KATHMANDU UNIVERSITY
End Semester Examination [C]
November/December, 2023

Marks Scored:

Level : B.E.
Year : III

Course : CHEG 310
Semester : II

Exam Roll No.: Time: 30 mins. F. M. : 10

Registration No.: Date 28 NOV 2023

SECTION "A"
[20Q. × 0.5 = 10 marks]

Encircle the most appropriate answer.

1. Identify the type of pipe from schedule no. 40S
   a. HDPE b. Stainless Steel c. Carbon Steel d. Alloy Steel

2. Which type of reducer is used to maintain the BOP (bottom of pipe) elevation of the pipeline?
   a. Conical Reducer b. Swage Reducer
   c. Eccentric Reducer d. Concentric Reducer

3. The higher the schedule number lower the thickness of pipe.
   a. False b. True c. None d. Both

4. Which of the following is used to specify pipe dimension?
   a. ID & OD b. Nominal pipe size & schedule number
   c. Size & Thickness d. Nominal pipe size & thickness number

5. Out of all conveyors which type of conveyor has a greater capacity to convey a large amount of coal?
   a. belt conveyor b. chain conveyor
   c. screw conveyor d. scraper conveyor

6. The function of magnetic separator in bulk material handling is to _____.
   a. remove impurities b. separate bulk solid
   c. remove iron particles d. separate metal contents

7. What is the use of electrostatic precipitations in the steam power plant?
   a. to remove the steam b. to draw coal powder into boiler
   c. to remove the feed water d. to remove fly ash

8. Which of the following is positive displacement pump?
   a. Reciprocating pump b. Propeller pump
   c. Centrifugal pump d. Jet Pump

9. In Cyclone separator, centrifugal force for circulation of air is supplied by which of the following way is?
   a. Applying vacuum b. Atomizing air
   c. Pumping d. Rotating blades

10. Why Porcelain is used in packing of distillation tower?
    a. To have uniform boiling
    b. To hasten the process
    c. To add weight for the substance
    d. To absorb excess heat

11. Freeze drying works on the principle of _____.
    a. Evaporation of water
    b. Liquefaction of ice to water
    c. Sublimation of water from ice phase to gas phase
    d. Heating at the freezing temperature of water

12. In cyclone separator, the separation depends on _____.
    a. Size & density
    b. Shape & density
    c. Shape & surface area
    d. Size & surface texture

13. Evaporation takes place at _____.
    a. Freezing point
    b. Melting point
    c. Boiling point
    d. All temperature

14. The multi stage compression as compared to single stage compression _____.
    a. Reduces work done per kg of air
    b. Reduces cost of compressor
    c. Gives more uniform torque
    d. All of the above

15. What is the discharge capacity of the reciprocating pump as compared to the centrifugal pump?
    a. Unpredictable
    b. Higher
    c. Lower
    d. Same

16. Identify which of the following flowmeters inherently dose measure mass flow rate?
    a. Thermal
    b. Magnetic
    c. Flow nozzle
    d. Venturi tube

17. Which one of the following pump is not a positive displacement pump?
    a. Reciprocating pump
    b. Centrifugal pump
    c. Vane pump
    d. Gear Pump

18. Floating head heat exchangers are used for the _____
    a. Heat transfer between corrosive fluids
    b. Cases where temperature difference between the shell and the tubes is more (>50°C)
    c. Co-current heat transfer systems
    d. Counter-current heat transfer systems

19. Filtration rate is affected by the _____
    a. Pressure drop across the cake & filter medium
    b. Cake & filter medium resistance
    c. Area of filtering surface & the viscosity of filtrate
    d. All of the above

20. In a shell and tube heat exchanger, the shortest center to center distance between the adjacent tubes is _____
    a. Called tube pitch
    b. Called tube clearance
    c. Always less than the diameter of the tube
    d. None of these

KATHMANDU UNIVERSITY
End Semester Examination [C]
November/December, 2023

28 NOV 2023

Level : B.E.
Year : III
Time : 2 hrs. 30 mins.

Course : CHEG 310
Semester : II
F. M. : 40

SECTION "B"

[4 Q. × 5 = 20 marks]

Attempt *ANY FOUR* questions.

1. What does schedule 40 means? Explain the working of a variable area flow meter with diagram? Explain cavitation & how it affects pump? [1+2+2]

2. Differentiate between core flow and mass flow out of silo? Compare between belt and screw conveyor? [3+2]

3. Starch powder with 0.5% moisture is to be transported across the plant floor on same level using a standard screw conveyor. Assume, $\rho_s = 1000 kg/m^3$, speed of the screw shaft is 70 rpm & diameter of 25cm. with given $C_{fs} = 0.1$. Calculate throughput capacity Q? [5]

4. Explain, how working of plate & frame filter is different compared to rotary vacuum drum filter? Explain the working of gravity sand filter along with diagram? [3+2]

5. Explain how 'Thermosyphon reboiler' works along with diagram? What are 'fins' and why it's used in heat exchangers? [3+2]

SECTION "C"

[5 Q. × 4 = 20 marks]

Attempt *ANY FIVE* questions.

6. Explain the working of Multi-Effect-Evaporator with diagram? [4]

7. Name and explain working of any two type of non-mechanical type mixer, along with diagam? [4]

8. Explain the working of circular clarifier with schematic diagram? A pulse of wash water from brewhouse bed filter (filter clay) is delivered to effluent treatment plant with, particle properties; size: 5.0×10^{-5} m, density: 2500 kg m^{-3} and viscosity of fluid $1.0 \times 10^{-3} kg.m^{-1}s^{-1}$. How long will it take for these particles to settle to depth of 1 meter in sedimentation tank? [2+2]

9. Explain how the shape and size of agitator affects a mixing operation? Why vortex forms during mixing operation? [2+2]

10. Explain any two mechanisms for size reduction along with their schematic diagram. Explain any two methods for particle size enlargement with diagram? [2+2]

11. Mention principle of ESP. Also, explain it's working with diagram? [4]

KATHMANDU UNIVERSITY
End Semester Examination [C]
November/December, 2023

Marks Scored:

Level : B.Arch.
Year : III
Course : CIEG 341
Semester : II
Exam Roll No. :
Time: 30 mins.
F. M. : 10
Registration No.:
Date 27 NOV 2023

SECTION "A"
[20 Q. × 0.5 = 10 marks]

Choose and encircle the most appropriate option. *Use of code IS 800:2007 & IS 883:1994 is not allowed in this section.*

1. Which of the following is a serviceability criteria?
   a. Stability against overturning
   b. Fire resistance
   c. Sway stability
   d. Fatigue

2. If S_d represents design strength, S_u represents ultimate strength and γ_m represents partial safety factor, then which of the following relation is correct?
   a. $S_d = \gamma_m S_u$ b. $S_d = \gamma_m / S_u$ c. $S_d = S_u / \gamma_m$ d. $S_u = S_d / \gamma_m$

3. The area at root of threads for a bolt of nominal diameter 16mm is _____
   a. 156.83 mm^2 b. 201.06 mm^2 c. 174.92 mm^2 d. 134.71 mm^2

4. If d is the nominal diameter of bolt and d_o is the diameter of hole, then minimum spacing between bolts according to IS 800:2007 is_____
   a. $2.5d_o$ b. $1.5d$ c. $2.5d$ d. $1.5d_o$

5. Minimum size of fillet weld according to IS 800:2007 is_____
   a. 5mm b. 6mm c. 2mm d. 3mm

6. The effective length of fillet weld is _____
   a. Total length - 2 × throat thickness
   b. Total length + 2 × weld size
   c. 0.7 × total length
   d. Total length - 2 × weld size

7. The best tension member section will be a_____
   a. Bolted single angle section
   b. Welded single angle section
   c. Double-angle section on opposite side of gusset plate
   d. Channel section

8. The effective slenderness ratio of a laced column is increased by:
   a. 5% b. 10% c. 15% d. 20%

9. For the block shear failure of a tension member, the failure occurs along a path through the connection involving _____
   a. Tension on one plane and shear on the other perpendicular plane
   b. Tension on the plane of connection and compression on the other perpendicular plane
   c. Tension on the two perpendicular planes
   d. Shear on the two perpendicular planes

10. For connecting lacing flats to column sections with 18 mm diameter bolt, the minimum width of flat should be _____
a. 36 mm b. 54 mm c. 64 mm d. 92 mm

11. The compressive strength of concrete (f_{ck}) is given as 25 N/mm^2. Taking bearing strength of concrete as $0.45f_{ck}$, the size of a square base plate required to carry an axial load of 600 kN is _____
a. 154.92 mm b. 259.80 mm c. 387.30 mm d. 230.94 mm

12. For a rolled steel beam ISMB 400 with web thickness 8.9 mm, the shear area is calculated as _____
a. 4000 mm^2 b. 2136.62 mm2 c. 3560 mm^2 d. 3401.58 mm^2

13. Which of the following type of section has lowest bending strength capacity?
a. Plastic b. Slender c. Compact d. Semi-compact

14. The minimum width of timber beam should be _____
a. 100 mm b. 75 mm c. 150 mm d. 50 mm

15. Form factor for solid circular timber section is _____
a. 1.18 b. 1.28 c. 1.38 d. 1.08

16. The slenderness ratio for short timber columns are limited to _____
a. 12 b. 15 c. 11 d. 9

17. A circular timber column is of diameter 500mm, if it's unsupported length is 4m, the slenderness ratio of column is _____
a. 8.0 b. 10.25 c. 7.62 d. 9.02

18. The wall which carries horizontal load in its own plane is known as _____
a. Retaining wall c. Load bearing wall
b. Shear wall d. Out of plane wall

19. Which of the following is NOT included in calculation of permissible stress of masonry wall?
a. Partial safety factor c. Stress reduction factor
b. Area reduction factor d. Shape modification factor

20. Which of the following is the correct method for increasing the seismic resistance of masonry wall?
a. Decreasing the thickness of wall
b. Keeping large openings for door and windows
c. Using horizontal bands at different levels
d. Increasing the length of wall