

Watershed Hydrology

Periods				Evaluation Scheme					Credits
L	T	P	Total	TA	CT	ESE	PR	Grand Total	
4		2	6	25	20	80	25	150	5

Objectives

Hydrology can be approached as a basic physical science, but because water is essential to all social and ecological systems, it can also be treated as an applied science addressing practical concerns. This course is design by keep in view following objectives.

1. To refine the understanding of the patterns and processes of water movement, storage and transformation in the environment.
2. To study the influence of weather in transformation and movement of water on the earth's surface.
3. Literature, measurement techniques, data sources, analytical methods and theories used to understand flows of water on the earth's surface.

A: Theory

Unit	Content	Duration	Nature
I	Introduction: Basic terminologies, World water resources, hydrology & hydrologic cycle, scope of hydrology, hydrological data.	04 hrs	Descriptive
II	precipitation - forms, types, rainfall measurement, estimation of missing data, mean rainfall depth, Depth-Area-Duration curve, Graphical representation of rainfall, analysis of rainfall data, frequency analysis of point rainfall, plotting position, test for consistency of rainfall records;	08 hrs	Descriptive & analytical
III	Estimation of water losses- interception, infiltration, Horton's laws, evaporation, transpiration, evapo-transpiration, estimation and measurement of water losses.	10 hrs	Descriptive & analytical
IV	Geomorphology of watersheds - Catchments characteristics, classification of streams,	08 hrs	Descriptive & analytical
V	Runoff - factors affecting, estimation of peak runoff rate, rational method, Cook's method, SCS method and volume by CN method	08 hrs	Descriptive & analytical
VI	Hydrograph- components, Stream flow separation, unit hydrograph, propositions, derivation, unit hydrograph of different durations, dimensionless unit hydrograph, distribution hydrograph, synthetic unit hydrograph, uses and limitations of unit hydrograph.	12 hrs	Descriptive & analytical
VII	Stream Gauging-methods, current meter gauging, stage discharge rating curve.	04 hrs	Descriptive & analytical
VIII	Flood Estimation & Routing- estimation of peak flood, methods of flood control, flood forecasting & warnings, flood routing – graphical methods of reservoir flood routing.	06 hrs	Descriptive

Section A: I, II, III & IV Unit

Section B: V, VI VII & VIII Unit

B: Practicals:-

The term work shall consist of following experiments (minimum ten)	
S.N.	Practical
1	Study of different types of rain gauges
2	Analysis of rainfall data and estimation of average rainfall
3	Determination of average depth of rainfall and frequency analysis
4	Study of stage level recorders and current meters
5	Study and use of sunshine recorder
6	Study of various types of Evaporimeters and estimation of evaporation.
7	Study of various catchment characteristics
8	Estimation of peak runoff rate by rational method
9	Estimation of runoff volume by CN method
10	Development of DRH from stage hydrograph
11	Development of UH from DRH
12	Graphical analysis of flood routing
13	Visit to meteorological observatory

The assessment of the term work shall be done on the following basis
<ul style="list-style-type: none"> • Continuous assessment. • Record of the experiments submitted by the student • Oral conducted on the syllabus and term work mentioned above

Practical Examination
The practical examination shall consist of performing an experiment, based on the practical work done during the course, the record of the experiments submitted by the candidate and viva-voce based on the syllabus

C: Suggested text books and references

1. Engineering Hydrology by K. Subramanya, Publisher Tata McGraw Hill book Co.
2. Hydrology-Principles, Analysis, Design by H. M. Raghunath, Publisher New Age International Pvt. Ltd.
3. Soil & Water Conservation Engineering by R. Suresh
4. Applied Hydrology by K. N. Mutreja, Publisher Tata McGraw Hill book Co. New Delhi

Pattern of Question Paper
Faculty of Engineering and Technology
Third Year (B. Tech.) Agricultural Engineering (Revised Course) Examination
November/December, May/June 200__
Subject Name: Watershed Hydrology

Time: 3 hrs

Maximum Marks: 80

“Please check whether you have got the right question paper”

- N.B.:- i. All questions are compulsory
ii. Use separate answer book for each section
iii.
iv.....

Section A

Question no 1

16 marks

This question will consists of questions from all the chapters under section A mentioned in the syllabus.

This will consists of objective type, multiple choice type, short questions, concept oriented problems.

Question no 2

12 marks

OR

Question no 2

Question no 3

12 marks

OR

Question no 3

- Note: 1. The questions will be memory based, application based and understanding type.
2. There should be intermixing in the questions.

Section B

Question no 4

16 marks

This question will consist of questions from all the chapters under section B mentioned in the syllabus.

This will consists of objective type, multiple choice type, short questions, concept oriented problems.

Question no 5

12 marks

OR

Question no 5

Question no 6

12 marks

OR

Question no 6

- Note: 1. The questions will be memory based, application based and understanding type.
2. There should be intermixing in the questions.

T. Y. B. Tech. Agricultural Engineering (Revised Syllabus)
Advanced Irrigation System Design

Periods				Evaluation Scheme					Credits
L	T	P	Total	TA	CT	ESE	PR	Grand Total	
4	-	2	6	25	20	80	-	125	5

Objectives:

The study of day to day depleting position of ground water enhances the efficient use of available water. For the efficient use of available irrigation water an introduction to micro irrigation systems is sought necessary for Agriculture Engineering students. Keeping this in view present syllabus aims to cover following objectives.

1. To study the need of micro-irrigation systems
2. Study of various components and design of sprinkler irrigation system.
3. Study of various irrigation methods for efficient use of water.
4. Study of various components and design of trickle irrigation system

A: Theory

Unit	Content	Duration	Nature
I	Micro-irrigation systems:- Past, present and future need of micro-irrigation systems, Role of Govt. for the promotion of micro-irrigation in India, Merits and demerits of micro-irrigation system, Types and components of micro-irrigation system,	12 hrs	Descriptive
II	Sprinkler Irrigation:- accessories, types, hydraulic characteristics, selection, valves, gauges, water meter, fittings and accessories, system types,	08 hrs	Descriptive & analytical
III	Design of Sprinkler Irrigation System: - planning for design, uniformity and efficiency, layout of set sprinkler system, lateral, manifold and main delivery system. Pressure requirement and pump power unit selection. Economical pipe selection and system economics. Rain-gun irrigation system.	10 hrs	Descriptive & analytical
IV	Irrigation methods:- Basic variables involved in design of irrigation methods, Infiltration equations, Advance and recession in border, furrow and check basin and their equations, hydraulic resistance, design criteria for border, furrow and check basin method, evaluation of surface irrigation method	10 hrs	Descriptive & analytical
V	Trickle Irrigation: Different types of trickle, components of trickle system, fertigation and chemigation. Maintenance and upkeep of trickle Irrigation.	10 hrs	Descriptive & analytical
VI	Design of Trickle Irrigation System: - Planning the trickle system and design strategy Selection and design criteria for emitters. Lateral/ manifold and main pipe system design. Clogging, filtration, Cost economics of the system.	10 hrs	Descriptive & analytical

Section A: I, II, & III Unit

Section B: IV, V & VI Unit

B: Practicals:-

The term work shall consist of following experiments (minimum ten)	
S.N.	Practical
1	Study of different components of sprinkler irrigation system.
2	Design of the sprinkler irrigation system.
3	Installation of sprinkler irrigation system.
4	Determination of precipitation pattern, discharge and uniformity coefficient.
5	Study of different components of trickle irrigation.
6	Design of trickle irrigation system.
7	Installation of trickle irrigation system.
8	Determination of pressure discharge relationship and emission uniformity for given emitter.
9	Study of different types of filters and determination of filtration efficiency.
10	Determination of fertilizer application efficiency.
11	Field evaluation of drip system.
12	Cost economics of drip irrigation system
13	Cost economics of sprinkler irrigation system

The assessment of the term work shall be done on the following basis
<ul style="list-style-type: none">• Continuous assessment.• Record of the experiments submitted by the student• Oral conducted on the syllabus and term work mentioned above

C: Suggested text books and references

1. Irrigation: Theory & Practices By A. M. Michael Vikas Publication House Delhi.
2. Irrigation Hydraulics By Dr. Radhey Lal, Saroj Prakashan , Allahabad.
3. Design & Evaluation of Irrigation method By A. M. Michael, Shri Mohan & K. R. Swaminathan, W.T.C., IARI New Delhi.
4. Sprinkler & Trickle Irrigation, Jack Keller & Ron D Bliesner, Van Nostrand Reinhold New York.
5. Drip Irrigation, III Edition WALMI Aurangabad.
6. Land & Water Management Engineering By V.V.N. Murthy Kalyani Publisher

Pattern of Question Paper
Faculty of Engineering and Technology
Third Year (B. Tech.) Agricultural Engineering (Revised Course) Examination
November/December, May/June 200__
Subject Name: Advanced Irrigation System Design

Time: 3 hrs

Maximum Marks: 80

“Please check whether you have got the right question paper”

- N.B.:- i. All questions are compulsory
ii. Use separate answer book for each section
iii.
iv.....

Section A

Question no 1

16 marks

This question will consists of questions from all the chapters under section A mentioned in the syllabus.

This will consists of objective type, multiple choice type, short questions, concept oriented problems.

Question no 2

12 marks

OR

Question no 2

Question no 3

12 marks

OR

Question no 3

- Note: 1. The questions will be memory based, application based and understanding type.
2. There should be intermixing in the questions.

Section B

Question no 4

16 marks

This question will consist of questions from all the chapters under section B mentioned in the syllabus.

This will consists of objective type, multiple choice type, short questions, concept oriented problems.

Question no 5

12 marks

OR

Question no 5

Question no 6

12 marks

OR

Question no 6

- Note: 1. The questions will be memory based, application based and understanding type.
2. There should be intermixing in the questions.

Agricultural Process Engineering

Periods				Evaluation Scheme					Credits
L	T	P	Total	TA	CT	ESE	PR	Grand Total	
4	-	2	6	25	20	80	25	150	5

Objectives

As the consumer demand for fresh fruits and vegetables coupled with a demand for convenience is fueling an interest in minimally processed products. The Agricultural Process Engineering provides intensive study of content with following objectives.

1. To study the various physical and mechanical properties of fruits and vegetables
2. To enhance the quality and shelf life of fruits and vegetable by various processing operations.
3. Preparation of value added products from perishable fruits and vegetable.

A: Theory

Unit	Content	Duration	Nature
I	Composition, classification, physical properties and structures of fruits and vegetables, Morphological characteristics of fruits and vegetables.	08 hrs	Descriptive & analytical
II	Physiology of growth & development of fruits and vegetables, physiology of ripening respiration transpiration texture. Harvest indices for fruits and vegetables,	08 hrs	Descriptive & analytical
III	Mechanical properties, Rheology of fruits, stress-strain behavior, poissions ratio, visco-elastic behavior.	07 hrs	Descriptive & analytical
IV	Principles & techniques in preservation of fruits & vegetables, pre cooling, cold storage, freezing concentration, dehydration, control and modified atmosphere storage.	07 hrs	Descriptive
V	Process parameters for sorting, washing, mixing and handling, cutting, blanching, slicing, canning, bottling and flexible packaging operations and associated machineries, transportation storage and preservation technology.	13 hrs	Descriptive
VI	Manufacturing methods of major horticulture and plantation crop products juices and juice concentrates, pickles, jam, jelly, dehydrated fruits and vegetables, essential oils,	12 hrs	Descriptive
VII	Flow process chart for manufacture of finished products, Application of quality control techniques.	05 hrs	Descriptive

Section A: I, II, III & IV Unit

Section B: V, VI & VII Unit

B: Practicals:-

The term work shall consist of following experiments (minimum ten)	
S.N.	Practical
1	Study of physical properties of fruits and vegetables.
2	Load determination characteristics of fruits and vegetables.
3	Determination of firmness of fruits and vegetables.
4	Study of chilling behavior of fruits and vegetables.
5	Study of fruits and vegetables washer and sorter.
6	Study of performance of slicer and mixer.
7	Study of performance of peeler.
8	Study of blanching of fruits and vegetables.
9	Study of heated air drying of horticulture produce.
10	Study of packaging materials and carrying.
11	Manufacturing methods of jam, jelly, pickles, dehydrated fruits and vegetables.
12	Visit to fruit / vegetable processing factory

The assessment of the term work shall be done on the following basis
<ul style="list-style-type: none"> • Continuous assessment. • Record of the experiments submitted by the student • Oral conducted on the syllabus and term work mentioned above

Practical Examination
The practical examination shall consist of performing an experiment, based on the practical work done during the course, the record of the experiments submitted by the candidate and viva-voce based on the syllabus

C: Suggested text books and references.

1. Preservation of Fruits & Vegetables by Girdharilal and Siddappa. Publication Information Division, ICAR New Delhi-12.
2. Sub-tropical fruits and vegetables by ER. B. Pantastics, AVI Publi. Co. Inc. Westpo connection (1975).
3. Fruits and Vegetable Preservation: Principles & Practices by R. P. Shrivastava & S. Kumar. International book distributing Co. Lucknow, UP, India
4. Food Engineering operations by J. G. Brennon, Steward, Wly. Publi-Gorden and Breach.Scién.Publisher, P. O. box-197, London-197, London WCIE, England.
5. Physical properties of plant and animal material by Nuri N. Mohsenin. Gorden and Breach Scien. Publisher.
6. Post Harvest Physiology of Vegetables by J. Weichman. Pub. Marcel, Deki and Basel INC Newyork (1987)
7. Handling, Transportation and Storage of Fruits & Vegetables Vol. I, IInd edition by A. L. Renall and N. T. Lipton, AVI Pub. Co. (1979)

Pattern of Question Paper
Faculty of Engineering and Technology
Third Year (B. Tech.) Agricultural Engineering (Revised Course) Examination
November/December, May/June 200__
Subject Name: Agricultural Process Engineering

Time: 3 hrs

Maximum Marks: 80

“Please check whether you have got the right question paper”

- N.B.:- i. All questions are compulsory
ii. Use separate answer book for each section
iii.
iv.....

Section A

Question no 1

16 marks

This question will consists of questions from all the chapters under section A mentioned in the syllabus.

This will consists of objective type, multiple choice type, short questions, concept oriented problems.

Question no 2

12 marks

OR

Question no 2

Question no 3

12 marks

OR

Question no 3

- Note: 1. The questions will be memory based, application based and understanding type.
2. There should be intermixing in the questions.

Section B

Question no 4

16 marks

This question will consist of questions from all the chapters under section B mentioned in the syllabus.

This will consists of objective type, multiple choice type, short questions, concept oriented problems.

Question no 5

12 marks

OR

Question no 5

Question no 6

12 marks

OR

Question no 6

- Note: 1. The questions will be memory based, application based and understanding type.
2. There should be intermixing in the questions.

Machine Design

Periods				Evaluation Scheme					Credits
L	T	P	Total	TA	CT	ESE	PR	Grand Total	
4	-	2	6	25	20	80	-	125	5

Objectives

Agroneers must able to design various agricultural machines. They must aware about principles of operation, design considerations, materials of construction and power transmission in agricultural machines through various basic components used in designing agricultural machines. For proper understanding of design processes and developing creativity for designing the various components such as pins, levers, keys, shafts, splines, Cotter and Knuckle joint, couplings etc., present course is included.

A. Theory:

Unit	Content	Duration	Nature
I	Introduction: Design process, Steps of design process. Aesthetic and Ergonomic Consideration in Design: Appearances, functional requirements, design of display and controls.	3 Hrs	Descriptive
II	Design considerations: Basic Design equation, Induced and design stress, factor of safety Simple stress situation: Tensile, Compressive, shear and bearing stresses acting one at time and induced due to direct loading, Bending and twisting and design equation related to them. Effect of combined stresses: Different possible combinations such as Direct and Bending Stresses, Normal and Shear Stresses, Principal Stresses, Maximum Shear Stress and design equations using them	5 Hrs	Descriptive and analytical
III	Selection of Material: Basics of selection I.S.S. and Designation of commonly used materials such as steel cast iron, aluminum, brass, bronze and other bearing materials, principal of local quality.	3 Hrs	Descriptive and analytical
IV	Theories of failure : Maximum Principal, stress, Maximum shear stress, maximum strain, maximum total strain energy and maximum energy of distortion theories of failure, their statements and derivations of design equations and applications compression.	6 Hrs	Descriptive and analytical
V	Design of components under simple stresses: Design of cotters, pins, levers, keys shafts subjected to only twisting, bolts Subjected to only direct loading, shearing and tension. Design of simple assemblies subjected to simple stresses such as Cotter and Knuckle joint, Couplings.	8 Hrs	Descriptive and analytical

VI	Combined Stresses: Direct and Bending, Design of Parts subjected to combined bending and direct stresses e.g. C- Clamp, frame, screw press frame etc.	5 Hrs	Descriptive and analytical
VII	Fatigue Loading: Endurance test S.N diagram, endurance limit. Soderberg diagram, Goodman diagram and equation for design under fluctuating load Modified, Low cycle and high cycle fatigue, Life and load relationship during high cycle fatigue. Designing for definite life, Basquins equations. Designing for variable combined stresses. Notch sensitivity stress concentration methods to improve fatigue strength Interpretation of brittle fracture. Miners equation of cumulative damage, short time testing.	06 Hrs	Descriptive and analytical
VIII	Design of Power Screw: Types of threads used, standards square and Acme efficiency of screw, Use of maximum shear stress the maximum energy of distortions theory buckling of screw of nut, materials, single and multi start differential and right and left handed type, efficiency in power screw, self locking of power screw.	8 Hrs	Descriptive and analytical
IX	Design of Bolted, Riveted and Welded Joints: Types of threaded fasteners, preloading of bolts, empirical design equations and exact analysis load to open the joint, improvement of factor of safety by preloading for bolted for bolted assembly subjected to fluctuating loads. Riveted joints, types, strength of joints, welded joints, types, symbols, methods to reduce the distortion and warping in welding, stress concentration, strength of arc welds subjected to direct, bending and twisting loads.	8 Hrs	Descriptive and analytical
X	Springs: Functions, types and spring rate, closed coil helical spring, design equation, Wahl's correction factor, springs in parallel and series, variable loading, effect of end turns, surging of compression springs, optimum design, springs with non circular sections, leaf springs design equation, construction, extra full length leaves, stress equations, torsion springs, design equations.	8 Hrs	Descriptive and analytical

Section A: I, II, III, IV, V & VI Units

Section B: VII, VIII, IX & X Units

B: Practicals:-

Part I: - Drawing sheets on following (Any three)

- Design and Drawing sheet (Details and assembly) on any two of the following.
 - 1) Cotter Joint
 - 2) Knuckle Joint
 - 3) Lever loaded safety valve or spring loaded safety valve
- Design and Drawing sheet(Details and assembly) on any one of the following :
 - 1) Rigid or Flexible coupling
 - 2) Bolted or welded joint subjected to eccentric loading.
- Design and Drawing sheet(Details and assembly) on any one of the following :

- 1) Screw jack
- 2) C- Clamp

Part II: - Assignments on following topics

- Design process, Aesthetic and Ergonomic Consideration in Design.
- Design considerations
- Selection of Material:
- Theories of failure
- Fatigue Loading
- Design of Power Screw
- Springs

The assessment of the term work shall be done on the following basis

- | |
|--|
| <ul style="list-style-type: none">• Continuous assessment.• Record of the experiments submitted by the student• Oral conducted on the syllabus and term work mentioned above |
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C. Suggested text books and references

1. Design of machine element by J .E Shigley, TMH Publication.
2. Design of machine element by M.F. Spotts, Prentice hall publication
3. Machine Design by Shaum Series, TMH Publication.
4. Machine Design by V.B. Bhandari, TMH Publication.
5. Machine Design by Pandya and Shah, Charotar Publication.
6. Machine Design by R.S. Khurmi, Eurasia Publishing House.
7. Machine Design by S.G. Kulkarni, TMH Publication.

Pattern of Question Paper
Faculty of Engineering and Technology
Third Year (B. Tech.) Agricultural Engineering (Revised Course) Examination
November/December, May/June 200__
Subject Name: Machine Design

Time: 3 hrs

Maximum Marks: 80

“Please check whether you have got the right question paper”

- N.B.:- i. All questions are compulsory
ii. Use separate answer book for each section
iii.
iv.....

Section A

Question no 1 **16 marks**

This question will consists of questions from all the chapters under section A mentioned in the syllabus.

This will consists of objective type, multiple choice type, short questions, concept oriented problems.

Question no 2 **12 marks**

OR

Question no 2

Question no 3 **12 marks**

OR

Question no 3

- Note: 1. The questions will be memory based, application based and understanding type.
2. There should be intermixing in the questions.

Section B

Question no 4 **16 marks**

This question will consist of questions from all the chapters under section B mentioned in the syllabus.

This will consists of objective type, multiple choice type, short questions, concept oriented problems.

Question no 5 **12 marks**

OR

Question no 5

Question no 6 **12 marks**

OR

Question no 6

- Note: 1. The questions will be memory based, application based and understanding type.
2. There should be intermixing in the questions.

Renewable Energy Sources

Periods				Evaluation Scheme					Credits
L	T	P	Total	TA	CT	ESE	PR	Grand Total	
4	-		46		20	80	-	100	4

Objectives

Agricultural Engineering students must be introduced with various renewable energy sources so that utilization of these sources can be increased in agriculture field. Present course content enable them to understand various forms of renewable energy, bio-conversion processes, production of the biomass and various energy potential with current status.

A. Theory:

Unit	Content	Duration	Nature
I	Introduction to convention & non conventional energy sources, status of energy related to India & world	8 hrs	Descriptive
II	Solar energy: introduction, solar constant, determination of solar time, measurement, solar gadgets.	7 hrs	Descriptive & Analytical
III	Biogas: introduction, aerobic & anaerobic respirations, Types, specifications, working, applications	8 hrs	Descriptive
IV	Biomass & Biofuels: classifications & its detail	7 hrs	Descriptive
V	Gasifiers: introduction, types of Gasifiers	8 hrs	Descriptive
VI	Wind Energy: wind energy potential, measurement & various types of wind mills	8 hrs	Descriptive
VII	Economic analysis: introduction, cost analysis	8 hrs	Descriptive
VIII	Environmental Impacts: natural cycle, impacts, remedial measures	6 hrs	Descriptive
	Total	60 hrs	

Section A: Unit I, II, III & IV Unit and

Section B: Unit V, VI VII & VIII

B. Suggested text books and references

1. Fundamentals of Renewable Energy Sources by G. N. Tiwari and M. K. Ghosal
2. Solar Energy Utilization by G. D. Rai
3. Renewable Energy Sources by J. W. Twidell and A. Weir
4. Solar Energy: Principles of thermal collection and Storage by S. P. Sukhatme
5. Non conventional energy Sources by G. D. Rai,

Pattern of Question Paper
Faculty of Engineering and Technology
Third Year (B. Tech.) Agricultural Engineering (Revised Course) Examination
November/December, May/June 200__
Subject Name: Renewable Energy Sources

Time: 3 hrs

Maximum Marks: 80

“Please check whether you have got the right question paper”

- N.B.:- i. All questions are compulsory
ii. Use separate answer book for each section
iii.
iv.....

Section A

Question no 1

16 marks

This question will consists of questions from all the chapters under section A mentioned in the syllabus.

This will consists of objective type, multiple choice type, short questions, concept oriented problems.

Question no 2

12 marks

OR

Question no 2

Question no 3

12 marks

OR

Question no 3

Note: 1. The questions will be memory based, application based and understanding type.

2. There should be intermixing in the questions.

Section B

Question no 4

16 marks

This question will consist of questions from all the chapters under section B mentioned in the syllabus.

This will consists of objective type, multiple choice type, short questions, concept oriented problems.

Question no 5

12 marks

OR

Question no 5

Question no 6

12 marks

OR

Question no 6

Note: 1. The questions will be memory based, application based and understanding type.

2. There should be intermixing in the questions.

Dairy Technology

Periods				Evaluation Scheme					Credits
L	T	P	Total	TA	CT	ESE	PR	Grand Total	
2	-	2	4	25	10	40	25	100	3

Objectives:

As a part of agricultural processing, dairy industry, today a highly specialized field which involves production, procurement, storage, processing and distribution of dairy products. As the milk processing mainly deal with the technical and quality control aspect of the processing industry and also work to develop improved methods in processing, this subject fulfils following objectives

1. To get familiar with various milk animal varieties
2. To study methods production, preservation and utilization of milk and milk products.
3. To study processing, packaging, storage, transport of handling milk and milk products

A: Theory

Unit	Content	Duration	Nature
I	Livestock and dairy buildings: - Importance of livestock, their important species and breeds. Functional requirements, site selection, production practices, environment favorable to livestock, sanitation condition, space requirement, types of dairy barn, planning, layouts and requirements of dairy barn,	08 hrs	Descriptive
II	Principles of feeding: - General principles of feeding, processing preservation, storage of feed and fodder, silo- types, design, environment control in silos.	04 hrs	Descriptive & analytical
III	Milk:- basic terminologies, food and nutritive value of milk, physico-chemical properties of milk, microbiology of milk, judging and grading of milk,	03 hrs	Descriptive
IV	Special milk:- flow charts for manufacture of Sterilized, homogenized, flavored, vitaminized, fermented, standardized, rehydrated, recombined, toned and double toned milk, methods of preparation of special milks	05 hrs	Descriptive
V	Dairy products and byproducts:- ice cream, butter, ghee, cheese, khava, curd, cream, milk powder, (only methods of preparation)	05 hrs	Descriptive
VI	Manufacturing of milk based sweets, infants foods, byproduct utilization of dairy industries, Legal standards (food laws) like PFA, AGMARK, BIS, etc.	05 hrs	Descriptive

Section A: I, II & III Unit

Section B: IV, V & VI Unit

B: Practicals:-

The term work shall consist of following experiments (minimum ten)	
S.N.	Practical
1	Familiarity with animal breeds.
2	Design and layout of dairy barn.
3	Design and layout of silos.
4	Study of quality parameters of milk.
5	Determination of milk fats.
6	Study of pasteurization process of milk.
7	Study of homogenization process of milk.
8	Study of Preparation of standardized milk.
9	Study of Preparation of Ice cream.
10	Study of Preparation of khava.
11	Study of Preparation of various milk based sweets.
12	Visit to Dairy industry.

The assessment of the term work shall be done on the following basis
<ul style="list-style-type: none">• Continuous assessment.• Record of the experiments submitted by the student• Oral conducted on the syllabus and term work mentioned above

Practical Examination
The practical examination shall consist of performing an experiment, based on the practical work done during the course, the record of the experiments submitted by the candidate and viva-voce based on the syllabus

C: Suggested text books and references

1. A text book of Animal Husbandry by Banarjee G. C.
2. Principles of Practices of Dairy farm management by Jagdish Prasad, Kalyani Pub. New Delhi
3. Outline of Dairy Technology by Sukumar De, Oxford Univ. Press, New Delhi
4. A handbook of Dairy Science by Mahanta K. C.
5. Principles of Agricultural Engineering Vol. I by A. M. Michael & T. P. Ojha, Jain Brothers, New Delhi.
6. Food Engineering & Dairy Technology by Kessier V. A., Freizing, Germany
7. Farm Structures by Vasavada, ICAR Publication New Delhi

Pattern of Question Paper
Faculty of Engineering and Technology
Third Year (B. Tech.) Agricultural Engineering (Revised Course) Examination
November/December, May/June 200__
Subject Name: Dairy Technology

Time: 2 hrs

Maximum Marks: 40

“Please check whether you have got the right question paper”

- N.B.:- i. All questions are compulsory
ii. Use separate answer book for each section
iii.
iv.....

Section A

Question no 1

08 marks

This question will consists of questions from all the chapters under section A mentioned in the syllabus.

This will consists of objective type, multiple choice type, short questions, concept oriented problems.

Question no 2

06 marks

OR

Question no 2

Question no 3

06 marks

OR

Question no 3

Note: 1. The questions will be memory based, application based and understanding type.

2. There should be intermixing in the questions.

Section B

Question no 4

08 marks

This question will consist of questions from all the chapters under section B mentioned in the syllabus.

This will consists of objective type, multiple choice type, short questions, concept oriented problems.

Question no 5

06 marks

OR

Question no 5

Question no 6

06 marks

OR

Question no 6

Note: 1. The questions will be memory based, application based and understanding type.

2. There should be intermixing in the questions.

Development of Skills-V

Periods				Evaluation Scheme					Credits
L	T	P	Total	TA	CT	ESE	PR	Grand Total	
---	---	2	2	50	---	---	---	50	1

Objective:

<ul style="list-style-type: none"> i) Understanding the concept of quality and applications of quality tools. ii) Understanding the Entrepreneurship Skills. iii) Understanding the Technical writing skills.
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A: Theory:

Unit	Contents	Duration	Nature
1	Quality: Definitions of Quality, Quality control, Quality Assurance, Dimensions of Quality circle details.	02 Hrs	Descriptive
2	2.Problem Solving Techniques: (Old & New tools) A. Old Tools: <ul style="list-style-type: none"> i)Tally Sheet/Check Sheet ii)Pareto Diagram iii)Cause & Effect Diagram iv)Graphs/Histogram/Run Chart v)Stratification vi)Scatter Diagram vii)Control Chart 	05Hrs	Descriptive
	B) New Tools: <ul style="list-style-type: none"> i)Affinity Diagram ii)Relation Diagram iii) Tree Diagram iv) Process Decision Program Chart v) Arrow diagram vi) Matrix Data Analysis Diagram 	05Hrs	Descriptive
	C) Helpful Techniques: <ul style="list-style-type: none"> i) Brainstorming ii) Flow Chart Definition purpose, procedure & examples of all the above said tools.	02Hrs	Descriptive
3	3) Entrepreneurship: Definitions, need, significance, success stories of few exceptional entrepreneurs.	06 Hrs	Descriptive
4	4) Marketing Management: Definitions of marketing, objectives, types of markets, marketing techniques.	06 Hrs	Descriptive
5	Writing Skills: Writing of Technical /Project reports, Writing Technical Research papers	04Hrs	Descriptive
SECTION :A Chap ----			
SECTION :B Chap ----			

B : Practical / Drawing / Design / Workshop: Practical

Term work shall consist of ten assignments as follows:

- 1) Three assignments on any three old QC tools.
- 2) Three assignments on any three new QC tools.
- 3) One assignment each on Entrepreneurship, Marketing Management, Writing Skills & Quality.

C. Suggested Text Books and References:

Sr. No.	Title	Author	Publication	Edition
1	Quality Planning and Analysis	Juran		
2	Handbook of Effective Technical Communications	Tyler G. Hicks, Carl M. Valorie, Sr	McGraw Hill Book Company	
3	Technical Writing Process and Product	Saron J. Gerson / M. Gerson	Prentice Hall	
4	Thesis and Assignment Writing	Anderson, Dustan, Poole	Wiley Eastern Limited.	

Soil & Water Conservation Engineering

Periods				Evaluation Scheme					Credits
L	T	P	Total	TA	CT	ESE	PR	Grand Total	
4	-	2	6	25	20	80	25	150	5

Objectives

Soil & Water Conservation Engineering is the application of engineering and biological principles to the solution of soil & Water management problems. Sound soil & water conservation is based on the full integration of engineering, atmospheric, plant and soil science. Agricultural engineering, because of their training in soils, plants and other basic agricultural subjects, in addition to their engineering background, are well suited to integrate these sciences. By keeping this in view, present syllabus incorporated with following objective

1. Study of soil erosion problems by natural erosive agents
2. To study various agronomical and mechanical measures for control soil & water conservation.

A: Theory

Unit	Content	Duration	Nature
I	soil erosion – problems of soil erosion, basic terminologies, causes, types, Factors affecting, water & wind erosion, factors affecting, mechanics of water erosion, classification of water erosion, splash, sheet, rill, gully & stream bank erosion, wind erosion- mechanics, control measures- vegetative, mechanical measures,	12 hrs	Descriptive
II	Soil loss estimation - universal soil loss equation and modified soil loss equation, determination of their various parameters rainfall erosivity and erodibility, sedimentation in reservoirs and streams, estimation and measurement, sediment delivery ratio, trap efficiency.	08 hrs	Descriptive & analytical
III	Gully Erosion - gullies and their classification, stages of gully development, principles of gully control, introduction to temporary & permanent gully control structures.	10 hrs	Descriptive & analytical
IV	Erosion control measures- Agronomical measures - contour cropping, strip cropping, mulching, wind breaks and shelter belts mechanical measures - bunds - contour bunds, graded bunds and their design	12 hrs	Descriptive & analytical
V	Terracing – functions, classifications, level and graded broad base terraces and their design, bench terraces & their design, layout procedure, terrace planning,	08 hrs	Descriptive & analytical
VI	Grassed water ways- uses, various cross sections, specifications & their design, introduction to water harvesting techniques	10 hrs	Descriptive & analytical

Section A: I, II, & III Unit

Section B: IV, V & VI Unit

B: Practicals:-

The term work shall consist of following experiments (minimum ten)	
S.N.	Practical
1	Study of soil loss measurement techniques.
2	Problems on Universal Soil Loss Equation (USLE)
3	Computation of erosion index from rainfall data
4	Determination of sediment concentration through oven dry method
5	Study of various gully erosion control structures
6	Study of agronomical erosion control measures
7	Design of contour bunding system
8	Design of graded bunding system
9	Study of various types of terraces
10	Design of bench terracing systems
11	Design of vegetative waterways.
12	Study of different Mechanical Protection Work (MPW)
13	Study of water harvesting techniques
14	Field visit to water harvesting structures

The assessment of the term work shall be done on the following basis
<ul style="list-style-type: none"> • Continuous assessment. • Record of the experiments submitted by the student • Oral conducted on the syllabus and term work mentioned above

Practical Examination
The practical examination shall consist of performing an experiment, based on the practical work done during the course, the record of the experiments submitted by the candidate and viva-voce based on the syllabus

C: Suggested text books and references

1. Soil & Water Conservation Engineering by R. Suresh
2. Manual of Soil & Water Conservation Engineering by Gurmel singh, C. Venkataramanan, G. Sastry & B. P. Joshi, Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.
3. Soil Conservation by N. Hudson
4. Soil & Water Conservation Engineering by G. o Schwab, D. D. Fangmeier, W. J. Elliot & R . K. Frevert, John Wiley & Sons, Inc. New York.

Pattern of Question Paper
Faculty of Engineering and Technology
Third Year (B. Tech.) Agricultural Engineering (Revised Course) Examination
November/December, May/June 200__
Subject Name: Soil and Water Conservation Engineering

Time: 3 hrs

Maximum Marks: 80

“Please check whether you have got the right question paper”

- N.B.:- i. All questions are compulsory
ii. Use separate answer book for each section
iii.
iv.....

Section A

Question no 1

16 marks

This question will consists of questions from all the chapters under section A mentioned in the syllabus.

This will consists of objective type, multiple choice type, short questions, concept oriented problems.

Question no 2

12 marks

OR

Question no 2

Question no 3

12 marks

OR

Question no 3

- Note: 1. The questions will be memory based, application based and understanding type.
2. There should be intermixing in the questions.

Section B

Question no 4

16 marks

This question will consist of questions from all the chapters under section B mentioned in the syllabus.

This will consists of objective type, multiple choice type, short questions, concept oriented problems.

Question no 5

12 marks

OR

Question no 5

Question no 6

12 marks

OR

Question no 6

- Note: 1. The questions will be memory based, application based and understanding type.
2. There should be intermixing in the questions.

Seed Processing and Equipments

Periods				Evaluation Scheme					Credits
L	T	P	Total	TA	CT	ESE	PR	Grand Total	
4	-	2	6	25	20	80	25	150	5

Objectives

The seed quality is very important aspect for an agriculturist. With the study of various Post harvesting operation, agricultural engineers should be familiar with various seed processes and equipment utilized for seed processing. The aim of this subject is to fulfill following the objectives.

1. To study various seed processing operations.
2. To study the design of various seed processing equipments
3. To study the role of various seed industries in agricultural development

A: Theory

Unit	Content	Duration	Nature
I	Basic seed processing operations, machines and plants for cleaning, separating and grading.	12 hrs	Descriptive
II	Seed processing and Industries: - Seed packaging, storage, handling, marketing and distribution, seed industry in India and their role in agricultural development.	08 hrs	Descriptive & analytical
III	Design synthesis and development of concept of processing equipment, design parameters, codes and material selection, component design, design drawing.	10 hrs	Descriptive & analytical
IV	Conveyors and Elevators: - detailed design analysis and procedure for belt conveyor, design procedure for screw conveyors, bucket elevator.	12 hrs	Descriptive & analytical
V	Pneumatic separator, storage vessels, hoppers, milling equipments, dryers, heat exchangers,	08 hrs	Descriptive & analytical
VI	Optimization of design with respect to process efficiency, energy and cost.	10 hrs	Descriptive & analytical

Section A: I, II, & III Unit

Section B: IV, V & VI Unit

B: Practicals:-

The term work shall consist of following experiments (minimum ten)	
S.N.	Practical
1	Study of operation of precleaners and cleaners.
2	Study of seed handling in graders (Cylinder separator, Specific gravity separator, air screen cleaner cum grader).
3	Periodical repair and maintenance of air screen cleaner.

4	Seed treating operations and the adjustments of seed treater.
5	Operation, maintenance, adjustments and working schedule for seed drier.
6	Repair and maintenance of elevators and conveyors.
7	Seed sample analysis for moisture content, mechanical damage, germination and viability.
8	Estimation of processing cost.
9	Preparation of layout for planning of new seed processing plant and seed storage.
10	Design of bucket elevators.
11	Design of belt conveyor.
12	Design of screw conveyor.
13	Design of continuous flow drier and batch drier.
14	Visit to seed processing plant.

The assessment of the term work shall be done on the following basis

- Continuous assessment.
- Record of the experiments submitted by the student
- Oral conducted on the syllabus and term work mentioned above

Practical Examination

The practical examination shall consist of performing an experiment, based on the practical work done during the course, the record of the experiments submitted by the candidate and viva-voce based on the syllabus

C: Suggested text books and references

1. Food Engineering and Dairy Technology by Kessler, V. A., Freising, Germany
2. Seed processing and handling by Vaughan C. E., Greag B. R. and James C. Delouche. Seed Testing Laboratory, Mississippi State Univ. USA.
3. Principles of Agricultural Engineering Vol. I by T. P. Ojha & A. M. Michael.
4. Agricultural Processing Equipments by Hall C. W.
5. Seed Technology by R. L. Agrawal. Oxford and IBH Pub Co.
6. Process Equipment Design by Brownell and Young.
7. Transport Process and Unit Operations by C. J. Geankoplis, Prentice Hall of India, New Delhi

Pattern of Question Paper
Faculty of Engineering and Technology
Third Year (B. Tech.) Agricultural Engineering (Revised Course) Examination
November/December, May/June 200__
Subject Name: Seed Processing and Equipments

Time: 3 hrs

Maximum Marks: 80

“Please check whether you have got the right question paper”

- N.B.:- i. All questions are compulsory
ii. Use separate answer book for each section
iii.
iv.....

Section A

Question no 1

16 marks

This question will consists of questions from all the chapters under section A mentioned in the syllabus.

This will consists of objective type, multiple choice type, short questions, concept oriented problems.

Question no 2

12 marks

OR

Question no 2

Question no 3

12 marks

OR

Question no 3

- Note: 1. The questions will be memory based, application based and understanding type.
2. There should be intermixing in the questions.

Section B

Question no 4

16 marks

This question will consist of questions from all the chapters under section B mentioned in the syllabus.

This will consists of objective type, multiple choice type, short questions, concept oriented problems.

Question no 5

12 marks

OR

Question no 5

Question no 6

12 marks

OR

Question no 6

- Note: 1. The questions will be memory based, application based and understanding type.
2. There should be intermixing in the questions.

Strength of Materials

Periods				Evaluation Scheme					Credits
L	T	P	Total	TA	CT	ESE	PR	Grand Total	
4	-	2	6	25	20	80	-	125	5

Objectives

The purpose of the subject of Strength of Materials is to make the students aware of the limiting values of stresses, safe carrying stresses and various mechanical properties of materials

A: Theory

Unit	Contents	Duration	Nature
I	Shear Force and Bending Moment: Concept, relation between load intensity, shear and bending moments and BM diagrams for various types of loadings like udl, uvl, bracket loads, point loads, moments etc. SF and BM for sections with varying Young's modulus and moment of inertia.	6 Hrs	Theoretical & Analytical
II	Simple Stresses and Strains: Simple stress and strain due to axial tension and compression, shear, temperature stresses for simple and composite sections, elongation of uniform and tapering sections, lateral strains and linear strains, elastic constants	8 Hrs	Theoretical & Analytical
III	Theory of Simple Bending: Pure bending, assumptions made in theory of simple bending, neutral axis, moment of resistance, section modulus, bending stress distribution diagrams for various end conditions and loading conditions of beams, fletched beams.	8 Hrs	Theoretical & Analytical
IV	Shear Stress Distribution : Shear stresses in beams, complimentary shear, various end conditions and loading conditions of beams	8 Hrs	Theoretical & Analytical
V	Direct and bending stresses: Bending combined with axial loads, eccentrically loaded short struts, chimneys.	4 Hrs	Theoretical & Analytical
VI	Principal Stresses and Strains: Concept, stress on oblique plane, two dimensional stress systems, planes of maximum shear stress, Mohr's circle diagram for principal stress.	6 Hrs	Theoretical & Analytical
VII	Theory of Torsion: Circular shafts subjected to torsion, torsional stresses, power transmission, torsion combined with bending and axial forces.	6 Hrs	Theoretical & Analytical
VIII	Thin Cylindrical and Spherical Shells: Thin pressure vessels, circumferential and longitudinal stresses, cylindrical and spherical objects subjected to internal fluid pressure, volumetric strains.	4 Hrs	Theoretical & Analytical
IX	Strain Energy: Strain energy due to gradually applied loads, suddenly applied loads and impact loads.	4 Hrs	Theoretical & Analytical

X	Deflection of Beams: Deflection of beams, statically determinate and indeterminate, double integration method, various types of loads and beams, slope and deflection equations.	6 Hrs	Theoretical & Analytical
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Section A: I, II, III & IV Units

Section B: V VI, VII, VIII, IX & X Units

B: Practicals:-

The term work shall consist of following experiments (minimum Eight)	
S.N.	Practical
1	Tension test on the ductile materials like mild steel and TOR steel
2	Flexural test on timber beam
3	Shear test on metals
4	Testing on bricks-water absorption and compression.
5	Transverse test on flooring tiles.
6	Abrasion test on flooring tiles.
7	Impact tests on metals-Izod and Charpy.
8	Torsion test on steel.
9	Hardness test
10	Cold bend test on steel
11	Pull out test

The assessment of the term work shall be done on the following basis
<ul style="list-style-type: none"> • Continuous assessment. • Record of the experiments submitted by the student • Oral conducted on the syllabus and term work mentioned above

C: Suggested text books and references

1. Strength of Materials by S.Ramamrutham, Dhanpatrai and Sons publication.
2. Strength of Materials by R.K.Bansal, Laxmi Publications
3. Strength of Materials by R.S.Khurmi, S.Chand Publication
4. Mechanics of Structure, Vol-I, by Junnarkar.

Pattern of Question Paper
Faculty of Engineering and Technology
Third Year (B. Tech.) Agricultural Engineering (Revised Course) Examination
November/December, May/June 200__
Subject Name: Strength of Material

Time: 3 hrs

Maximum Marks: 80

“Please check whether you have got the right question paper”

- N.B.:- i. All questions are compulsory
ii. Use separate answer book for each section
iii.
iv.....

Section A

Question no 1 **16 marks**

This question will consists of questions from all the chapters under section A mentioned in the syllabus.

This will consists of objective type, multiple choice type, short questions, concept oriented problems.

Question no 2 **12 marks**

OR

Question no 2

Question no 3 **12 marks**

OR

Question no 3

- Note: 1. The questions will be memory based, application based and understanding type.
2. There should be intermixing in the questions.

Section B

Question no 4 **16 marks**

This question will consist of questions from all the chapters under section B mentioned in the syllabus.

This will consists of objective type, multiple choice type, short questions, concept oriented problems.

Question no 5 **12 marks**

OR

Question no 5

Question no 6 **12 marks**

OR

Question no 6

- Note: 1. The questions will be memory based, application based and understanding type.
2. There should be intermixing in the questions.

Groundwater, Wells and Pumps (EL-I)

Periods				Evaluation Scheme					Credits
L	T	P	Total	TA	CT	ESE	PR	Grand Total	
4	-	2	6	25	20	80	25	150	5

Objectives

The day-by-day depleting status of the ground water due to continuous exploitation has brought need of exploration of the ground water. The same can achieve by fulfillment of following objectives under this subject.

1. To study the groundwater hydraulics
2. To study the wells, bore wells and well development.
3. To study various pumping systems

A: Theory

Unit	Content	Duration	Nature
I	Groundwater Hydraulics: Types of ground water, occurrence and movement of ground water, Darcy's law and its limitations, ground water exploration, aquifers, types and characteristics of aquifers,	10 hrs	Descriptive & analytical
II	Aquifer Parameters: Determination of aquifer parameters by different method such as Theis, Jacob and Chow's etc. Theis recovery method, surface and subsurface exploitation and estimation of ground water potential, quality of ground water, artificial groundwater recharge planning, modelling, ground water project formulation.	10 hrs	Descriptive & analytical
III	Wells:- Classification of wells, steady and transient flow into partially, fully and non-penetrating and open wells, familiarization of various types of bore wells common in the state, design of open well, groundwater exploration techniques, methods of drilling of wells, percussion, rotary, reverse rotary,	10 hrs	Descriptive & analytical
IV	Well Development:- Design of assembly and gravel pack, installation of well screen, completion and development of well, well interference, multiple well systems,	10 hrs	Descriptive & analytical
V	Pumps: different types of pumping machinery, classification of pumps, component parts of centrifugal pumps; pump selection, installation and trouble shooting; design of centrifugal pumps, performance curves, effect of speed on head capacity, power capacity and efficiency curves, effect of change of impeller dimensions on performance characteristics, hydraulic ram, propeller pumps, mixed flow pumps and their performance characteristics; priming, self priming devices, rotodynamic pumps for special purposes such as deep well turbine pump and submersible pump	20 hrs	Descriptive & analytical

Section A: I, II & III Unit

Section B: IV & V Unit

B: Practicals:-

The term work shall consist of following experiments (minimum ten)	
S.N.	Practical
1	Determination of Hydraulic properties of steady state flow to wells in unconfined aquifers.
2	Determination of Hydraulic properties of steady state flow to wells in confined aquifers
3	Unsteady state flow to wells in unconfined aquifers
4	Unsteady state flow to wells in confined aquifers
5	Study of artificial recharge of ground water
6	Verification of Darcy's Law.
7	Estimation of aquifer parameters by various methods.
8	Study of determination of hydraulic properties of wells
9	Study of different drilling equipments
10	Estimation of specific yield and specific retention.
11	Well design under confined and unconfined conditions,
12	Well losses and well efficiency
13	Study of radial flow and mixed flow centrifugal pumps,
14	Installation and testing of centrifugal pump and study of cavitations;
15	Study of hydraulic ram
16	Study and testing of submersible pump

The assessment of the term work shall be done on the following basis
<ul style="list-style-type: none">• Continuous assessment.• Record of the experiments submitted by the student• Oral conducted on the syllabus and term work mentioned above

Practical Examination
The practical examination shall consist of performing an experiment, based on the practical work done during the course, the record of the experiments submitted by the candidate and viva-voce based on the syllabus

C: Suggested text books and references

1. Ground water hydrology by Raghunathan
2. Irrigation theory and practices by A. M. Michael, Vikas publishing house, New Delhi.
3. Water, Well and Pump Engineering by A. M. Michael & S. D. Khepar, Tata Mc Graw-Hill pub. Co. Ltd, New Delhi.
4. Preparation of Lift Irrigation Scheme, Manual of minor irrigation project, Pub. Govt. of Maharashtra (1987-88).
5. Ground Water Hydrology by Todd D. K., John Willey & Sons, New York

Pattern of Question Paper
Faculty of Engineering and Technology
Third Year (B. Tech.) Agricultural Engineering (Revised Course) Examination
November/December, May/June 200__
Subject Name: Groundwater, Wells and Pumps (EL-I)

Time: 3 hrs

Maximum Marks: 80

“Please check whether you have got the right question paper”

- N.B.:- i. All questions are compulsory
ii. Use separate answer book for each section
iii.
iv.....

Section A

Question no 1 **16 marks**

This question will consists of questions from all the chapters under section A mentioned in the syllabus.

This will consists of objective type, multiple choice type, short questions, concept oriented problems.

Question no 2 **12 marks**

OR

Question no 2

Question no 3 **12 marks**

OR

Question no 3

- Note: 1. The questions will be memory based, application based and understanding type.
2. There should be intermixing in the questions.

Section B

Question no 4 **16 marks**

This question will consist of questions from all the chapters under section B mentioned in the syllabus.

This will consists of objective type, multiple choice type, short questions, concept oriented problems.

Question no 5 **12 marks**

OR

Question no 5

Question no 6 **12 marks**

OR

Question no 6

- Note: 1. The questions will be memory based, application based and understanding type.
2. There should be intermixing in the questions.

T. Y. B. Tech. Agricultural Engineering (Revised Syllabus)
Production Technology for Agricultural Machines (EL-I)

Periods				Evaluation Scheme					Credits
L	T	P	Total	TA	CT	ESE	PR	Grand Total	
4	-	2	6	25	20	80	25	150	5

Objectives

The subject designed to provide in-depth knowledge on Production Technology of Agricultural Equipment. The basic objective to design this subject to convert ideas in to machines; to study specialized techniques of production, to visit agricultural equipment production/testing units.

A. Theory:

Unit	Contents	Duration	Nature
I	Computer Aided Drafting/ Manufacturing: Computer Aided Drafting, Computer Aided Manufacturing	10 hrs	Descriptive
II	Manufacturing Principles & Economics: General Design Principles for Manufacturing, Economics of Process Selection, Small Scale Industry Profile, Mechanical Estimation & Costing, Value Engineering	10 hrs	Descriptive
III	Manufacturing Process: Casting/Molding Technology, Joining Technology, Forging Technology, Material Removal Technology, Assembly Technology, Plastic Engineering & Technology	10 hrs	Descriptive & Analytical
IV	Quality Control & Standardization: Measuring Instrument/Gauges, Layout & Dimensioning, Limits, Fits & Tolerances, Jigs & Fixtures - Design & Fabrication, Dies & Punches - Design & Fabrication, Template Making, Standardization, Industrial Engineering	10 hrs	Descriptive & Analytical
V	Critical Component - Manufacture & Selection: Critical Part - Manufacturing and sourcing, Selection Criteria	10 hrs	Descriptive & Analytical
VI	Metallurgical Technologies: Material Properties, Application & Selection, Mechanical/Metallurgical Properties Determination Techniques, Treatment for Bulk Properties Improvement, Surface Modification - Particle coating, Hard Facing, Thermal Spraying, Shot Peening etc.	10 hrs	Descriptive & Analytical

**Section A: Unit I, II, & III Unit and
Section B: Unit V, VI, & VII**

B. Practicals & Term work

S. No.	Practical	Duration, hrs
1	Study of Computer Aided Drafting	4
2	Mechanical Estimation & Costing	2
3	Study of Manufacturing Processes	4
4	Study of Measuring Instruments/Gauges	2
5	Industrial visit & Report submission	4

The assessment of the term work shall be done on the following basis

- Continuous assessment.
- Record of the experiments submitted by the student
- Oral conducted on the syllabus and term work mentioned above

Practical Examination

The practical examination shall consist of performing an experiment, based on the practical work done during the course, the record of the experiments submitted by the candidate and viva-voce based on the syllabus

C. Suggested Text books & References

1. Industrial Economics by B.N. Narayan, Anmol Publications ,1997, New Delhi.
2. A Textbook of Workshop Technology (Manufacturing Processes) by R.S. Khurmi (A Textbook for the Engineering Degree and Diploma Students), Sultan Chand & Co.
3. Production Engineering Technology by D. B. Richardson J.D. Radford Palgrave Macmillan.
4. Agricultural Machines Theory and Construction Vol 2 by Kanafowski, Cz. USDA Pub, Poland.
5. Computer Aided Engineering Design by Anupam Saxena
6. Design of Agricultural Machinery by Gary W. Krutz, John K. Schueller, Paul W., II Claar John Wiley & Sons Inc.
7. Production Technology by G. G. Thomas, Oxford University Press
8. Proceedings of Winter School on Production Technology of Agricultural Equipments November 01-21, 2008, CIAE, Nabi Bagh, Berasia Road, Bhopal-462 038 (MP)

Pattern of Question Paper
Faculty of Engineering and Technology
Third Year (B. Tech.) Agricultural Engineering (Revised Course) Examination
November/December, May/June 200__
Subject Name: Production Technology for Agricultural Machines (EL-I)

Time: 3 hrs

Maximum Marks: 80

“Please check whether you have got the right question paper”

- N.B.:- i. All questions are compulsory
ii. Use separate answer book for each section
iii.
iv.....

Section A

Question no 1

16 marks

This question will consists of questions from all the chapters under section A mentioned in the syllabus.

This will consists of objective type, multiple choice type, short questions, concept oriented problems.

Question no 2

12 marks

OR

Question no 2

Question no 3

12 marks

OR

Question no 3

- Note: 1. The questions will be memory based, application based and understanding type.
2. There should be intermixing in the questions.

Section B

Question no 4

16 marks

This question will consist of questions from all the chapters under section B mentioned in the syllabus.

This will consists of objective type, multiple choice type, short questions, concept oriented problems.

Question no 5

12 marks

OR

Question no 5

Question no 6

12 marks

OR

Question no 6

- Note: 1. The questions will be memory based, application based and understanding type.
2. There should be intermixing in the questions.

Tractor and Their Power Units (EL-II)

Periods				Evaluation Scheme					Credits
L	T	P	Total	TA	CT	ESE	PR	Grand Total	
4	-	2	6	25	20	80	-	125	5

Objectives:

Tractor is most important power house for Agriculture as all the field operations can be possible with tractor. An Agricultural Engineer must aware of its operation, design parameters, ergonomics etc. For proper understanding of agricultural tractor, this course is designed.

A. Theory:

Unit	Content	Duration, hrs	Nature
I	Introduction: Types of farm tractors. Trends in tractor design.	8	Descriptive
II	Engine Performance: Testing and evaluation of IC engines. Performance characteristics of SI and CI engines. Governors and their controls.	8	Descriptive
III	Tractor Transmission: Tractor clutches and brakes. Power transmission system and final drives.	8	Descriptive & Analytical
IV	Traction Theory: Different types of traction devices. Mechanics of traction and towed wheels. Evaluating the performance of traction devices.	6	Descriptive & Analytical
V	Tractor Chassis: Mechanics of tractor chassis. Lateral and longitudinal stability. Weight transfer. Steering system.	8	Descriptive & Analytical
VI	Hitch Systems: Three point linkage geometry. Free link and restrained link mechanisms. Automatic position and draft control systems used in modern tractors.	8	Descriptive & Analytical
VII	Tractor Test and Performance: Drawbar performance of tractors. Tractor power cost estimation. Test standards.	8	Descriptive & Analytical
VIII	Tractor ergonomics: Human factors in the design of tractor seat and different controls.	6	Descriptive
	Total	60	

Section A: Unit I, II, III & IV Unit

Section B: Unit V, VI VII & VIII

B: Practicals:-

The term work shall consist of following experiments (minimum ten)	
S.N.	Practical
1	Study of various types of farm tractors.
2	Performance characteristics of IC engine.
3	Governors and their controls.
4	Study of power transmission system in tractor.
5	Study of clutch systems.
6	Study of brake systems.

7	Study of traction devices.
8	Study of steering system.
9	Study of hitching system.
10	Tractor power cost estimation.
11	Study of draft control system.
12	Tractor ergonomics study.
13	Visit to tractor repair workshop.

The assessment of the term work shall be done on the following basis	
<ul style="list-style-type: none"> • Continuous assessment. • Record of the experiments submitted by the student • Oral conducted on the syllabus and term work mentioned above 	

B. Suggested Text books & References

1. Principles of Agricultural Engineering by A. M. Michel & T.P. Ojha Vol. - I. Jain Brothers, New Delhi.
2. Practical Agricultural Engineering by Ghosh and Swain Vol. - I & II. Naya Prakash 206, Bidhar Sarani, Kolkata.
3. Tractors and their Power Units by E.L. Barger, J.B. Liljedahl, W.M. Carleton, E.G. Mokibben. Wiley Eastern Private Ltd., New Delhi.
4. Elements of Agricultural Engineering by Jagdiswar Sahay Vol. - I & II. Agro Book Agency, New Area, Jakkanpur, Patna – 1.
5. Principles of Farm Machinery by R A Kepner, Roy Bainer; E L Barger

Pattern of Question Paper
Faculty of Engineering and Technology
Third Year (B. Tech.) Agricultural Engineering (Revised Course) Examination
November/December, May/June 200__
Subject Name: Tractor and Their Power Units (EL-II)

Time: 3 hrs

Maximum Marks: 80

“Please check whether you have got the right question paper”

- N.B.:- i. All questions are compulsory
ii. Use separate answer book for each section
iii.
iv.....

Section A

Question no 1 **16 marks**

This question will consists of questions from all the chapters under section A mentioned in the syllabus.

This will consists of objective type, multiple choice type, short questions, concept oriented problems.

Question no 2 **12 marks**

OR

Question no 2

Question no 3 **12 marks**

OR

Question no 3

- Note: 1. The questions will be memory based, application based and understanding type.
2. There should be intermixing in the questions.

Section B

Question no 4 **16 marks**

This question will consist of questions from all the chapters under section B mentioned in the syllabus.

This will consists of objective type, multiple choice type, short questions, concept oriented problems.

Question no 5 **12 marks**

OR

Question no 5

Question no 6 **12 marks**

OR

Question no 6

- Note: 1. The questions will be memory based, application based and understanding type.
2. There should be intermixing in the questions.

Watershed Management (EL-II)

Periods				Evaluation Scheme					Credits
L	T	P	Total	TA	CT	ESE	PR	Grand Total	
4	-	2	6	25	20	80	-	125	5

Objectives

With awareness of soil and water conservation problems, the Agroneers should aware with integrated management of watershed. The watershed management is related with other methods of water resource management and to large scale man made changes in our environment course content also helps to understand Rehabilitation, Protection and improvement of water yields.

A: Theory:-

Unit	Content	Duration	Nature
I	Watershed - concept, types, watershed management, objectives, steps in watershed development, development components in watershed programme, deterioration of watershed.	10 hrs	Descriptive & analytical
II	Watershed characteristics – physical and geomorphologic, factors affecting watershed management, hydrologic data for watershed planning.	10 hrs	Descriptive & analytical
III	Watershed delineation, delineation of priority watershed, water yield assessment and measurement from a watershed.	10 hrs	Descriptive
IV	Hydrologic and hydraulic design of earthen embankments and diversion structures; sediment yield estimation and measurement from a watershed and sediment yield models.	10 hrs	Descriptive
V	Rainwater conservation technologies - in-situ and storage, design of water harvesting tanks and ponds; water budgeting in a watershed, effect of cropping system, land management and cultural practices on watershed hydrology;	10 hrs	Descriptive
VI	Evaluation and monitoring of watershed programmes, people's participation in watershed management programmes; planning and formulation of project proposal; cost benefits analysis of watershed programmes; land use models; case studies.	10 hrs	Descriptive

Section A: I, II & III Unit

Section B: IV & V Unit

B: Practicals:-

The term work shall consist of following experiments	
S.N.	Practical
1	Study of different watershed characteristic.
2	Analysis of hydrologic data for watershed management.
3	Study of Delineation of watershed and measurement of area under different vegetative and topographic conditions.
4	Study of measurement of water and sediment yield from watershed

5	Study of different watershed management structures.
6	Study of various water budget parameters.
7	Study of watershed management technologies;
8	Preparation of a techno-economically effective project proposal
9	Formulation of project proposal for watershed management work
10	Visit to watershed development work.

The assessment of the term work shall be done on the following basis

- | |
|--|
| <ul style="list-style-type: none"> • Continuous assessment. • Record of the experiments submitted by the student • Oral conducted on the syllabus and term work mentioned above |
|--|

C: Suggested text books and references

1. Manual of Soil & Water conservation Practices by G. Singh, C. Venkataramanan, G. Sastry & B. P. Joshi.
2. Soil & Water Conservation Engineering by R. Suresh.
3. Watershed Management by V. V. Druvanarayan, G. Sastry & U. S. Patnaik
4. Soil Conservation by N.W. Hudson
5. Soil & Water Conservation Engineering by G. O. Schwab, R. K Frevert, T. W. Edminster and K. K. Barnes.
6. Field Manual on Watershed Management by R. P. Singh.
7. Hydrology- Principles, Analysis, Design and Analysis by H. M. Raghunath

Pattern of Question Paper
Faculty of Engineering and Technology
Third Year (B. Tech.) Agricultural Engineering (Revised Course) Examination
November/December, May/June 200__
Subject Name: Watershed Management (EL-II)

Time: 3 hrs

Maximum Marks: 80

“Please check whether you have got the right question paper”

- N.B.:- i. All questions are compulsory
ii. Use separate answer book for each section
iii.
iv.....

Section A

Question no 1 **16 marks**

This question will consists of questions from all the chapters under section A mentioned in the syllabus.

This will consists of objective type, multiple choice type, short questions, concept oriented problems.

Question no 2 **12 marks**

OR

Question no 2

Question no 3 **12 marks**

OR

Question no 3

- Note: 1. The questions will be memory based, application based and understanding type.
2. There should be intermixing in the questions.

Section B

Question no 4 **16 marks**

This question will consist of questions from all the chapters under section B mentioned in the syllabus.

This will consists of objective type, multiple choice type, short questions, concept oriented problems.

Question no 5 **12 marks**

OR

Question no 5

Question no 6 **12 marks**

OR

Question no 6

- Note: 1. The questions will be memory based, application based and understanding type.
2. There should be intermixing in the questions.

Technical Report Writing

Periods				Evaluation Scheme					Credits
L	T	P	Total	TA	CT	ESE	PR	Grand Total	
2	-		26	-	10	40	-	50	2

Objectives

The preparation of technical report is very important aspect for technical student and researcher. This subject is incorporated for the fulfillment of following objectives.

1. To study the concept and importance of technical writing.
2. To study the structure and presentation of technical report.
3. To study the technical presentation of tables, illustrations and graphs in technical report.

A: Theory

Unit	Content	Duration	Nature
I	Concept and significance of technical writing, basic aspects of technical writing, structural analysis of published technical article.	07 hrs	Descriptive
II	Structure of technical report, mock preparation of technical report on the given topic, preparation of cover page, introduction, review of literature & its mock preparation, material and methods.	08 hrs	Descriptive
III	Results and discussion, summary and conclusions, summary writing Abstract, preparation of abstract, bibliography, abbreviations and punctuations.	07 hrs	Descriptive
IV	Presentation of data, tables, illustrations, graphs, mock preparation of tables, illustrations and graphs, style language and vocabulary, common errors, mock preparation of investigative and functional technical report, oral presentation of technical report.	08 hrs	Descriptive

Section A: I & II Unit**Section B: III & IV Unit****B: Suggested text books and references**

1. Technical and Professional writing by Herman A. Estrain.
2. English for Engineering Students by G. V. L. N. Sharma.
3. Reports, Technical Writing and Specification by H. R. Glidden.
4. Technical Writing by Richard W. Smith.
5. Research and Report Writing by S. M. Gatner
6. Writing the Technical Report by J. R. Nelson
7. Effective Technical Writing and Speaking by Barry T. Tuner.

Pattern of Question Paper
Faculty of Engineering and Technology
Third Year (B. Tech.) Agricultural Engineering (Revised Course) Examination
November/December, May/June 200__
Subject Name: Technical Report Writing

Time: 2 hrs

Maximum Marks: 40

“Please check whether you have got the right question paper”

- N.B.:- i. All questions are compulsory
ii. Use separate answer book for each section
iii.
iv.....

Section A

Question no 1 **08 marks**

This question will consists of questions from all the chapters under section A mentioned in the syllabus.

This will consists of objective type, multiple choice type, short questions, concept oriented problems.

Question no 2 **06 marks**

OR

Question no 2

Question no 3 **06 marks**

OR

Question no 3

Note: 1. The questions will be memory based, application based and understanding type.

2. There should be intermixing in the questions.

Section B

Question no 4 **08 marks**

This question will consist of questions from all the chapters under section B mentioned in the syllabus.

This will consists of objective type, multiple choice type, short questions, concept oriented problems.

Question no 5 **06 marks**

OR

Question no 5

Question no 6 **06 marks**

OR

Question no 6

Note: 1. The questions will be memory based, application based and understanding type.

2. There should be intermixing in the questions.

Seminar

Periods			Evaluation Scheme					Credit
			Sessional Exam		ESE		Total	
L	P	Total	TA	CT	TH	PR		Total
---	02	02	50	---	---	50	50	1

Objective:

1. To create awareness amongst pre final year students for latest technological Aspects.
2. To improve presentation and communication skills.
3. To inculcate qualities of team work and team spirit.
4. To motivate for research work in the respective areas.
5. To have common platform where interaction between various groups of students will take place on the various advanced and emerging topics of technology.
6. To improve skills related to search on the internet.
7. To realize importance of basic technological aspects.

Guidelines for students and faculty

1. Seminar topics may be chosen by the students with advice from the guide/Industry persons, which shall be finalized by guide and approved by concerned head of the department. Students are to be exposed to the following aspects of the seminar presentation.
 - a. Literature Survey / Review
 - b. Organization of the material
 - c. Preparing for presentation
 - d. Technical writing
2. Each student is required to-
 - a. Submit one page synopsis before the seminar talk for display on the notice board and
 - b. Give a 20 minutes presentation through OHP, PC, and Slide projector followed by a 10 minute question answer session.
3. For award of Sessional marks:
 - a. 25 marks - based on the assessment done by internal guide during semester and the involvement of student in the work assigned related to the seminar topic
 - b. Remaining 25 marks based on the examination at final presentation. Student is to be examined on the basis of an oral and written presentation by at least two examiners, one of them shall be guide and other as an external examiner appointed by the principal of the institute.

Seminar Report Format

1. The Seminar Report shall be typed on A-4 size white bond paper.
2. Typing shall be with spacing of 1.5 using one side of the paper.
3. Margins :-
 - (i) Left 37.5 mm.
 - (ii) Right, top and bottom 25 mm.
4. Binding :- Hard with golden embossing on the front cover of brown colour
5. Front cover of hard bound report:-

It should be identical to first title page.
6. Default font size TNR-12
7. Format for title page (First Page) (Centre justified)

Report of Seminar (TNR-14, Bold)
in

{Title}(TNR-18, Bold)
by

{Name of student}(TNR-16, Bold)
(Roll No:)

Submitted in partial fulfillment of the requirement for
Degree of Bachelor of Technology (Branch Name) (TNR-14, Bold)

of

Dr. Babasaheb Ambedkar Marathwada University,
Aurangabad. (TNR-14, Bold)

Department of _____Engineering, (TNR-14, Bold)
Maharashtra Institute of Technology, (TNR-16, Bold)
Aurangabad. (TNR-14, Bold)

200 - 200

Format for Certification page (Second page)

CERTIFICATE (TNR-16, Bold)

This is to certify that the Seminar Report

Submitted by

(Name of Student) (TNR-14, Bold)

(Roll No: __)

Is completed as per the requirement of the Dr. Babasaheb Ambedkar Marathwada University,
Aurangabad in partial fulfillment of
Degree of Bachelor of Technology (Branch Name) (TNR-14, Bold)

For the academic Year 20__ - 20__

(Name)
Guide

(Name)
Head of Department

(Name)
Principal (TNR -12, Bold)

8. The third page will be certificate issued by the industry regarding the completion of Seminar if applicable..
9. The fourth page would be for acknowledgement, which would be followed by index page (Fifth page).
10. Sketches should be drawn on separate sheet (minimum A4 size) and be inserted at proper places. The sketches should be drawn in black ink and be numbered.
11. Tables should preferably type in the text only.
12. The mathematical symbol should be typed or neatly written so as to match darkness of the text.
13. The last item on the index should be references.
14. Page number must appear on the right hand top corner of each page starting after index page.
15. The contents of the seminar can be decided by the internal guide / department and student.
16. Minimum number of copies = 5 Copies (Central Library + Department + Internal Guide + External Examiner + Student). The copy of External Examiner will be submitted by the student after completion of Seminar.

SAMPLE COPY

Report of Seminar

in

Remote Sensing through Satellite System

by

Mr. Prasad V Muley

(Roll No:)

Submitted in partial fulfillment of the requirement for
Degree of Bachelor of Technology (Electronics & Telecommunication),

of

**Dr. Babasaheb Ambedkar Marathwada University,
Aurangabad.**

**Department of Electronics & Telecommunication Engineering,
Maharashtra Institute of Technology,
Aurangabad.**

200 - 200

SAMPLE COPY

CERTIFICATE

This is to certify that the Seminar Report

Submitted by

Mr. Prasad V Muley

(Roll No:)

Is completed as per the requirement of the Dr. Babasaheb Ambedkar Marathwada University,

Aurangabad in partial fulfillment of

Degree of Bachelor of Technology

(Electronics & Telecommunication Engineering)

For the academic Year 200 – 200

**(Name)
Guide**

**(Name)
Head of Department**

**(Name)
Principal**

General Attributes

- Chapter heading -All Capital—TNR 14 Font (Bold)
- Heading –All Capital- TNR 12 Font (Bold)
- Subheading–Title case- TNR12 Font (Bold)
- Text – TNR11 Font
- Title of the Report should not be more than two lines
- Page numbers are at right hand corner at ½ inch from right and top side.
- Page number should be allotted only from Chapter no. 1 onwards.

References

Last chapter of the report is references including the addresses of websites.