteria for sizing vertical gas – oil separators for gas capacity constraint. [8]
b) Summarize the procedure for determining the diameter and length of a three phase horizontal separator. [7]
- 2 a) It is desirable to compress 100 MMSCFD of gas from 800 psig at 100⁰F to 1000 psig in a reciprocating compressor. The engine that drives the compressor is rated for 1600 HP at 900 rpm. Horse power is proportional to speed. Assume $k = 1.26$; $z_s = 0.88$ and $z_d = 0.85$. Calculate the gas discharge temperature and volumetric efficiency. (The compressor is having double acting cylinders with a minimum clearance of 17.92%). [8]
b) The maximum flow rate of a liquid to be pumped 360 gpm; the total differential head = 322 ft; specific gravity of the liquid = 0.485. The efficiency = 0.62. Calculate the brake horse power. [7]
- 3 a) Write down a stepwise procedure for thermal design of a shell and tube heat exchanger. [8]
b) Depict the basic configuration of a plate-fin exchanger. [7]
- 4 a) How do you size a vertical heater treater for crude oil? [8]
b) Discuss the factors that should be considered to determine the most desirable method of treating crude oil. [7]
- 5 a) Discuss the general considerations to design a crude oil desalting unit. [8]
b) How are the plate coalescers designed to treat produced water? [7]
- 6 a) Enunciate the design criteria to calculate minimum diameter of an iron-sponge unit. [7]
b) Discuss the design criteria for TEA absorber to dehydrate natural gas. [8]
- 7 a) Discuss the criteria for setting maximum allowable working pressures in pressure vessel design. [7]
b) Write down the formulae used in wall thickness of the following:
i. Cylindrical shells. ii. Hemispherical heads.
iii. 2:1 ellipsoidal heads iv. Cones [8]
- 8 a) Give four examples of situations requiring a combination of spring operated reliefs in series with rupture discs [8]
b) Describe the advantages and disadvantages of a pilot operated safety valve. [7]