# MAHARASHTRA AGRICULTURAL UNIVERSITIES EXAMINATION BOARD, PUNE
## SEMESTER END EXAMINATION

**B.Tech. (Agril. Engg.)**

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|---|---|---|---|---|---|
| **Semester** | : **V (Old)** | **Term** | : **I** | **Academic Year** | : **2018-19** |
| **Course No.** | : FS 354 | **Title** | : **Agricultural Structures and Environmental Control** | | |
| **Credits** | : 3(2+1) | | | | |
| **Day & Date** | : Monday, 12.11.2018 | **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) What is farmstead? Explain size and arrangement of farm stead.

b) Explain various rooms of improved farm house with plan.

Q.2 Compare at least with eight points stall barn verses loose housing barn.

Q.3 a) What factors to be considered while planning poultry house.

b) Explain in detail wire floored poultry house.

Q.4 a) What are the requirements of good storage structures?

b) Explain any two types of grain bins.

Q.5 a) What is the purpose of farm fencing?

b) Calculate cost of barbed wire fence for 25 hectare square farm.

Q.6 a) Write sensible heat balance equation and explain terms in it, for enclosed animal shelter.

b) What is the function of ventilation system in building?

Q.7 a) Sate and explain various heads on which rural sanitation is being carried out.

b) Explain bore hole latrines adopted in rural area.

Q.8 Explain design procedure for pit silo and trench silo.

Q.9 What is the object of treatment of water? Explain treatment process.

Q.10 Write short notes.

a) Farm machinery storage structures b) Quality of water

## SECTION "B"

Q.11 State True or False.

1) pH value of drinking is 3 to 5.
2) Stall barn is about 2 to 2.5 times more costly than loose housing barn.
3) Single stored poultry houses are preferred in warm regions.
4) The capacity of Bukkhari type storage structure varies from 9 to 35 tons.

**(P.T.O.)**

5) Turbidity of water is measured on platinum cobalt scale.

6) T.D.S. value of drinking is 500 (Acceptable).

7) Permanent tower type silos built of concrete, metal are not durable.

8) Plain wire fencing is more effective than barbed wire fencing.

Q.12 Define the following terms.

1) Silage
2) Aeration
3) Feed alley
4) Fence
5) Cess pool
6) Milking parlour
7) Infiltration
8) Rural sanitation

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# MAHARASHTRA AGRICULTURAL UNIVERSITIES EXAMINATION BOARD, PUNE
## SEMESTER END EXAMINATION

**B.Tech. (Agril. Engg.)**

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|---|---|---|---|---|---|
| **Semester** | : V (Old) | **Term** | : I | **Academic Year** | : 2018-19 |
| **Course No.** | : IDE 353 | **Title** | : Groundwater, Wells and Pumps | | |
| **Credits** | : 3(2+1) | | | | |
| **Day & Date** | : Thursday, 15.11.2018 | **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) Describe the procedure to determine the age of groundwater.

b) Enlist the techniques of artificial recharging of ground water. Explain any one of them.

Q.2 a) Describe design criteria of gravel pack.

b) What is priming? Explain in brief the techniques used for priming of centrifugal pumps.

Q.3 a) Explain the recovery method for determination of aquifer parameters.

b) Give classification of centrifugal pumps.

Q.4 a) Describe in brief semiconfined aquifer.

b) Explain principle of operation of propeller pump.

Q.5 a) State the effect of speed and impeller diameter on pump performance.

b) Describe reverse circulation hydraulic rotary drilling with neat sketch.

Q.6 a) Describe in brief principle of operation of hydraulic ram.

b) What is well development? Discuss the objectives of well development.

Q.7 State Thiem's assumptions for steady state flow to wells. Derive an expression for steady state flow to wells in unconfined aquifer.

Q.8 a) Explain electrical resistivity surveying method for investigation of groundwater.

b) Describe different types of wells.

Q.9 Write short notes.

a) Archimedian screw

b) Criteria for selection of location of well

Q.10 A pump lifts 200,000 litres of water per hour, against a total head of 30 meters. Compute the water horse power. If the pump has an efficiency of 75 per cent, what size of prime mover is required to operate the pump? If a direct-driven electric motor with an efficiency of 75 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 10 hours daily for 30 days. The cost of electrical energy is 40 paise per unit.

**(P.T.O.)**

## SECTION "B"

Q.11 Fill in the blanks.

1) An imaginary surface representing the hydrostatic pressure in confined aquifer is called_____.
2) The hoop and radial stresses developed in a well are principal stresses and _____ in nature.
3) Perched aquifer is a special case of _____ aquifer.
4) Turbine type pumps are usually used for _____ head conditions.
5) Specific yield is a property of _____ aquifer.
6) Hydraulic ram works on the principle of _____.
7) Tube wells are classified as shallow tube well, deep tube well and _____ well.
8) Uniformity coefficient ($C_u$) is expressed as the ratio of effective sizes $d_{60}$ and _____.

Q.12 State True or False.

1) When value of hydraulic resistance (c) is equal to zero, the layer is considered as aquifer.
2) Enclosed impeller is designed to pump clear water.
3) A gamma ray log is influenced by changes in water quality.
4) Principle of operation of centrifugal pump is production of high velocity and the total transformation of this velocity into pressure head.
5) Multiple- well system is useful in controlling water level in waterlogged soil.
6) Most commonly used manually operated water lifting devices are used only when depth of water does not exceed 1.2m.
7) Volute type pump is preferred for medium and large capacity medium and moderately high head applications.
8) Mixed flow pumps are applicable for low discharge medium-head conditions.

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# MAHARASHTRA AGRICULTURAL UNIVERSITIES EXAMINATION BOARD, PUNE
## SEMESTER END EXAMINATION

**B.Tech. (Agril. Engg.)**

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|---|---|---|---|---|---|
| **Semester** | : **V (Old)** | **Term** | : **I** | **Academic Year** | : **2018-19** |
| **Course No.** | : FS 353 | **Title** | : **Strength of Materials** | | |
| **Credits** | : 3(2+1) | | | | |
| **Day & Date** | : Monday, 19.11.2018 | **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 1 m long and 20mm x 20mm in cross section is subjected to a tensile force of 40 KN. Determine the elongation of the rod, if the modulus of elasticity for the rod material is 200 Gpa.

b) A steel bar 2m long, 40 mm wide and 20 mm thick is subjected to an axial pull of 160 KN in the direction of length. Find the changes in length, width and thickness of the bar. Take E = 200 Gpa and Poisson's ratio = 0.3.

Q.2 For a given material, Young's modulus is 120 Gpa and modulus of rigidity is 40 Gpa. Find the bulk modulus and lateral contraction of a round bar of 50 mm diameter and 2.5 mm long, when stretched 2.5 mm. Take poission ratio as 0.25.

Q.3 a) Calculate the strain energy stored in a bar 2 m long, 50 mm wide and 40 mm thick when it is subjected to a tensile load of 60 KN. Take E as 200 Gpa.

b) Show that in a bar, subjected to an axial load, the instantaneous stress due to sudden application of a load is twice the stress caused by the same load is applied gradually.

Q.4 a) A cantilever beam 2 m long carries a uniformly distributed load of 1.5 KN/m over a length of 1.6 m from the free end. Draws shear force and bending moment's diagrams for the beam.

b) What are the various types of beams? Explain in details.

Q.5 a) Prove the relation, M/I = f/y = E/R. Where M= Bending moment, I= Moment of inertia, f = Bending stress, E = Young's modulus and R = Radius of curvature.

b) A rectangular strut is 150 mm wide and 120 mm thick. It carries a load of 180 KN at an eccentricity of 10 mm in a plane bisecting the thickness. Find the maximum and minimum intensities of stress in the section.

Q.6 a) A simply supported beam of span 3m is subjected to a central load of 10 KN. Find the maximum slope and deflection of the beam. Take $I=12x10^6$ $mm^4$ And E=200 Gpa.

b) What is mean by eccentric loading?

Q.7 a) Explain the failure of long columns and short columns?

b) A steel rod 5 m long and of 40 mm diameter is used as a column, with one end fixed and the other free. Determine the crippling load by Euler's formula. Take E = 200 Gpa.

**(P.T.O.)**

Q.8 Write short notes (Any Two).

a) Shear force

b) Bending moment

c) Hook's law

Q.9 a) A cantilever beam 120 mm wide and 150 mm deep is 1.8 m long. Determine the slope and deflection at the free end of the beam, when it carries a point load of 20 KN at its free end. Take E for cantilever beam as 200 Gpa.

b) Explain with sketches different types of loads acting on beams.

Q.10 a) What are the assumptions in the Euler's column theory?

b) Describe the types of stresses with neat sketches?

**SECTION "B"**

Q.11 Fill in the blanks.

1) The ratio of change in volume to the original volume is called_____.

2) The force per unit area is called_____.

3) The load at which the column just buckles is called _____ load.

4) The maximum strain energy stored in a body is called _____.

5) The property of certain materials of returning back to their original position after removing the external force is known as _____.

6) The unit of young's modulus is _____.

7) The beam material is stressed within its elastic limit and thus obeys_____ law.

8) A load whose line of action doesn't coincide with the axis of a column or strut, is known as an_____.

Q.12 State True or False.

1) Within elastic limit, the ratio of lateral strain to the linear strain is known as Poisson's ratio.

2) Hook's law equally holds good for tension as well as compression.

3) The material of the beam is perfectly homogeneous and isotropic.

4) For uniformly distributed load between two sections, the shear force diagram is a Horizontal line.

5) Change in length per unit original length is known as lateral strain.

6) The S.F. at the cross-section of a beam is the unbalanced vertical force to the right or left of the section.

7) The failure of column occurs due to buckling alone.

8) The necessary condition to obtain maximum bending moment is where shear force changes sign. OR S.F. = 0.

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**MAHARASHTRA AGRICULTURAL UNIVERSITIES EXAMINATION BOARD, PUNE**
**SEMESTER END EXAMINATION**

**B.Tech. (Agril. Engg.)**

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|---|---|---|---|---|---|
| **Semester** | : **V (Old)** | **Term** | : **I** | **Academic Year** | : **2018-19** |
| **Course No.** | : SWCE 355 | **Title** | : **Soil Conservation Structures Design** | | |
| **Credits** | : 3(2+1) | | | | |
| **Day & Date** | : Wednesday, 21.11.2018 | **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) Give the classification of gully control structures. What are the functional requirements of gully control structures?

b) What is the difference between open channel flow and pipe flow?

Q.2 a) What is hydraulic jump? What are the applications of hydraulic jump?

b) Explain in brief loss of energy in hydraulic jump.

Q.3 a) Enlist the different types of weirs. Explain in brief with equations for computation of discharge.

b) Explain the effect of gravity on state of flow.

Q.4 a) Explain chute spillway with respect to following points.

a) Functional uses b) Adaptability

c) Advantages d) Limitations

b) What is the difference between hydraulic design and hydrologic design of permanent gully control structures?

Q.5 A drop spillway is purposed for construction in gully. The drop of gulley is 2.0 m carries peak discharges as 25 $m^3/s$. ones in 50 years duration. Rectangular weir is used for allowing the water, which opening length may be taken as 8.5 m. The tail water depth is used as 0.55 m. calculate dimensions of following components of gulley.

a) Head over crest (h) b) Height of head wall

c) Height of side wall d) Height of wing wall

e) Length of apron f) Depth of cut-off wall

(Assuming head causing seepage flow is 1.10 m.)

Q.6 a) Enlist and explain in brief different types of farm ponds.

b) Calculate the volume of excavation required to construct a dugout type farm pond, if;

a) Average depth of pond is 4.5 cm

b) Bottom width is 12 m

c) Bottom length is 25 m

d) Side slope to be used as 2:1

**(P.T.O.)**

Q.7 a) What are the different forces acting on gravity dam? Explain in brief the horizontal water pressure acting on gravity dam.

b) What are the different design criteria's for earth dam.

Q.8 a) Write the design procedure to find out dimensions of floor blocks in stilling basin.

b) Explain the criteria for critical state of flow.

Q.9 Determine the capacity of a 762 mm diameter corrugated culvert 18.29 m long with a square edged entrance. Elevation of the inlet invert is 127.92 m and the elevation of the outlet invert is 127.71 m. Headwater elevation is 129.54 m and tail water elevation is 126.80 m. Assume, $K_e = 0.5$ and $K_c = 0.112$.

Q.10 Explain in detail types of earthen dams.

**SECTION "B"**

Q.11 Define the following terms.

1) Gravity dam
2) Diversion drains
3) Weir
4) Steady flow
5) Varied flow
6) Reynolds number
7) Froude Number
8) Specific energy

Q.12 Fill in the blanks.

1) _____ type of flumes are well suited for runoff measurement as they have high capacity and are accurate at different rates of flow.
2) When the froud number is unity, then the flow is said to be _____.
3) _____is the vertical distance between the top of the embankment and water level in the reservoir.
4) _____ is the part of structure which receives the flow of water from inlet and leaves the same to the outlet.
5) The design of permanent gully control structure is done for the return period of _____.
6) _____is the component of hydraulic structure to provide more stability to outlet.
7) _____involves the determination of strength and stability of different parts of the structure.
8) _____ is an efficient structure for controlling relatively low heads normally up to one meter.

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# MAHARASHTRA AGRICULTURAL UNIVERSITIES EXAMINATION BOARD, PUNE
## SEMESTER END EXAMINATION

**B.Tech. (Agril. Engg.)**

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|---|---|---|---|---|---|
| **Semester** | : **V (Old)** | **Term** | : **I** | **Academic Year** | : **2018-19** |
| **Course No.** | : APE 355 | **Title** | : **Dairy and Food Engineering** | | |
| **Credits** | : 3(2+1) | | | | |
| **Day & Date** | : Tuesday, 13.11.2018 | **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 Define the term pasteurization. Explain HTST pasteurization with neat sketch.

Q.2 a) Explain the mass and energy balance in food processing with neat block diagram.

b) If 35,000 kg of whole milk containing 4% fat is to be separated in a 6 hr period into skim milk with 0.45% fat and cream with 45% fat what are the flow rates of the two output streams from a continuous centrifuge which accomplishes this separation.

Q.3 a) What are the different physical and chemical properties of milk?

b) Enlist the various physical, chemical and biological methods of food preservation.

Q.4 What are Planks assumptions considered for estimation of freezing time? Derive Planks equation to compute freezing time of rectangular slab.

Q.5 a) Explain the working of single effect evaporator with neat sketch.

b) How much water would be required in a jet condenser to condense the vapours from an evaporator evaporating 5000 kg $h^{-1}$ of water under a pressure of 15 cm of mercury? The condensing water is available at $18^0$C and the highest allowable temperature for water discharged from the condenser is $35^0$C.

Q.6 a) A solution of common salt in water is prepared by adding 20 kg of salt to 100 kg of water to make a liquid of density 1323 kg $m^{-3}$.Calculate the concentration of salt in this solution as a (a) weight/weight fraction, (b) weight/volume fraction, (c) mole fraction (d) molar concentration.

b) A processing plant is producing minced meat, which must contain 15% of fat. If this is to be made up from boneless cow beef with 23% of fat and from boneless bull beef with 5% of fat, what are the proportions in which these should be mixed?

Q.7 a) Explain function and operation of homogenizing valve.

b) Write a short note on multiple effect evaporator.

Q.8 A food containing 80% water is to be dried at 100 $^0$C down to moisture content of 10%.If the initial temperature of the food is $21^0$C, calculate the quantity of heat energy required per unit weight of the original material, for drying under atmospheric pressure. The latent heat of vaporization of water at 100 $^0$C and at standard atmospheric pressure is 2257 k.J, $kg^{-1}$. The specific heat capacity of the food is 3.8 kJ $kg^{-1}$ $^0C^{-1}$ and of water is 4.186 kJ $kg^{-1}$ $^0C^{-1}$. Find also the energy requirement/kg water removed.

**(P.T.O.)**

Q.9 a) What is distillation? Write in short about steam distillation.

b) Derive fundamental equation of filtration.

Q.10 a) Enlist methods used for plant sterilization? Write a short note on 'cleaning in place'.

b) What are the points to be considered while selection of site for dairy plant?

## SECTION "B"

Q.11 Match the following pairs.

| 'A' | 'B' |
|---|---|
| 1) LTLT Pasteurization | a) Used for making of milk power |
| 2) HTST Pasteurization | b) Works on principle of sublimation of water |
| 3) Condenser | c) Steam consumption 1.2 kg/kg of water |
| 4) Homogenization quality | d) Steam consumption 0.4 kg/kg of water |
| 5) Single effect evaporator | e) Barometric leg |
| 6) Triple effect evaporator | f) Farrall Index |
| 7) Freeze dryer | g) Heating of milk at 62.8 $^0$C for 30 min |
| 8) Spray dryer | h) Heating of milk at 71.7$^0$C for 15 sec |

Q.12 Fill in the blanks.

1) The condition at which all three states of water co-exists together is called _____.

2) If air consists of 77 % by weight of nitrogen and 23 % by weight of oxygen. The mole fraction of oxygen is _____.

3) Presence of _____ enzyme in milk indicates inadequate pasteurization.

4) _____ is a popular heat exchanger used for milk processing.

5) If whole milk is being fed into a centrifugal separator to separate it into _____ and _____ under law of conservation of mass.

6) Homogenization of milk must have 90 % of fat globules smaller than _____μ in diameter.

7) Modern homogenizing valves are made of _____.

8) _____is used for concentrating the essential oils, flavours in the food industries.

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# MAHARASHTRA AGRICULTURAL UNIVERSITIES EXAMINATION BOARD, PUNE
## SEMESTER END EXAMINATION

**B.Tech. (Agril. Engg.)**

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|---|---|---|---|---|---|
| **Semester** | : **V (Old)** | **Term** | : **I** | **Academic Year** | : **2018-19** |
| **Course No.** | : IDE 354 | **Title** | : **Drainage Engineering** | | |
| **Credits** | : 3(2+1) | | | | |
| **Day & Date** | : Friday, 16.11.2018 | **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) The drainage coefficient of land is 10 mm. Calculate the capacity required at the outlet end of the drainage ditch draining a watershed of 300 hectares.

b) Describe the benefits of agricultural drainage.

Q.2 a) 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 millimhos/cm. The bulk density of soil is 1.2 gm/cu.cm and the density of water is 1 gm/cu.cm. The saturation percentage of the soil is 40.

b) Explain salt affected soils and state their reclamation procedures.

Q.3 Derive Hooghoudt's equation for drain spacing with necessary assumptions.

Q.4 a) Derive an interrelationship of irrigation and drainage as $Da = (1-e_a)\, e_c V$.

b) Explain the causes of water logging and enlist the control measures.

Q.5 Calculate the most efficient bottom width for a drainage channel to carry a flow 2m deep in clay soil. Compute the velocity and discharge capacity of the channel if the channel gradient is 0.04 per cent. Recommended side slope for channel in clay soil is 1:1. Permissible velocity in the channel in clay soil = 1.2 m/sec.

Q.6 a) Define drainage coefficient and calculate the drainage coefficient for drainage canal discharging 0.2 $m^3$/sec of water and drains 250 ha.

b) Explain in brief, tube well (vertical) drainage for controlling water table.

Q.7 a) Determine the size of clay tile required at the end of 500 long tile line. If the drainage coefficient is 1 cm, grade is 0.3 per cent and tile spacing is 50 m.

b) What are the different layouts of pipes drainage systems? Explain any one.

Q.8 Write short notes.

a) Design of gravel filter

b) Parallel field drainage system

Q.9 a) What are the drains envelops? Explain the functions of envelope.

b) Discuss in brief about bio-drainage.

Q.10 Explain the different components of drainage flow considered in Earnest' equation.

**(P.T.O.)**

## SECTION "B"

Q.11 a) Fill in the blanks.

1) Gypsum is added to reclaim the _____ soil.
2) Drainage does not remove _____type of water from the soil.
3) The clay tiles are usually made in the lengths of about _____cm.
4) Exchangeable sodium percentage of saline soil is _____.

b) State True or False.

1) Herringbone system is economical than gridiron system of drainage.
2) Outlet condition decides the depth of the field drains.
3) The unit of intrinsic permeability is $cm^2$.
4) Filter material is provided to increase the effective diameter of drain.

Q.12 Define the following terms.

1) Drainage coefficient
2) Saline soil
3) Hydraulic conductivity
4) Mole drainage
5) Isotropic soil
6) Collector drain
7) Drain spacing
8) Waterlogged land

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# MAHARASHTRA AGRICULTURAL UNIVERSITIES EXAMINATION BOARD, PUNE
## SEMESTER END EXAMINATION

**B.Tech. (Agril. Engg.)**

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|---|---|---|---|---|---|
| **Semester** | : V (Old) | **Term** | : I | **Academic Year** | : 2018-19 |
| **Course No.** | : FMP 359 | **Title** | : **Farm Machinery and Equipment –II** | | |
| **Credits** | : 2(1+1) | | | | |
| **Day & Date** | : Wednesday, 14.11.2018 | **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 Classify different types of chaff cutter? Explain flywheel type chaff cutter?

Q.2 Write the functions of nozzles and classify different sprayer nozzles.

Q.3 Classify threshing cylinders of power thresher. Explain in brief construction features of thresher.

Q.4 A bullock drawn mower has a drive wheel 90 cm in diameter. The power to drive the knife is transmitted to the crank wheel though a transmission gear train. The first step consists of a 120 tooth gear on main axle, driving 20 tooth gears on a countershaft. The second step consists of a 60 tooth bevel pinion on the crankshaft. The guards are spaced 8 cm apart with knife stroke 8 cm.

Calculate: a) The number of strokes, the knife will make per minute when the Mower is pulled at 4 km per hour speed and driven gear =15 tooth.

b) The total length of knife stroke per minute in cm.

Q.5 What are the adjustments to be done in thresher with respect to cylinder speed, concave clearance, blower speed and sieve size?

Q.6 Write the functional units of Mechanical Pickers? Explain different types of Mechanical Strippers?

Q.7 Explain the parameters required for selection of plant protection equipment.

Q.8 a) Explain in brief constructional features of shear bar type field chopper.

b) A chaff cutter having two knives cut dry hay at 6 rev/min giving 480 kg per hour. If the throat size is 18 cm x 6 cm, find the effective density of dry hay for a theoretical length of cut of 2.5 cm.

Q.9 a) Calculate the total time required to harvest 2.5 ha of grass by means of a 2 meter mower being operated at 4km/hr. Take field efficiency of mower as 80%.

b) A mower has drive wheel of 60cm diameter. The crank of the mower makes 600 rev/min. when it is driven by a tractor moving at a speed of 2.3 km/hr. If the speed ratio between the crank wheel and land wheel is changed to 27:1, Calculate the increase in speed of mower to maintain same speed of the crank.

**(P.T.O.)**

Q.10 Write short note.

a) Cylinder type Maize Sheller

b) Tractor drawn one row potato digger

**SECTION "B"**

Q.11 Write the function of following parts.

1) Rear Beater 2) Shoe

3) Strainer 4) Pitman

Q.12 Choose the correct answer.

1) The pressure developed by the knapsack sprayer generally varies from_____.

a) 3-12 kg/cm$^2$ b) 11-21 kg/cm$^2$

c) 22-32 kg/cm$^2$ d) 33-41 kg/cm$^2$

2) The operating speed of the combine harvester at field varies from_____.

a) 1-3 km/h b) 4-6 km/h

c) 8-10 km/h d) 12-14 km/h

3) An average _____% cutting efficiency is lost with blunt ledger plate in harvesting equipment.

a) 10% b) 20%

c) 30% d) 40%

4) The optimum value of reel index should be _____ for minimum cutter bar loss.

a) 0.05 to 0.90% b) 1.1 to 1.25%

c) 1.5 to 1.85% d) 1.85 to 2.05%

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**MAHARASHTRA AGRICULTURAL UNIVERSITIES EXAMINATION BOARD, PUNE**
**SEMESTER END EXAMINATION**

**B.Tech. (Agril. Engg.)**

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|---|---|---|---|---|---|
| **Semester** | : **V (Old)** | **Term** | : **I** | **Academic Year** | : **2018-19** |
| **Course No.** | : APE 357 | **Title** | : **Storage Engineering** | | |
| **Credits** | : 2(1+1) | | | | |
| **Day & Date** | : Thursday, 22.11.2018 | **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 interrelation of physical, chemical and biological variables in the deterioration of stored grain.

Q.2 Explain the concept of moisture migration of stored grains with neat sketch.

Q.3 Classify the modern grain storage systems and Enumerate advantages of controlled atmosphere storage system.

Q.4 What is fan efficiency?

A fan delivers air at a flow rate of 15 $m^3/s$ against static pressure of 150 mm water gauge. Determine the static efficiency of the fan. The power required to operate the fan is 30 kW.

Q.5 Explain the importance of fumigation in grain storage.

Q.6 A.R.C.C. cylindrical grain storage bin has internal diameter of 5 m and is 20 m deep. It is completely filled with paddy weighing 600 $kg/m^3$. The angle of internal friction for paddy can be taken as $35^0$ while the angle of friction between paddy and bin wall is $30^0$. The ratio of horizontal and vertical pressure intensity, k, is 0.4. Calculate the lateral pressure intensity at the depth of 8.0 m.

Q.7 Write short notes.

a) Squat silo b) Respiration of grains

Q.8 Describe the role of moulds in food spoilage.

Q.9 Discuss the benefits of aeration in the storage of grains.

Q.10 State the different fan laws with formulae.

**SECTION "B"**

Q.11 Fill in the blanks.

1) A_____silo has a wall height to diameter ratio 0.5 or even less.

2) Enzymes convert _____into amino acids.

3) Sealed storages can be effectively fumigated, using _____ or phosphine.

4) _____developed a theory for pressure induced by granular material against retaining wall or in shallow bins.

Q.12 Match the following pairs.

| **'A'** | **'B'** |
|---|---|
| 1) Perishable food | a) Made up of bricks |
| 2) Food poisoning | b) Cylindrical in shape |
| 3) Pusa bin | c) *Clostridium botulinum* |
| 4) Bukhari | d) Fish |

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|---|---|---|---|---|---|
| **Semester** | : **V (Old)** | **Term** | : **I** | **Academic Year** | : **2018-19** |
| **Course No.** | : APE 356 | **Title** | : **Drying of Farm Crops** | | |
| **Credits** | : 2(1+1) | | | | |
| **Day & Date** | : Saturday, 17.11.2018 | **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 Differentiate between wet basis and dry basis moisture content. Derive an expression for converting moisture content from wet basis to dry basis.

Q.2 Determine the values of c and n from the Henderson's equation for the following data obtained from thin layer paddy drying studies:

a) RH = 30%, t = 50 $^0$C, Me = 10.5 %

b) RH = 55%, t = 50 $^0$C, Me = 15.5 %

Q.3 Explain in detail about construction and working of LSU dryer with neat sketch.

Q.4 Enlist psychrometric terms and explain any four.

Q.5 Define EMC. Explain in brief static method of determination of EMC of the product.

Q.6 What are the factors to be taken into consideration in design of heated air grain dryer?

Q.7 What are different methods of determination of moisture content of grains? Explain air oven method.

Q.8 Draw figure of typical drying rate curve and explain in detail constant rate drying.

Q.9 8000 kg of paddy with moisture content of 0.12 (d.b.) is required for a research project on grain storage. It was decided that the available freshly harvested paddy with a moisture content of 0.20 (w.b.) should be procured and then it will be dried to a moisture content of 12% on a dry basis. How many kg freshly harvested paddy are to be procured?

Q.10 Explain the concept of deep bed drying. Discuss the terms time of advance of drying front and decreasing rate period.

## SECTION "B"

Q.11 Fill in the blanks.

1) Thickness of grain bed is _____in thin layer drying.
2) The difference between description and adsorption curves is known as _____.
3) _____ refers to the moisture contained by a substance which exerts equilibrium vapour pressure equal to that of the pure liquid at the same temperature.
4) The relationship of Heat Utilization Factor (HUF) and Coefficient of Performance (COP) is given by _____.

Q.12 State True or False.

1) Free moisture is moisture contained by a substance equal to equilibrium moisture.
2) Cereal grains are usually dried entirely under constant rate period.
3) The rate of drying decreases with the rise of air temperature.
4) In dielectric drying, heat is generated within the solid by placing it in a fixed high frequency current.

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