MAHARASHTRA AGRICULTURAL UNIVERSITIES EXAMINATION BOARD, PUNE
SEMESTER END EXAMINATION
B.Tech. (Agril. Engg.)

Semester	: **V (New)**	**Term**	: **I**	**Academic Year**	: **2016-17**
Course No.	: IDE 354	**Title**	: **Drainage Engineering**		
Credits	: 3(2+1)				
Day & Date	: Friday, 11.11.2016	**Time**	: 14.00 to 17.00	**Total Marks**	: **80**

Note :
1. Solve **ANY EIGHT** questions from **SECTION "A".**
2. All questions from **SECTION "B"** are compulsory.
3. All questions carry equal marks.
4. Draw neat diagrams wherever necessary.

SECTION "A"

Q.1 a) Enlist and explain in brief the causes of waterlogging.

b) Differentiate between land smoothing and surface grading.

Q.2 a) Explain in brief about the information to be obtained from drainage surveys.

b) The drainage coefficient of a land is 10 mm. Calculate the capacity required at the outlet end of the drainage ditch draining a watershed of 300 hectares.

Q.3 Derive and prove that the Hooghoudt's equation for drain spacing represents the equation of an ellipse.

Q.4 a) State with neat sketch the different layouts of drainage systems.

b) What is the importance of good drainage outlet? State the characteristics of outlet structures.

Q.5 a) Explain the different components of drainage flow considered in Ernst equation.

b) Explain with neat sketch the Glover-Dumm equation for drain spacing.

Q.6 Design the main open drain with bed slope of 0.1% to drain the catchment area of 6 km^2 with a drainage coefficient of 66 mm/day, assuming the value of Manning's coefficient to be 0.03. The type of soil permits a side slope of 1.5:1. The depth of the drain at the outlet can't exceed 1.5 m, based on the topography of the area and the elevation of the outlet.

Q.7 a) What is vertical drainage? Give its advantages.

b) Determine the depth of irrigation water, which would change 30 cm depth of loam soil into saline condition, if the EC of irrigation water is 1 mmhos/cm, the density of the soil is 1.2 gm/cm^3 and the density of water is 1 gm/cm^3. The saturation percentage of the soil is 40.

Q.8 a) Describe the diagnosis of salt affected soils.

b) What are the main causes for the development of salinity and alkalinity in soils.

Q.9 Calculate the spacing between drains of a subsurface drainage system in a homogeneous soil to control the water table under following condition.

Design discharge rate is 1 mm/ day; Depth of root zone below soil surface is 1 m; Depth of drains is 2m ; Drain pipes of PVC with a radius of 0.10 m; Depth of impervious layer is 6.8 m; Hydraulic conductivity of the soil 0.14m/day. (Given: Hooghoudt's equivalent depth: for S = 75 m; d = 3.40 m; for S = 65 m, d = 3.22 m and for S=50 m; d= 2.96)

(P.T.O)

Q.10 Write short notes (Any two).

1) Bio-drainage.
2) Drainage criteria under steady and unsteady conditions.
3) Drain Envelope.

SECTION "B"

Q.11 Fill in the blanks.

1) In isotropic soil, hydraulic conductivity is _____ in all directions.
2) An agricultural land is said to be _____ when the high water table affects its productivity.
3) The type of soil water which cannot be utilized by the crops from the soil is called _____.
4) _____ is the most widely used chemical additive for the replacement of sodium in alkali soils.
5) _____ is always expressed as the depth in centimeters of water drained off form a given area in 24 hours.
6) Electrical conductivity of saline soil is more than _____.
7) _____ is provided to restrict the soil particles from entering the drainage pipe.
8) _____ is the ratio of electrical conductivity of irrigation water to the electrical conductivity of drainage water.

Q.12 State True or False.

1) Drainage removes only capillary water from the soil.
2) Lime is required to reclaim alkali soils.
3) Subsurface ground water is removed by shallow ditches.
4) Exchangeable sodium percentage of alkali soil is less than 15 per cent.
5) The depth of field drain is governed by outlet conditions.
6) "Kd/ μ" stands for the drainage criterion for steady state groundwater conditions.
7) An open ditch if extended below water table removes subsurface ground water.
8) In most cases the hydraulic conductivity decreases with depth due to accumulation of clay found in the subsoil.

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MAHARASHTRA AGRICULTURAL UNIVERSITIES EXAMINATION BOARD, PUNE
SEMESTER END EXAMINATION

B.Tech. (Agril. Engg.)

Semester	: **V (New)**	**Term**	: **I**	**Academic Year**	: **2016-17**
Course No.	: APE 356	**Title**	: **Drying of Farm Crops**		
Credits	: 2(1+1)				
Day & Date	: Saturday, 12.11.2016	**Time**	: 14.00 to 16.00	**Total Marks**	: **40**

Note : 1. Solve **ANY EIGHT** questions from **SECTION "A".**
2. All questions from **SECTION "B"** are compulsory.
3. All questions carry equal marks.
4. Draw neat diagrams wherever necessary.

SECTION "A"

Q.1 Explain the principle of drying. What are constant rate and falling rate drying periods.

Q.2 The wheat weighing 5000 kg with a moisture content of 0.125 (wb) is required for a research project on grain storage. It was decided that the available freshly harvested wheat with moisture content of 0.25 (db) should be procured and then it will be dried to a moisture content of 12.50 % on wet basis. How many kilogram of freshly harvested wheat are to be procured.

Q.3 Explain the working of LSU dryer.

Q.4 Air at temperature of 35 ^{0}C and 25 % relative humidity is heated to 45 ^{0}C and this air enters a bed of parboiled paddy. The mass flow rate of air is 2.0 kg/s. The air leaves the drier under saturated condition. Determine the moisture removal rate. Use psychrometric chart.

Q.5 Give importance of and different methods to determine equilibrium moisture content.

Q.6 Determine values of c and n from Henderson's equation for the following data obtained for thin layer drying studies.

RH = 35 %	t = 55 ^{0}C	Me = 11.5% (db)
RH = 55 %	t = 55 ^{0}C	Me = 16.5% (db)

Q.7 Designate moisture content. Derive expression for converting moisture content from wet basis to dry basis and vice versa.

Q.8 The purchaser purchased 500 kg of arhar dal costing Rs. 180/kg. It was later found that the dal contained 12 % (wb) moisture content. As the pulses have storage moisture of 10 % (wb), calculate monetary loss to the purchaser.

Q.9 Give steps in final selection of dryer.

Q.10 In an experiment on thin layer drying of rough rice at 55 ^{0}C and relative humidity of 22 %, the following data was observed.

Time (min)	10	30	60	90	120	180	230	270
m.c.%(db)	42.55	34.92	28.29	23.92	20.70	16.62	14.81	13.75

The initial and equilibrium moisture contents are 46.50 % (db) and 11.75 % (db), respectively. Compute drying constant 'k' for thin layer drying equation $MR=e^{-kt}$ by regression of the logarithmic moisture ratio to time for the given data.

(P.T.O.)

SECTION "B"

Q.11 Define the following terms.

1) Equilibrium moisture content
2) Dehydration
3) Hysteresis
4) Drying

Q.12 Do as directed.

1) What is water activity?
2) Convert 18 % wb moisture to fraction db moisture.
3) What is thin layer drying?
4) Which is the indirect method to determine moisture content?

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MAHARASHTRA AGRICULTURAL UNIVERSITIES EXAMINATION BOARD, PUNE
SEMESTER END EXAMINATION

B.Tech. (Agril. Engg.)

Semester	: **V (New)**	**Term**	: **I**	**Academic Year**	:	**2016-17**	
Course No.	: FS 353	**Title**	: **Strength of Materials**				
Credits	: 3(2+1)						
Day & Date	: Tuesday, 15.11.2016	**Time**	: 14.00 to 17.00	**Total Marks**	:	**80**	

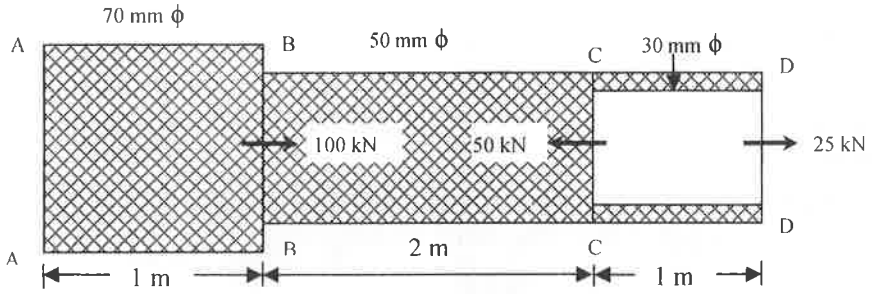
Note : 1. Solve **ANY EIGHT** questions from **SECTION "A".**
2. All questions from **SECTION "B"** are compulsory.
3. All questions carry equal marks.
4. Draw neat diagrams wherever necessary.

SECTION "A"

Q.1 a) A steel rod 2 m long and 20 mm × 20 mm in cross section is subjected to tensile force of 80 kN. Determine elongation of the rod if modulus of elasticity for rod material is 200 GPa.

b) Derive an expression for maximum stress in bar of circular tapering section.

Q.2 A circular steel rod ABCD of different cross sections is loaded as shown in figure. Find maximum stress induced in the rod and its deformation. Take E as 200 GPa.



Q.3 a) A circular bar rigidly fixed at its both ends uniformly tapers from 90 mm at one end to 60 mm at the other end. If its temperature raised through 26^0K, what will be the maximum stress developed in the bar. Take E as 200 GPa and α as 12×10^{-6} / ^{0}K for the bar material.

b) Derive an expression for thermal stresses in bar of circular tapering section.

Q.4 a) A steel bar 3 m long, 40 mm wide and 20 mm thick is subjected to an axial pull of 160 kN in the direction of its length. Find the changes in length, width and thickness of the bar. Take E = 200 GPa and Poisson's ratio = 0.3.

b) Derive an expression for volumetric strain, if a rectangular body is subjected to three mutually perpendicular forces.

Q.5 a) Calculate the strain energy stored in bar of 2 m long and 2000 mm^2 in cross section area subjected to tensile load of 60 kN. Take E = 200 GPa.

b) Show that stress induced in the body when load is applied suddenly is twice than, the stress induced when same load is gradually applied.

Q.6 A simply supported beam 6 m long is carrying a uniformly distributed load of 5 kN/m over a length of 3 m from the right end. Draw the S.F. and B.M. diagram for the beam and also calculate the maximum B.M. on the section.

Q.7 Two plates 10 mm thick are joined by a double riveted lap joint. The pitch of each row of rivets is 50 mm. The rivets are 20 mm in diameter and permissible stresses in shearing and bearing of rivets are 70 MPa and 160 MPa, respectively. The permissible stress in tearing of plate is 100 MPa. Determine the efficiency of the joint.

(P.T.O.)

Q.8 a) State the assumptions in the Euler's column theorem.

b) State any two types of end conditions of the column and also formula to calculate crippling load.

Q.9 a) A simply supported beam 3 m long is subjected to a central load of 10 kN. Find maximum slope and deflection of the beam. Take E as 200 GPa and $I = 12 \times 10^6 mm^4$.

b) State various methods to find the slope and deflection of beam and explain any one.

Q.10 a) Show that bending stress in beam at any point is directly proportional to the distance of it from the neutral axis.

b) Derive formula for limit of eccentricity of a circular section.

SECTION "B"

Q.11 Define the following terms.

1) Strength of materials
2) Tensile stress
3) Bulk modulus
4) Volumetric strain
5) Poisson's ratio
6) Modulus of resilience
7) Eccentric load
8) Bending stress

Q.12 Choose the correct answer.

1) Modulus of elasticity is the ratio of _____.

a) Stress to strain
b) Stress to original length
c) Deformation to original length
d) All of these

2) A simply supported beam of span (l) is subjected to uniformly distributed load of (w) per unit length over the whole span. The maximum deflection at centre of beam is _____.

a) $5wl^5 / 48\ EI$
b) $5wl^4 / 96\ EI$
c) $5wl^4 / 192\ EI$
d) $5wl^3 / 384\ EI$

3) The ratio of lateral strain to the linear strain is called _____.

a) Modules of elasticity
b) Modulus of rigidity
c) Bulk modulus
d) Poissons ratio

4) The maximum stress produced in bar of tapering section is at _____.

a) Larger end
b) Smaller end
c) Middle
d) Any where

5) In a composite section, the number of different material are _____.

a) Only one
b) Only two
c) More than two
d) All of these

6) The section modulus of a circular section of diameter (d) is _____.

a) $\pi (d^2) / 32$
b) $\pi (d^3) / 32$
c) $\pi (d^3) / 64$
d) $\pi (d^4) / 64$

7) The bending moment at the free end of a cantilever beam carrying any type of load is _____.

a) Zero
b) Minimum
c) Maximum
d) Equal to the load

8) The maximum eccentricity of a load on a circular section to have same type of stress is _____.

a) One eighth of diameter
b) One sixth of diameter
c) One fourth of diameter
d) One third of diameter

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MAHARASHTRA AGRICULTURAL UNIVERSITIES EXAMINATION BOARD, PUNE
SEMESTER END EXAMINATION

B.Tech. (Agril. Engg.)

Semester	: **V (New)**	**Term**	: **I**	**Academic Year**	: **2016-17**
Course No.	: SWCE 355	**Title**	: **Soil Conservation Structures Design**		
Credits	: 3(2+1)				
Day & Date	: Wednesday, 16.11.2016	**Time**	: 14.00 to 17.00	**Total Marks**	: **80**

Note : 1. Solve **ANY EIGHT** questions from **SECTION "A".**
2. All questions from **SECTION "B"** are compulsory.
3. All questions carry equal marks.
4. Draw neat diagrams wherever necessary.

SECTION "A"

Q.1 State and explain classification of open channel flow according to change in flow depth.

Q.2 a) State the difference between energy and momentum principles, applied to flow problems.

b) State the functional requirement of soil erosion control structures.

Q.3 Explain the phenomenon of hydraulic jump. Describe different types of hydraulic jump corresponding to Froude number.

Q.4 Design a drop spillway for a watershed whose drainage area is 58 ha. The drop is 2 m. The rainfall intensity considered for duration equal to time of concentration of watershed and frequency of 25 years, is 120 mm/hr. Assume coefficient of runoff as 0.30. 'h/f' ratio for crest lengths 4.5, 4.0 and 3.5 m, are 0.55, 0.40 and 0.45, respectively.

Q.5 Explain design criteria of SAF stilling basin.

Q.6 a) State the criteria of possible flow conditions in drop inlet spillway.

b) Determine the capacity of a 762 mm diameter corrugated culvert (pipe spillway) 18.29 m long with square edged entrance. Elevation of inlet is 127.92 m and the elevation of outlet is 127.71 m. Headwater elevation is 129.54 m and tailwater elevation is 126.80 m. Assume, $K_e = 0.5$, $K_c = 0.112$ and neglect losses due to bends.

Q.7 A dam of trapezoidal section with vertical fall has top width of 1.5 m, base width of 3.0 m and height of 6.0 m. It impounds water to a height of 5.5 m. Test the structure for stability analysis. Assume density of masonry as 2.2 g/cm^3, density of water as 1.0 g/cm^3, coefficient of friction as 0.50 and bearing capacity of soil as 25,000 kg/m^2.

Q.8 Describe different types of earthen dam.

Q.9 Describe the various external forces acting on gravity dam.

Q.10 Describe different types of weirs used for channel flow measurement.

(P.T.O.)

SECTION "B"

Q.11 Fill in the blanks.

1) The effect of viscosity and gravity, relative to inertia, upon state of flow is represented respectively by, _____ number and _____ number.

2) At critical state of flow, the velocity head is equal to the half of _____.

3) Vegetated waterways are laid _____ the slope, while the diversion drains are laid _____ the slope.

4) To avoid tension within the structure, the resultant of forces should lie within the middle third of the _____.

5) In drop spillway, freeboard is provided to prevent _____ from head wall.

6) _____ wall prevents undercutting on downstream side of the structure.

7) Antiseep collars are provided in drop inlet spillway to prevent _____ along the conduit pipe.

8) _____ of earthen embankment in fine grained soils is attained faster as compared to that in coarse grained soils.

Q.12 Define the following terms.

1) Specific force

2) Energy dissipater

3) Dugout pond

4) Eccentricity

5) Spillway

6) Critical depth

7) Flume

8) Freeboard

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MAHARASHTRA AGRICULTURAL UNIVERSITIES EXAMINATION BOARD, PUNE
SEMESTER END EXAMINATION

B.Tech. (Agril. Engg.)

Semester	: **V (New)**	**Term**	: **I**	**Academic Year**	: **2016-17**
Course No.	: APE 357	**Title**	: **Storage Engineering**		
Credits	: 2(1+1)				
Day & Date	: Thursday, 17.11.2016	**Time**	: 14.00 to 16.00	**Total Marks**	: **40**

Note :
1. Solve **ANY EIGHT** questions from **SECTION "A".**
2. All questions from **SECTION "B"** are compulsory.
3. All questions carry equal marks.
4. Draw neat diagrams wherever necessary.

SECTION "A"

Q.1 Enlist major causes of food deterioration and state the common methods of food preservation.

Q.2 Describe the design parameters suitable for cooling of dry grains by aeration and also state the benefits of aeration.

Q.3 a) A fan delivers air at a flow rate of 15 m^3s^{-1} against static pressure of 150 mm water gauge. Determine the static efficiency of fan if power required to operate the fan is 30 kW.

b) The particulars of a fan used in a drying system are given below.

1) Air flow rate = 12 m^3s^{-1}
2) Total pressure head = 600 Pa,
3) Specific volume of air = 0.88 m^3kg^{-1}
4) Efficiency of motor = 65 %.
5) Pressure loss per m = 11.2 Pa

Determine the power requirement of fan.

Q.4 State the fan laws with formulae.

Q.5 Explain the spoilage of grains stored in bins during winter and summer season with neat diagram.

Q.6 Write short notes.

1) Hoper bottom vertical silos
2) Squat silos

Q.7 Differentiate between deep and shallow bins with neat diagram.

Q.8 Wheat weighing 900 kg m^{-3} is loaded in a circular concrete silo of 3 m internal diameter and clear height of 8 m. The angle of internal friction for wheat is 25^o and that for wheat and concrete is 24^o. By applying Airy's theory calculate the maximum lateral pressure at the bottom of the bin.

Q.9 Design a bag storage structure for storing 250 tonnes of paddy with a stack of 10 bags in length and 10 bags in width. Each bag is 85 cm long, 60 cm wide and 30 cm high. Give complete floor plan of storage structure (godown). Assume reasonable data wherever necessary but state them clearly.

Q.10 Enlist the different traditional storage structures and explain the CAP storage structure

(P.T.O.)

SECTION "B"

Q.11 Fill in the blanks.

1) Foods with high acid content are processed at _____ °C.

2) The bacteria that grow well at refrigerator temperature are called _____ bacteria.

3) In deep bins, the depth of grain is _____ than equivalent diameter.

4) The foods are classified as acid food or non-acid food depending on whether the pH is below or above _____.

Q.12 Define the following terms.

1) Food spoilage

2) Angle of rupture

3) Aeration

4) Food intoxication

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MAHARASHTRA AGRICULTURAL UNIVERSITIES EXAMINATION BOARD, PUNE
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B.Tech. (Agril. Engg.)

Semester	: V (New)	**Term**	: I	**Academic Year**	: 2016-17
Course No.	: FS 354	**Title**	: **Agricultural Structures and Environmental Control**		
Credits	: 3(2+1)				
Day & Date	: Friday, 18.11.2016	**Time**	: 14.00 to 17.00	**Total Marks**	: 80

Note : 1. Solve **ANY EIGHT** questions from **SECTION "A".**
2. All questions from **SECTION "B"** are compulsory.
3. All questions carry equal marks.
4. Draw neat diagrams wherever necessary.

SECTION "A"

Q.1 Write salient features of improved farmhouse design with the help of a floor plan.

Q.2 State types of dairy barn. Explain stanchion barn.

Q.3 Enlist types of poultry houses? Explain deep litter poultry house.

Q.4 a) What is the significance of farm fencing? Enlist types of fencing.
b) Explain barbed wire fencing.

Q.5 What are the types of milking parlors? Differentiate between polygon herringbone and side opening milking parlor.

Q.6 What are the types of silo? Describe Pusa bin.

Q.7 Enlist source of water. Write a note on underground source of water.

Q.8 Why water treatment is required? Explain in short water treatment process.

Q.9 a) Which are the existing grain storage structures? What is the requirement of good storage structure?
b) Explain Marai type storage structure.

Q.10 Write short notes (Any Two).
1) Sheep house
2) Farm machinery storage structure
3) Bacteriological standard

SECTION "B"

Q.11 Define the following terms.

1) Humidity	2) CAP storage	3) Silage	4) Homeothermy
5) Septic tank	6) Convective heat transfer	7) Silo	8) Aquifuge

Q.12 State True or False

1) The polygon herringbone design is one of the most efficient particularly when milking parlor is fully mechanized.
2) Side opening milking parlor is also known as tandem.
3) One 5 W bulb per 100 sq.ft. (9 m^2) is usually considered satisfactory for inspection of equipments and birds in poultry housing.
4) Water bearing layer is called aquifer.
5) In plain sedimentation process suspended impurities like silt, clay and sand are removed.
6) The fecal and urinary waste of ruminants decreases with cold weather.
7) The Kothar type of storage structure is having capacity ranging from 9 to 35 tons.
8) The maximum length of the barn should be restricted to 40 m so that nearly 72 cows can be household in one barn unit.

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MAHARASHTRA AGRICULTURAL UNIVERSITIES EXAMINATION BOARD, PUNE
SEMESTER END EXAMINATION
B.Tech. (Agril. Engg.)

Semester	: **V (New)**	**Term**	: **I**	**Academic Year**	: **2016-17**
Course No.	: APE 355	**Title**	: **Dairy and Food Engineering**		
Credits	: 3(2+1)				
Day & Date	: Saturday, 19.11.2016	**Time**	: 14.00 to 17.00	**Total Marks**	: **80**

Note :
1. Solve **ANY EIGHT** questions from **SECTION "A".**
2. All questions from **SECTION "B"** are compulsory.
3. All questions carry equal marks.
4. Draw neat diagrams wherever necessary.

SECTION "A"

Q.1 Describe the term homogenization. Give the function and operation of poppet valve.

Q.2 If a slab of meat is to be frozen between refrigerates plates with plate temperature -34 ^{0}C, how long will it take to freeze if the slab is 10 cm thick and the meat is wrapped in cardboard of 1 mm thick on either side of the slab? What will be freezing time in the absence of cardboard? Assume that for the plate freezer the surface heat transfer coefficient is 600 J/m^2 s ^{0}C, the thermal conductivity of cardboard is 0.06 J/m s^{0}C, the thermal conductivity of frozen meat is 1.6 J/m s^{0}C, its latent heat is 2.56×10^5 J/kg and density 1090 kg/m^3. Assume also that meat freezes at -2^{0}C

Q.3 a) Enlist different types of dryers used in food industries. Explain in brief pneumatic dryer.

b) Classify in detail various methods of food preservation.

Q.4 An autoclave contains 1000 cans of pea soup. It is heated to an overall temperature of 100 ^{0}C. If the cans are to be cooled to 40^{0}C before leaving the autoclave, how much cooling water is required if it enters at 15^{0}C and leaves at 35^{0}C? The specific heat of pea soup and can metal are 4.1kJ/kg^{0}C and 0.50 kJ/kg^{0}C, respectively. The weight of each can is 60 g and it contains 0.45 kg of pea soup. Assume that the heat content of autoclave walls above 40^{0}C is 1.6×10^4 kJ and there is no heat loss through the walls.

Q.5 A dryer reduces the moisture content of 100 kg of potato product from 80 % to 10 % moisture. If 250 kg of steam at 70 kPa is used to heat 49800 m^3 of air to 80^{0}C and if the air cooled to 71^{0}C in passing through the dryer, calculate the efficiency of the dryer in terms of heat supplied a) from the air and b) from the steam. The specific heat of potato is 3.43 kJ kg^{-1} ^{0}C. Assume potato enters at 24^{0}C and leaves at the same temperature as the exit air.

Q.6 Enlist methods of milk pasteurization and explain in detail HTST pasteurization.

Q.7 What are the methods used for plant sterilization? Explain in detail any one of them.

Q.8 Describe the term filtration. Derive fundamental equation for filtration.

Q.9 a) Explain thermal death time curve.

b) What are the basic factors affecting rate of evaporation.

Q.10 Write short notes (Any Two).

1) Membrane separation
2) In-place cleaning of plant
3) Single effect evaporator

(P.T.O.)

SECTION "B"

Q.11 Fill in the blanks.

1) Butter oil refers to the _____ obtained mainly from butter or cream by the removal of all the water and solids-not-fat.

2) Boiling point elevation _____ with increase in concentration of solids in the fluid.

3) The freezing point of milk is always _____ than water.

4) Sugar concentration is measured in _____ units.

5) In homogenization process the viscosity of milk is _____.

6) An average specific gravity of milk is _____.

7) When n = 1, the fluid is known as _____.

8) Rate of filtration = _____ / Resistance.

Q.12 State True or False.

1) *Clostridium botulinum* is food poisoning bacteria.

2) The temperature of chilling is in the range of -2 to 2^0C.

3) The curd tension of milk decreases due to homogenization.

4) Mole fraction is the ratio of moles of solute to the total number of moles of all species present in the solution.

5) Multiple effect evaporators are not connected in series.

6) The SI unit of pressure is joule.

7) Pasteurization is a heat treatment applied to foods which is more drastic than sterilization.

8) All unit operations do not obey the laws of conservation of mass and energy.

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MAHARASHTRA AGRICULTURAL UNIVERSITIES EXAMINATION BOARD, PUNE
SEMESTER END EXAMINATION

B.Tech. (Agril. Engg.)

Semester	: **V (New)**	**Term**	: **I**	**Academic Year**	: **2016-17**
Course No.	: FMP 359	**Title**	: **Farm Machinery and Equipment –II**		
Credits	: 2(1+1)				
Day & Date	: Monday, 21.11.2016	**Time**	: 14.00 to 16.00	**Total Marks**	: **40**

Note : 1. Solve **ANY EIGHT** questions from **SECTION "A".**
2. All questions from **SECTION "B"** are compulsory.
3. All questions carry equal marks.
4. Draw neat diagrams wherever necessary.

SECTION "A"

Q.1 a) Give different liquid formulations used for plant protection.

b) Describe calibration of manually operated hydraulic energy sprayer.

Q.2 a) What is the difference between reaper windrower and reaper binder?

b) What is the requirement of field and crops for mechanized reaper windrower?

Q.3 a) Give principle of cutting crop.

b) Enlist the basic operations required to perform in a harvesting combine.

Q.4 a) Enlist different type of reapers.

b) What power is required to pull 1.2 m mower working at a speed of 4.8 km/hr, if there is a load of 50 kg/m length of mower and mechanical efficiency is 80%.

Q.5 a) Give different types of chaff cutters.

b) Explain each in one line about the dropping position type of chaff cutters.

Q.6 a) Enlist the different types of mower.

b) Give parts of conventional mower with their function.

Q.7 a) Give the types of cotton harvesters.

b) Explain the principle of operation of spindle in cotton picker.

Q.8 How to measure 1) Operating speed of tractor 2) Fuel consumption of tractor.

Q.9 a) Enlist the points considered to compute the suitable horse power of the tractor.

b) Give considerations for selection of better tractor after computing the horse power.

Q.10 Write short notes on.

1) Knapsack sprayer 2 Rotary type hand duster

(P.T.O.)

SECTION "B"

Q.11 State True or False.

1) Wearing plate is a hardened steel plate attached to the finger bar to form a bearing surface for the back of the knife.

2) Windrow is a row of material formed by combining two or more swaths.

3) Pitman is a type of connecting rod which is pinned to the crankshaft with the help of a pin, which transmits reciprocating motion to a knife.

4) All the bolls whether open or closed are removed from the cotton plant in cotton picker.

Q.12 Fill in the blanks.

1) The spraying liquid to be delivered is done by using _____ energy where air is commonly used.

2) The rasp bar cylinder consists of number of _____ steel plates mounted axially on the periphery of the cylinder.

3) Knife is a reciprocating part of the_____, comprising of knife head, knife back and knife section.

4) The efficiency of harvesting combine is judged by its _____.

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MAHARASHTRA AGRICULTURAL UNIVERSITIES EXAMINATION BOARD, PUNE
SEMESTER END EXAMINATION

B.Tech. (Agril. Engg.)

Semester	: V (New)	**Term**	: I	**Academic Year**	: 2016-17
Course No.	: IDE 353	**Title**	: **Groundwater, Wells and Pumps**		
Credits	: 3(2+1)				
Day & Date	: Tuesday, 22.11.2016	**Time**	: 14.00 to 17.00	**Total Marks**	: 80

Note :
1. Solve **ANY EIGHT** questions from **SECTION "A".**
2. All questions from **SECTION "B"** are compulsory.
3. All questions carry equal marks.
4. Draw neat diagrams wherever necessary.

SECTION "A"

Q.1 a) Define steady state flow. Explain recovery test for determination of aquifer properties.

b) Derive the expression for steady state flow to wells in confined aquifer.

Q.2 a) What is the effect of change of pump speed and impeller diameter on pump performance.

b) Enlist different methods of surface and subsurface investigation of ground water.

Q.3 a) A well in a confined aquifer is pumped at a constant rate of 1500 lit/min. The drawdowns were measured in the piezometer after 60 minutes of pumping. The tests work as follows.

Distance of piezometer from centre of the well (m)	3	9	40	90
Drawdown	6.5	4.75	3.0	1.5

Using the test results calculate transmissibility values of different sections and the average transmissibility.

b) Enlist different methods of artificial groundwater recharge and explain any one.

Q.4 Write short notes (Any Two).

1) Well interference

2) Percussion drilling

3) Counterpoise bucket lift

Q.5 a) Explain principle of operation, construction and use of hydraulic ram.

b) A masonry well is to be constructed in a fine sand subsoil formation. The discharge of well is anticipated to be 15 m^3/h under depression head of 4 m. Determine the diameter of the well. The specific yield for fine sand subsoil formation is 0.5.

Q.6 Design the thickness of the brick lining of an open well having diameter of 2 m and depth of 10 m. The angle of repose of the soil is 25^0 and weight of soil is 0.016 kg/cm^3. First class brick masonry with 1:3 cement mortar, safe compressive stress is 15 kg/cm^2. Assume minimum thickness of brick 23 cm and unit weight of masonry 0.0023 kg/cm^2.

Q.7 a) Explain the pump characteristics curves for centrifugal pump.

(P.T.O.)

b) A farmer wishes to have his own pump for the following cropping pattern to be followed in his holdings of 3 ha. Calculate the right size of the centrifugal pump he should have. The crops proposed to be grown in different seasons, depth of irrigation, rotation periods and the duration of operation of the pump are as follows.

Season	Crop	Area to be irrigated	Irrigation depth per irrigation (cm)	Rotation period (days)	Period of work (hr/day)
Winter (rabi)	Wheat	3	7.5	15	10
Summer (kharif)	Maize	1	7.5	20	10
	Paddy	2	5.0	2	10

Q.8 a) Give principle of operation and classification of centrifugal pump.

b) What is priming of centrifugal pump.

Q.9 a) A pump lifts 1,00,000 litres of water per hour, against a total head of 20 meters. Compute the water horse power. If pump has an efficiency of 75 per cent, what size of prime mover is required to operate the pump, if a direct drive electric motor with an efficiency of 80 per cent is used to operate the pump. Compute the cost of electrical energy in a month of 30 days. The pump is operated for 12 hours daily for 30 days. The cost of electrical energy is Rs. 2/per unit.

b) What is principle of operation of mixed flow pump.

Q.10 Differentiate between (Any Two).

1) Volute centrifugal pump and diffuser centrifugal pump
2) Unconfined and confined aquifer
3) Horizontal centrifugal pump and vertical centrifugal pump.

SECTION "B"

Q.11 A) Fill in the blanks

1) The maximum possible suction lift for centrifugal pump is _____.
2) Power varies _____ of speed in centrifugal pump.
3) Gravel packing is used in _____ formation.
4) _____ type impeller is used for water containing considerable amount of small solids.

B) Define the following terms.

1) Effective size
2) Well curb
3) Specific discharge
4) Uniformity coefficient

Q.12 State True or False

1) Head is developed by lift of vanes in propeller pump.
2) Removing water from casing of centrifugal pump is called priming.
3) The head capacity curves of propeller pump are steeper than that of a centrifugal pump.
4) If two pumps are connected in parallel, their discharge will increase.
5) Hydraulic ram works on the principle of centrifugal force.
6) Confined aquifer is also called artesian aquifer.
7) Hoop stress developed in well lining is the maximum and twice the radial stress.
8) Housing pipe should be at least 5 cm more in diameter than the nominal diameter of pump.

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