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C20-CHST–504

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BOARD DIPLOMA EXAMINATION, (C-20)

OCTOBER/NOVEMBER—2023

DCHST – FIFTH SEMESTER EXAMINATION

SUGAR EQUIPMENT CAPACITY CALCULATIONS

Time : 3 Hours] [*Total Marks* : 80

PART—A

3×10=30

Instructions : (1) Answer **all** questions.

(2) Each question carries **three** marks.

(3) Answers should be brief and straight to the point and shall not exceed five simple sentences.

1. Find the number of spray nozzles required for a plant of 2500 TCD.

2. Find the imbibition water weighing tank capacity at 6 minutes retention time.

3. Given : crushing capacity = 2500 TCD, mixed juice % cane = 105, MOL consumption = 1·6% on juice by volume, concentration of MOL = 10 Beaume and 1 liter MOL contains 95 gms of CaO. Find the lime consumption by weight.

4. For plant of 2500 TCD, find the length of horizontal portion as well as inclined portion of a carrier in which height of the inclined portion is 8 m and the angle of slope $\varphi = 18°$

5. Write the steam consumption for any two of the following units of a 2500 TCD sulphitation plant *(a)* juice heaters, *(b)* evaporators and *(c)* pans.

6. From the following data, calculate the mill capacity in TCH using E. Hugot formula :

Data :

Coefficient of preparatory devices	=	1·15
Length of the roller	=	1·7 m
Roller speed	=	4.5 rpm
No. of rollers in the milling tandem	=	15
Dia of the roller	=	0·85 m
Fiber per unit cane	=	0·15

7. From the following data, calculate the pressure drop (loss of head) in juice heater :

Data :

Crushing capacity	= 2500 TCD
Velocity of juice	= 2 m/sec
Inside dia of the tube	= 0.042 m
No. of passes	= 15
Length of the tubes	= 4 m

8. Given : Evaporation in the first body of Quad = 16,000 kg/hr. Specific volume of the vapour = 1·4 m^3/kg and vapour velocity = 25 m/sec. Find the diameter of vapour pipe line from the first body to second body calendria.

9. Find the quantity of bagacillo required to make mud magma at Oliver filter station.

10. Given : juice sulphitor retention time = 10 minutes, working height = 2 m, mixed juice%cane = 110 and crushing capacity = 2500 TCD, find the diameter of the juice sulphitor.

PART—B

8×5=40

Instructions : (1) Answer **all** questions.

(2) Each question carries **eight** marks.

(3) If any data is not given assume your own relevant data.

11. *(a)* Write the differences between gravity and a non gravity plants. Also explain their advantages and disadvantages.

(OR)

(b) Given plant capacity = 2500 TCD

(i) A massecuite%cane = 30

(ii) A m/c boiling time = 4 hrs

(iii) B massecuite%cane = 10

(iv) B m/c boiling time = 6 hrs.

(v) C massecuite%cane = 07

(vi) C m/c boiling time = 12 hrs.

If a pan of 50 tons capacity is designed, find the number of pans required for A, B and C boilings.

12. *(a)* Explain the primary points which should be taken into consideration while selecting the site for a sugar industry.

(OR)

(b) Write the constructional details and working operation of a SO_2 burner.

13. *(a)* Given: Plant capacity = 2500 TCD

Mixed juice% cane = 105

Specific heat of the juice = 0.9

Temperature of the heating media = 105 °C

Temperature of the incoming juice = 30°C

Temperature of the outgoing juice = 60 °C

Velocity of the juice = 2 m/sec

From the above given data, find the heating surface required to heat the mixed juice by using vertical type of juice heater.

(OR)

(b) For a plant of 2500 TCD find the following to operate a cooling tower :

(i) Cubic contents of tower

(ii) Platform area required

(iii) Capacity of cistern required

14. *(a)* For a plant of 2500 TCD given :

Clear juice%cane = 98

Clear juice brix = 15

Brix of the syrup = 60

Retention time = 15 minutes

Working height = 1.5 m

Assume 1.3 ton of syrup approximately equal to 1 cum of syrup, find the diameter of syrup sulphitor.

(OR)

(b) Draw the various entrainment catchers used in sugar industry and identify the various parts.

15. *(a)* Draw the diagram of multijet condenser and identify the various parts.

(OR)

(b) Crushing rate = 2500 TCD

Brix of the clear juice = 15

Brix of the syrup = 60

Clear juice % cane = 95

Brix % massecuite = 95

Calculate the injection water required to operate barometric condenser.

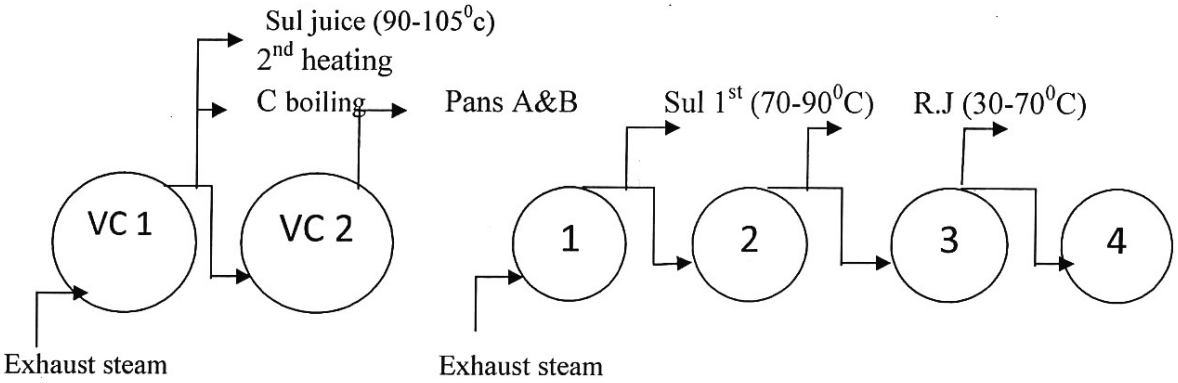
PART—C

10×1=10

Instructions : (1) Answer the following question.

(2) The question carries **ten** marks.

16. Calculate the steam consumption on % cane for the following bleeding arrangement of a double effect evaporator :



Clear juice brix = 15, Syrup brix = 60, A m/c % cane = 30, B m/c % cane = 10, C m/c% cane = 7, Latent heat (L) for Sul juice 2nd heating = 538, L = 544 (R. J heating) and L = 538 (S.J-1st heating).

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