CURRICULUM FOR THREE YEAR

DIPLOMA COURSE IN

# AGRICULTURAL ENGINEERING

Effective from Session

Semester System

Prepared By

Curriculum Development Cell

INSTITUTE OF RESEARCH DEVELOPMENT
& TRAINING, U.P., KANPUR

APPROVED BY

BOARD OF TECHNICAL EDUCATION
U.P. LUCKNOW,
CORRECTED AS SYLLABUS COMMITTEE OF:
B.T.E. MEETING HELD ON 10.06.2015

Corrected and Approved By B.T.E. Meeting On Dated 10.06.2015

STUDY AND EVALUATION SCHEME FOR
THREE YEARS (SIX SEMESTER) DIPLOMA COURSE IN AGRICULTURAL ENGINEERING
(Effective From )

I Semester

| Curriculum: Periods Per Week | | | | | | S U B J E C T | Scheme of Examination: Theory | | | | Practical | | | | Grand Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lec. | Tutorial | Draw | Lab | Work Shop | Total | | Examination Dur. | Marks | Sess. Marks | Total Marks | Examination Dur. | Marks | Sess. Marks | Total Marks | |
| 5 | - | - | 3 | - | 8 | 1.1 Professional Communication | 2.5 | 50 | 20 | 70 | 3 | 20 | 10 | 30 | 100 |
| 3 | 1 | - | - | - | 4 | 1.2 Applied Mathematics-I(A) | 2.5 | 50 | 20 | 70 | - | - | - | - | 70 |
| 3 | 1 | - | - | - | 4 | 1.3 Applied Physics-I | 2.5 | 50 | 20 | 70 | - | -- | -- | -- | 70 |
| 6 | - | - | 4 | - | 10 | 1.4 Applied Chemistry | 2.5 | 50 | 20 | 70 | 3 | 40 | 20 | 60 | 130 |
| - | - | 14 | - | - | 14 | 1.5 Engineering Drawing | 3.0 | 50 | 20 | 70 | - | - | - | - | 70 |
| 6 | - | - | 2 | - | 8 | 1.6 Agricultural Science | 2.5 | 50 | 20 | 70 | 3 | 30 | 15 | 45 | 115 |
| 23 | 2 | 14 | 9 | - | 48 | <---------TOTAL----------> | -- | 300 | 120 | 420 | | 90 | 45 | 135 | 555 |
| Games/NCC/Social and Cultural Activities + Discipline ( 15 + 10) | | | | | | | | | | | | | | | 25 |
| TOTAL | | | | | | | | | | | | | | | 580 |

II Semester

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3 | 1 | - | - | - | 4 | 2.1 Applied Mathematics-I(B) | 2.5 | 50 | 20 | 70 | - | - | - | - | 70 |
| 3 | 1 | - | 4 | - | 8 | 2.2 Applied Physics-II | 2.5 | 50 | 20 | 70 | 3 | 40 | 20 | 60 | 130 |
| 5 | 1 | | 2 | - | 8 | 2.3 Applied Mechanics | 2.5 | 50 | 20 | 70 | 3 | 40 | 20 | 60 | 130 |
| 6 | 2 | | 4 | - | 12 | 2.4 Mat. & Rural Construction Technology | 2.5 | 50 | 20 | 70 | 3 | 30 | 15 | 45 | 115 |
| - | - | - | - | 14 | 14 | 2.5 Workshop Practice | -- | -- | -- | -- | 4 | 60 | 30 | 90 | 90 |
| 17 | 5 | - | 10 | 14 | 46 | <---------TOTAL----------> | -- | 200 | 80 | 280 | | 170 | 85 | 255 | 535 |
| Games/NCC/Social and Cultural Activities + Discipline ( 15 + 10) | | | | | | | | | | | | | | | 25 |
| TOTAL | | | | | | | | | | | | | | | 560 |

NOTE:- (1) Each period will be 50 minutes duration.
(2) Each session will be of 16 weeks.
(3) Effective teaching will be at least 14 weeks.
(4) Remaining periods will be utilised for revision etc.

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STUDY AND EVALUATION SCHEME FOR
THREE YEARS (SIX SEMESTER) DIPLOMA COURSE IN AGRICULTURAL ENGINEERING
(Effective From )

III Semester

| Curriculum | | | | | | SUBJECT | Scheme of Examination | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Periods Per Week | | | | | | | Theory | | | Practical | | | | | Grand Total |
| Lec. | Tutorial | Draw | Lab | Work Shop | Total | | Examination Dur. | Sess. Marks | Total Marks | Examination Dur. | Sess. Marks | Total Marks | | | |
| 6 | 2 | - | 2 | - | 10 | 3.1 Hydraulics | 2.5 | 50 | 20 | 70 | 1.5 | 30 | 15 | 45 | 115 |
| 6 | - | - | 4 | - | 10 | 3.2 Soil Mech. Soil Scinece | 2.5 | 50 | 20 | 70 | 3 | 40 | 20 | 60 | 130 |
| 4 | - | - | 8 | - | 12 | 3.3 Surveying & Levelling | 2.5 | 50 | 20 | 70 | 6 | 50 | 20 | 70 | 140 |
| 2 | - | - | 5 | - | 7 | 3.4 Introduction To Computer | - | - | - | - | 3 | 60 | 30 | 90 | 90 |
| - | - | - | - | 8 | 8 | 3.5 Agricultural Equipment Workshop Practice | -- | -- | -- | -- | 6 | 50 | 25 | 75 | 75 |
| 18 | 2 | - | 19 | 8 | 47 | <---------TOTAL----------> | -- | 150 | 60 | 210 | | 230 | 110 | 340 | 550 |
| | | | | | | Games/NCC/Social and Cultural Activities + Discipline ( 15 + 10) | | | | | | | | | 25 |
| | | | | | | | | | | | | | TOTAL | | 575 |

IV Semester

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5 | 2 | - | 3 | - | 10 | 4.1 Mechanics of Solids | 2.5 | 50 | 20 | 70 | 3.0 | 40 | 20 | 60 | 130 |
| 6 | - | - | 4 | - | 10 | 4.2 Farm Power Engg. & Non-conventional Energy | 2.5 | 50 | 20 | 70 | 3 | 40 | 20 | 60 | 130 |
| 6 | - | - | 4 | - | 10 | 4.3 Electrical Engg. & Rural Electrification | 2.5 | 50 | 20 | 70 | 3 | 40 | 20 | 60 | 130 |
| - | - | - | - | 12 | 12 | 4.4 Agriculture Engg. Drawing | 3.0 | 100 | 40 | 140 | - | -- | -- | -- | 140 |
| 6 | - | - | - | - | 6 | 4.5 Dairy and Food Engineering | 2.5 | 50 | 20 | 70 | - | -- | -- | -- | 70 |
| 23 | 2 | - | 11 | 12 | 48 | <---------TOTAL----------> | -- | 300 | 120 | 420 | -- | 120 | 60 | 180 | 600 |
| | | | | | | Games/NCC/Social and Cultural Activity/Community Development work Discipline ( 30 + 20) | | | | | | | | | 25 |
| | | | | | | | | | | | | | Aggregate | | 625 |

NOTE:- (1) Each period will be of 50 minutes duration.
(2) Each session will be of 16 weeks.
(3) Effective teaching will be at least 14 weeks.
(4) Remaining periods will be utilised for revision etc.
(5) 4 weeks structured and supervised, branch specific, task oriented industrial/field exposure to be organised after IV Semester. There will be 40 marks for this exposure and will be awarded in VI Semester during Project Viva Exam. (Sess. Marks 20 & 20 in viva) Training shall be in any one of the following fields;

i. Agricultural Workshop
ii. U. P. Agro Ind. Corporation
iii. Tractor training & testing center.

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STUDY AND EVALUATION SCHEME FOR
THREE YEARS (SIX SEMESTER) DIPLOMA COURSE IN AGRICULTURAL ENGINEERING
(Effective From )

V Semester

| Curriculum | | | | | | SUBJECT | Scheme of Examination | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Periods Per Week | | | | | | | Theory | | | Practical | | | Grand | | |
| Lec. | Tutorial | Draw | Lab | Work Shop | Total | | Examination Dur. | Sess. Marks | Total Marks | Examination Dur. | Sess. Marks | Total Marks | Total | | |
| 6 | - | - | 4 | - | 10 | 5.1 Minor Irrigation & Tube Well Engineering | 2.5 | 50 | 20 | 70 | 1 | 10 | 5 | 15 | 85 |
| 6 | - | - | 8 | - | 14 | 5.2 Post Harvest Tech. & Agro Based Industries | 2.5 | 50 | 20 | 70 | 3 | 50 | 20 | 70 | 140 |
| 8 | - | - | - | - | 8 | 5.3 Estimationg & Costing | 4.0 | 100 | 40 | 140 | - | -- | -- | -- | 140 |
| 6 | - | - | - | - | 6 | 5.4 Banking,Fram & Industrial Management | 2.5 | 50 | 20 | 70 | - | -- | -- | -- | 70 |
| 6 | - | - | 4 | - | 10 | 5.5 Rural & Enterpreneurship Development | 2.5 | 50 | 20 | 70 | #Viva | 50 | 20 | 70 | 140 |
| 32 | - | - | 16 | - | 48 | <---------TOTAL----------> | -- | 300 | 120 | 420 | -- | 110 | 45 | 155 | 575 |
| Games/NCC/Social and Cultural Activity/Community Development work Discipline ( 30 + 20) | | | | | | | | | | | | | | | 25 |
| | | | | | | | | | | | | | Aggregate | | 600 |

VI Semester

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4 | - | - | - | - | 4 | 6.1 Environmental Education* & Disaster Management | 2.5 | 50 | -- | -- | - va | -- | -- | -- | -- |
| 6 | - | - | 4 | - | 10 | 6.2 Irrigation & Drainage Engineering | 2.5 | 50 | 20 | 70 | 2 | 20 | 10 | 30 | 100 |
| 6 | - | - | 8 | - | 14 | 6.3 Soil-Water Conservation & Land Reclaimation Engg. | 2.5 | 50 | 20 | 70 | 3 | 50 | 20 | 70 | 140 |
| 6 | - | - | 4 | - | 10 | 6.4 R.C.C. & Steel Structure | 2.5 | 50 | 20 | 70 | 3 | 50 | 20 | 70 | 140 |
| 4 | - | - | 4 | - | 8 | 6.5 Farm & Land Dev. Machinery | 2.5 | 50 | 20 | 70 | 3 | 40 | 15 | 55 | 125 |
| 2 | - | - | - | - | 2 | 6.6 Project Work | - | -- | -- | -- | #Viva | 100 | 50 | 150 | 150 |
| | | | | | | 6.7 Training Report of Industrial/Field Exposure done at the end of IV Semester | | | | | #Viva | 20 | 20 | 40 | 40 |
| | | | | | | end of V Semester | | | | | #Viva | 20 | 20 | 40 | 40 |
| 28 | - | - | 20 | - | 48 | <---------TOTAL----------> | -- | 200 | 80 | 280 | -- | 300 | 155 | 455 | 735 |
| Games/NCC/Social and Cultural Activity/Community Development Work + Discipline ( 15 + 10) | | | | | | | | | | | | | | | 25 |
| | | | | | | | | | | | | | Aggregate | | 760 |

NOTE:-
(i) Each period will be of 50 minutes duration.
(ii) Each session will be of 16 weeks.
(iii) Effective teaching will be at least 14 weeks.
(iv) Remaining periods will be utilised for revision etc.

| | |
|---|---|
| 30% Carry Over of I & II. | 342 |
| 70% Carry Over of III & IV | 840 |
| 100% Carry Over of V & VI | 1360 |
| Grand Total | 2542 |

(v ) Student centred activity includes games, NCC, Social & cultural activities, terminal exam and class tests, etc.

(vi ) Each student/group of Maximum 5 students will be given live problems to be solved. Three hours per week has been provided in the scheme. This time should be given at stretch in the end. Project will be under the guidence of teachers

(vii ) Field visits and extension lectures are to be organised and planned well in advance at Polytechnic level as per need

(viii) (*) It is compulsory to appear & to pass in examination, But marks will not be included for division and percentage of obtained marks.

(ix) 4 to 6 weeks structued fiedl exposure/training during/end of the V semester in any one of the fields given below
i. Soil & Water Conservation Training Centre.
ii. Minor irrigation.
iii. Agro processing unit iv. Construction unit.

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THREE YEARS DIPLOMA IN AGRICULTURAL ENGINEERING

CONTENTS



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## MAIN FEATURES OF THE CURRICULUM

| | | |
|---|---|---|
| 1. COURSE TITLE | : | DIPLOMA IN AGRICULTURAL ENGG. |
| 2. DURATION OF COURSE | : | Three Years(Six Semester) |
| 3. TYPE OF COURSE | : | Full Time, Semester Pattern. |
| 4. ENTRY QUALIFICATION | : | Passed High School With Agriculture 35% Marks |
| 5. INTAKE | : | 60 |
| 6. ADMISSION CRITARIA | : | Through Joint Entrance Examination |

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The experts who have contributed in the Semester System of curriculum held on 04.04.15.

| | | |
|---|---|---|
| 1. | Sri N. K. Naresh | Principal G.L.I., Agra |
| 2. | Sri K. K. Srivastava | Principal, G.P. Ambedakar Nagar |
| 3. | Sri Hari Om Singh | Principal, G. P., Sravasti |
| 4. | Sri Sanjeev Awasthi | HOD,J.L.Poly.Mahamudabad,Sitapur |
| 5. | Sri V. S. Rai | Retd. Lect, G. P. Gazipur |
| 6. | Sri Dinesh Sharma | Lecturer, I. R. D. T., Kanpur |

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## NEED ANALYSIS

It was considered essential to revise the curriculum of diploma course in Agricultural Engineering to accomodate new areas of technology as well as update and modernise the existing course contents so as to make it more relevant to the needs of the world of work. Accordingly, workshops were organised to look into the gaps in the existing curriculum and revise the same. Number of professionals representing various field organisations, higher technological institutions and polytechnics were envolved to update the curriculum of agricultural engineering.

Experts from the field and higher technological institutes emphasised the need of making the course more technology oriented and practice based. Need for inclusion of course on computer application, environmental awareness, entrepreneurship development and linkage of polytechnics with the world of work was also emphasised. Experts from the field and higher technological institutes were also of the view that curriculum should be broad based in nature so as to provide large base of employment and flexibility in functioning.

Based on the above, the curriculum of agricultural engineering was revised and during revision topics on entrepreneurship development,non conventional sources of energy, environmental pollution and control, safety procedures,banking,design of reinforced cement concret and steel structures and agro based industries have been included in the curriculum.

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## PROFILE DEVELOPMENT

A tool in form of a questionnaire for getting informations about job opportunities, man power requirements and job activities of diploma holders in agricultural engineering was designed and sent to various organisation, industries, higher technological institutes and polytechnics.

Feed back from experts of above organisations,industries higher technological institutes and polytechnics was taken through questionnaire, personal interviews, was analysed and a draft structure of curriculum was prepared in tne workshop held on 19th and 20th Feb. at Lucknow.

The course outline,detailed course contents and resource input was developed in the workshop adopting the following procedure.

(i) Listing job potential and job activities.
(ii) Analysing activities into knowledge and skill.
(iii) Determining the course objectives.
(iV) Deriving the subject area from course objectives.
(v) Planning horizontal and vertical organisation of the subjects.
(vi) Development of study and evaluation scheme.
(vii) Development of detailed course contents and coverage time keeping in view the knowledge and skill requirements.
(viii) Determination of resource input in terms of human resources and information resources.

Review of this draft of the structure of curriculum was done in a workshop held at I.R.D.T., U.P.,Kanpur through a group of experts from field, higher technological institutes and polytechnics.

It is hoped that revised curriculum of diploma in Agricultural Engineering will be useful in producing the desired type of middle level trained manpower for agricultural world of work.

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JOB OPPORTUNITIES

| Sl.No. | Name of Deptt. | Name of Post |
|---|---|---|
| 1. | Agriculture | |
| | (a) Ground water cell (Tubewell & minor irrigation) | Supervisor/J.E. |
| | (b) Soil & Water Conservation | Supervisor/J.E. |
| | (c) Non Conventional Energy Sources | Supervisor/J.E. |
| | (d) Agricultural Engineering | Supervisor/J.E. |
| 2. | Minor Irrigation & Tubewell Corporation | Supervisor/J.E. |
| 3. | Command Area Development Project | Supervisor/J.E. |
| 4. | Soil Conservation | Supervisor/J.E. |
| 5. | Agro Industrial Corporation | |
| | (a) Work Shop | Foreman/Supervisor |
| | (b) Marketing of Tractors, Implement, Seeding & Harvesting Equip. | Supervisor |
| 6. | Development Corporation | |
| 7. | National Seed Corporation | Supervisor |
| 8. | State Formers Corporation | Supervisor |
| 9. | Fertilizer Carporation of India | |
| | (a) Feed plant | Incharge |
| | (b) Fertilizer Plant | Incharge |
| 10. | Ware Housing Corporation | J.E. |
| 11. | UP State Krishi Utpadan Mandi Parishad | J.E. |
| 12. | Rice Mills | Supervisor |
| 13. | State Forest Department | Supervisor Machinary (Soil Conservate) |
| 14. | Banks, UP State Coop Krishi Avam Gramya Bank Ltd. | Tech. Supervisor/J.E. |
| 15. | Research & Extention Deptt. of Agriculture | Research Assistant |
| 16. | Manufactures of Tractors & Agro implements | Supervisor/Foreman/ Sales Representative |
| 17. | Teaching Institute | Asstt.Lect./Foreman |
| 18. | Mandal Vikas Nigam | J.E. |
| 19 | Krishi Vigyan Kendra | J.E. |
| 20. | Town & Country Planning | J.E. |
| 21. | Gram Vikas Sansthan,Bakshi Ka Talab | Supervisor |
| 22. | U.P. Jal Nigam | Supervisor/J.E. |
| 22. | U.P. Khadi Gramodyog Board | Supervisor/J.E. |
| 23. | Tractor Krishi Yantra Workshop | Supervisor/Foreman |
| 24. | Auto Tractors Ltd. | Supervisor/Foreman |
| 25. | Appropriate Technology Deve. Association | J.E. |
| 26. | Zila Gram Vikas Abhikaran | A.D.O. |
| 27. | Entrepreneurs | |
| | (a) Manufacturers of | |
| | i. Agricultural implements | |
| | ii. Pump sets | |
| | iii.Fibre Processing | |
| | iv. Crop Processing | |
| | (b) Repair & Maintenance Centre of Agri.Implements,Pump Set etc. | |

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## JOB ACTIVITIES

| Sl.No. | Name of Activities |
|---|---|
| 1. | Surveys the land and water resources of command areas. |
| 2. | Supervises Land levelling operations. |
| 3. | Prepares plans for surface & sub surface water conveyance system. |
| 4. | Supervises construction of farm structures. |
| 5. | Assists in planning and execution of the schemes for<br>(i) Rain fall<br>(ii) Run off<br>(iii) Water harvesting and its recycling<br>(iv) Water shed management |
| 6. | Interprets production drawings. |
| 7. | Procures raw materials. |
| 8. | Assists in quality control in production process of the products. |
| 9. | Controls labour for optimum production. |
| 10. | Diagonose faults in equipment/machinary. |
| 11. | Estimates the repair cost including requirement of spares. |
| 12. | Procures spares and prepare their inventory. |
| 13. | Tests the equipement and machinary for desired performance. |
| 14. | Conducts demonstration of various products. |
| 15. | Markets the products. |
| 16. | Provides costumer hire service. |
| 17. | Assists farmer in arranging finance for land development work. |
| 18. | Plans and executes land reclamation works. |
| 19. | Supervises land development work. |
| 20. | Performs after sales service to agricultural impliments. |
| 21. | Survey for the feasibility of tubewells. |
| 22. | Installs trial bores for the area where such sources are lacking |
| 23. | Selects bore size for a given situation. |
| 24. | Selects pumps, power units and pipe line for a pump house. |
| 25. | Prepare estimates and cost for distribution lines for installation of tube wells. |
| 26. | Supervises installation and trial run of a tube well. |
| 27. | Supervises rejovination of old choked tube wells. |
| 28. | Assists in determining aquifer parameters by performing pump test. |
| 29. | Supervises operations, maintenance and repair of irrigation pumping sets. |
| 30. | Demonstrates and populerise use of improved agricultural implements. |
| 31. | Guides the farmers for the efficient use of tubewells, pumping sets and other lifting devices like wind mill etc. |
| 32. | Collects data for pri & post monsoon water table of observation well. |
| 33. | Supervises installation & maintenance of biogasplant, wind mills, solar pumps, solar crop dryer and other non conventional energy equipments. |
| 34. | Guides the farmers in arranging finance for purchasing non conventional energy source equipments. |
| 35. | Guides the fabricators for standard design and quality of equipments. |
| 36. | Guides the farmers for operation and maintenance of tractors and other allied equipments |
| 37. | Supervises the construction of drainage & irrigation system of fields. |

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38. Plans and constructs soil and water conservation structure.
39. Plans the layout of farms.
40. Supervises operation maintenace & servicing of land development equipments.
41. Supervises installation, errection and commissioning of seed processing plants.
42. Supervises storing of processed seeds.
43. Supervises storage of food grains.
44. Operates and maintains grain handling equipments and storage structures.
45. Supervises handling, operations & Maintenance of rice processing machinary.
46. Assists farmers in preparing loan application for agricultural equipments.
47. Prepares feasibility report for loan.
48. Scrutinises applications for loand with reference to assets & liabilities.
49. Does liason between bank & loanee.
50. Suggests new schemes for advances for new Bank Loan.
51. Assists in testing and evaluation of finished products as per BIS.
52. Trains the trade men.
53. Conducts experiments on soil and water
54. Helps in research and extension works to engineers.
55. Supervises flow operation of the manufacture of tractors & other implements.
56. Estimates the cost of maierials and equipments.
57. Establishes services & costermer hiring service centres for related agricultural deptt.
58. Supervises handling, operation & maintenance of vegetable & fruit storage machines.
59. Prepares ketchup, Jam, Jelly and squash of different fruit & vegetable.
60. Supervises the preservation of different fruit & vegetable

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ANALYSIS OF ACTIVITIES INTO KNOWLEDGE AND SKILLS

| Sl.No. | Name of Activities | Knowledge | Skill | Aptitude |
|---|---|---|---|---|
| 1. | Surveys the land and water resources of command areas. | Civil Engineering<br>Surveying Cham survey<br>compass survey, plan table survey, area calculation , Theodolite, levelling. | Surveying of<br>& water<br>& levelling | land Prudent<br>resources |
| 2. | Supervises Land levelling operations. | Surveying, Levelling eqquip-<br>ments, methods. | Levelling | Initiative<br>hard working. |
| 3. | Prepares plans for surface & sub surface water conveyance system.<br>(i) Rain fall<br>(ii) Run off<br>(iii) Water harvesting and its recycling<br>(iv) Water shed management | Open channel irrigation pipe irrigation their types and application.<br>Civil Engineering drawing and surveying.<br>Hydraulics.<br>Hydrology.<br>Collection of data for rainfall & run-off,irrigation. | Making plans irrigation for various of terrain.<br>Measurement of | for perposes<br>types<br>rainfall Conscientious. |
| 4. | Supervises construction of farm structures. | Various materials used for construction work.<br>Masonry work techniques reads Civil Engineering drawings. Labour management. | Test of materials as requirement of standards. | constraction Conscien-<br>per tious. |
| 5. | Assists in planning and execution of the schemes for | | | |
| 6. | Interprets production drawings. | Basic Engineering drawing<br>Mach.Engg.drawing<br>Assembly of farm machinary & tractors materials. | Roads assembly<br>Interprets<br>justment<br>workers about<br>requirements. | drawings Analytical<br>drawing<br>correctly to<br>job |
| 7. | Procures raw materials. | Materials, their charecter-<br>stics and application.<br>Estimating & costing of materials. Purchase procedufe.<br>Inventory controle. | Selection of<br>& suitable | economical Quality<br>materials conscien-<br>tious. |
| 8. | Assists in quality control in production process of products. | Work shop processes.<br>Machining processes. | Quality work | job in Quality<br>carpentary,smithy, Conscientious |
| 9. | Controls labour for optimum production. | Layout management.<br>Labour Laws. | Cooperative | shop economical<br>systemetic. |
| 10. | Diagonose faults in equipment/machinary. | Form equipment & implements tractors, their assembly.<br>Operation of machinary and equipment. System of fault finding,working of various cycles. | Dessemble the equipment &<br>Make correct various tools<br>ruments for faults. | machinary Safety<br>tractors. Conscien-<br>use of tious.<br>and inst-<br>dignosing |

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| | | | | |
|---|---|---|---|---|
| 11. Estimates the repair cost including requirement of spares. | cost | Cost and | Repair cost estimation process of repair of various parts, machining processes. | Estimation of keeping in view (i) Spare Cost (ii) Machining (iii) |
| | the | time | | |
| | Conscien- | | | |
| | time | tious. | | |
| | Maintinance | | | |
| 12. Procures spares and prepare their inventory. | proper | Quality and | Inventory controle Methods basic mechanism and spare parts with and specification. | Preparation of inventory of |
| | the spares. | cost cons- | | |
| | cientions. | | | |
| 13. Tests equipments and machinary for desired performance. | cycles/equipments | methodo- | Testing procedures,proper use of instruments | Test |
| | logical. | | | |
| 14. Conducts demonstration of various products. | the working | Conscien- | 1. Agricultural inputs<br>2. Machinary & their application<br>3. Construction & working of farm machinary.<br>4. Operation of farm machinary.<br>5. Rural Socialogy | Demonstrates of farm uses to their |
| | machinary to the | tious. | | |
| | satifaction | | | |
| 15. Markets the products. | Communica- | | Sales, Marketing & Management principles. Salient features of products. | Marketing skill Communication |
| | skill | tive con- | | |
| | vincing | | | |
| 16. Provides costumer hire service. | skill | Polite & | Agriculture economics proce-dure of hire purchase | Communication demonstration |
| | skill | convincing | | |
| 17. Assists farmer in arranging finance for land development | skill | Cooperative | Financing agencies & Their term and condition of giving loan/subsidiary. | Communication |
| | work. | | | |
| 18. Plans and executes land reclamation works. | Methodo- | | Land reclamation methods & selection of machinary, working and application of machinary C.P.M. & PERT Techniques Time Schedule | Management Techniques Exucution of land work |
| | logical | | | |
| | reclamation | | | |
| 19. Supervises the land development work | of | Cooperative | Civil Engineering Surveying Soil sampling Land development methods Water and soil conservation method Land Developement Machinary operation of land development machniary. | Fault defection i) Civil Survey ii)Land machinary & |
| | equipment | | | |
| | development | | | |
| | implement | | | |
| 20. Perform after sales services to Agricultural | material | Quality | Preparation of plan for water and soil conservation Drawing, Estimating & costing methods. | Prepare plan, & cost Management of machinery |
| | Implements. | | | |
| | estimates | conscein- | | |
| | men and | tious. | | |
| | effectively. | | | |
| 21. Survey for the feasibility of tube well. | survey, | Sincere | Site selection,spacing & type of tubewells, suitability & availilbility of good ground water | Conducts Identify type well analyse table & quality |
| | of tube | hardworking | | |
| | water | analytical | | |

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| | | | | | |
|---|---|---|---|---|---|
| 22. Installs trial bores for the area where such sources are not available. | Installing,testing & men & tious | Safety conscein- | Selection of site for trial bores,procedure of installation,sources of trial bores procedure of installation, management of men & | management of machinary Conscein- | |
| 23. Selects bore size for a given situation. | suitable size boring as per ground layout maps | Conscein- tious about specifica- | Hydraulics of wells, | selects & size of availability of water,read | |
| 24. Selects pumps, power units and pipe line for a pump house. | pumps movers | Specifica- tion conscein- | Different types of pumps, construction & working of prime movers, ellectrical distribution system & fitting. | Selection of and prime | |
| 25. Prepare estimates and cost for distribution lines for installation of tube wells. | schedule, mate- given/ market rate. estimate & cost | Cost Conscein- tious | Estimating and costing of service connection, pumping sets and other accessories. | Reads rate select suitable rials of from available prepares of materials. | |
| 26. Supervises installation and trial run of a tube well. | well, choked tious. | Safety conscein- | Causes of sick wells, principles of rejovination of tube well | Diognose sick rejovinate tube wells | |
| 27. Supervises rejovination of old choked tube wells. | persons conscein- tious. | Safety | Procedure of Installation of of tubewell, trial testing/ procedures, human relation & management. | Management of and machinary. | |
| 28. Assists in determining aquifer parameters by performing pump test. | Cooper- ative. | | Aquifer parameter,pump tests | Pump testing | |
| 29. Supervises operations, maintenance and repair of irrigation pumping sets. | irrigation faults Manage- & | Initiative cooperative sincere. | Working of irrigation pump Troubles in working of pumps repair and maintenance of pumps and precautions. equipment , estimate of cost precaution, in manufacture. | Operates pumps diagnose remove defects. ment of workers | |
| 30. Demonstrates and populerise use of improved agricultural implements. | skill agricultural initiative. | Extrovert Innovative | Agricultural processes, agricultural implements, working principles use and salient feature communication tech., knowledge of charecterstics of various other semilar equip. | Demonstration use of implements. | |

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| | | | | | |
|---|---|---|---|---|---|
| 31. Guides the farmers for the efficient use of tubewells, pumping sets and other lifting devices like wind mill etc. | main-tubewell | Cooperative communication skill | Types of tubwell machinary, working principles of pumps and prime movers. | Operation and tenance of machinary,use pumping sets |
| 32. Collects data for pri & post monsoon water table of observation well. | water record | Initiative drive sincerity | Water table fluctuation,rain fall data recording,measurement of water table. Basic meterology. | Measurement of table,rainfall ing. |
| 33. Supervises installation & maintenance of biogasplant, wind mills, solar pumps, solar crop dryer and other non conventional energy equipments. | non-energy management | Initiative drive, co-oprative men. | Feasibility,site selection, construction & working of non conventional energy equipment precautions in use & maintenance. | Installation of conventional equipment, of machinery & |
| 34. Guides the farmers in arranging finance for purchasing non conventional energy source equipments. | skill | Cooperative | Financing agencies & terms & conditions of giving loan/subsidiary. | Communication |
| 35. Guides the fabricators for standard design and quality of equipments. | interpret Measure-dimensions with instruments. | safety conscient-ious. | Basic & machine drawing standard specifications of equipment/implements Basic manufacturing processes and materials. | Read & m/c drawing. ment of measuring |
| 36. Guides the farmers for operation and maintenance of tractors & tractor and other allied equipments | repair | Systemetic patience. | Tractor, working principles & circuits, selection crite-ria of tractors, operation & maintenance of tractors. | Drive Tractors service & minor of tractors. |
| 37. Supervises the construction of drainage & irrigation system of fields. | in varied tests of materials skill. | Quality & cost conscient-ious. | Materials & construction tech. Structurs of various types & their appplication, masonry work, RCC & steel structure, water measurement devices. | Measure water situation, construction estimating |
| 38. Plans and constructs soil and water conservation structure. | civil | Cost conscient-ious. | Civil Engg. Drawing, material & construction tech. masonry work, RCC & steel structure, Soil properties, hydraulics. | Measurement of works. |
| 39. Plans the layout of farms. | consting of materials and items of | Aesthetic imaginative. | Basic of form building planning for various requirement as per location of farm special reaquirement of various facelaties, Civil Engg. Drawing. | Estimating & building other related for a farm. |
| 40. Supervises operation maintenace & servicing of land development equipments. | faults conscient-ious. | Safety | Operation and working of land development equipments, common faults and trouble in machinery. | Dignose the in machines. |
| 41. Supervises installation, errection and commissioning of seed processing plants. | errect seed minature size. plant. | safety consciet-ious. | Construction, working & application, processing, basic machine drg. errection | Install & grader of seed processing |

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| | | | | |
|---|---|---|---|---|
| | | | installation of equipment & use. Trial test methods. | |
| 42. Supervises storing of processed seeds. | seed | Careful. | Storing procedure,precaution standard practice of storage seed treatment. | Supervison of storage. |
| 43. Supervises storage of food grains. | of seeds | careful. | Storing procedure and plant, precautions. | Proper storing |
| 44. Operates and maintains grain handling equipments and storage structures. | grain storage | Safety conscient-ious. | Construction and working of grain handling and storage equipment & structures. | Operation of handling and equipment |
| 45. Supervises handling, operations & maintenance of rice processing machinary. | processing Maintain Rice unit. | Safety | Construction and working of rice shellers. Operation and maintenance of rice milling machinery. | Operate Rice machinery. processing |
| 46. Assists farmers in preparing loan application for agricultural equipments. | act/communication effectively. | Polite. | Agriculture inputs in which assistance is offered. Communication. | Inter with farmers |
| 47. Prepares feasibility report for loan. | feasibi- | Self Study | Factor about suitability, marketability labour, raw material etc. | Preparation of report. |
| 48. Scrutinises applications for loand with reference to assets & liabilities. | Prudent initiative. | | Knowledge of evaluation of assets & liabilites. | |
| 49. Does liason between bank & loanee. | Verbal/Communication | Communi-cative. | Communication | skill. |
| 50. Suggests new schemes for advances for new Bank Loan. | proposal a new /cottage / or repair | Prudent honest. | Modern development, Rural Sociology,agricultural economics,Agricultural Science,allied sector occupation. | Prepare project for setting up small scale other industry shop. |
| 51. Assists in testing and evaluation of finished products as per BIS. | product in improve- | Quality conscient-ious. | BIS for testing equipment requirement of finished product. | Testing of field,suggest ment. |
| 52. Trains the trade men. | | | Industrial management safety practice in shop flore. | |
| 53. Conducts experiments on soil and water. | Systemetic and water, water the data. | approach. | Soil Science, Testing proce-dure as per BIS of soil and water. | Arrangement for testing soil tests soil & conclusion from |
| 54. Helps in research and extension works to engineers. | Cooperative | | Extension works: Principle & and extension scheme . | |
| 55. Supervises flow operation of the manufacture of tractors & other implements. | Safety study | conscientious | Manufacturing process know-ledge of parts is assembly time motion study. | Drawings time motion |
| 56. Estimates the cost of materials and equipments. | skill of suitable | Quality conscientious | Material, specification, applications, estimation | Selecting convinal & |

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| | | | |
|---|---|---|---|
| | | methods purchase procedure inventory controle. | mater purchase quality |
| of proper material will in law. | | | |
| 57. Establishes services & costermer hiring service centres for the related agricultural deptt. | P.R.G. | Knowledge of various agrl. crops & seasons crops harve- | Demontating functions & |
| 58. Supervises handling, operation & maintenance of vegetable & cold fruit storage machines. | Safety. | Construction of cold storage Airconditioning and refrige- ration unit. Working and maintenance of cold storage plant. | Operation of storage unit. |
| 59. Prepares ketchup, Jam, Jelly and squash of different fruit & vegetable. | jam, jelly, Innovative | Principle of ketchup, jelly, squash & jam manufacture, construction & working of equipment , estimate of cost precaution, in manufacture. | Preparation of |
| 60. Supervises the preservation of different fruit & vegetable practice. | skill Quality | Principle of preservation. Preservatives,method of packing. | Preservation and packing |

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COURSE OBJECTIVES

(A) To develop capabilities for understanding the engineering principle and techniques required for solving agricultural problem.

(i) Irrigation and drainage.

(ii) Land preparation & conservation.

(iii) Processing of crop, its storage & transportion.

(iv) Farm equipment and machinary.

(v) Form power and non conventional sources of energy.

(B) To develop awareness of various activities involved in agricultural engineering.

(C) To develop professional skills in technology for:

(i) Installation

(ii) Operation

(iii) Maintenance

(iv) Servicing

(v) Marketing

(vi) Construction

a. Farm Stucture

b. Irrigation system

c. Drainage system

(vii) Processing of crop.

(D) To develop capacities for decision making and qualities needed for :

(i) Active & intelligent participation in team work.

(ii) Leadership at work & in community as whole.

(E) To develop entrepreneurship traits

(i) Decision making innovation.

(ii) Calculated risk taking abilities etc.

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CURRICULUM AREAS

1. Soil & Water Engineering :

Conserve soil and water by installation of irrigation system.

Drainage, flood and soil erosion system.

2. Farm Power and Mechinery :

Equipment including crop processing plant, Mechinery maintenance and operation.

3. Farm Structure :

Layouts and supervises consturction of form bulding and utilities.

4. Rural Electrification and non conventional energy :

Rural electric supply distribution system.

Non conventional energy.

5. Process Engineering :

Processing of farm products.

6. Computer Application :

Uses computer for scheduling, estimating and farm related other activites as well as for farm managemrnt.

7. Rural & Entrepreneurship Development :

Prepares project for rural development and starting his own enterprise.

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I Semester

## 1.1 PROFESSIONAL COMMUNICATION

[ Common to All Engineering/Non Engineering Courses]

| L | T | P |
|---|---|---|
| 5 | - | 3 |

Rationale:

Communication forms an important activity of diploma holder. It is essential that he/she should be in a position to communicate in writing and orally with superiors,equals and subordinates. This subject aims at providing working knowledge of languages like Hindi and English so as to train the students in the art of communication. It is suggested that maximum attention should be given in developing Communication abilities in the students while imparting instructions by giving maximum emphasis on practice.

| Sr.No. | Units | Coverage time L | T | P |
|---|---|---|---|---|
| 1. | Introduction to communication methods meaning,channels & media written and verbal. | 5 | - | - |
| 2. | Development of comprehension of English & Hindi through study of text material& language exercises. | 10 | - | - |
| 3. | Development of expression through | | | |
| | A. Letters(English & Hindi) | 10 | - | - |
| | B. Report writing (English) | 10 | - | - |
| | Note making and minutes writing | | | |
| 4. | Paragraph writing, Essey writing, Proposal writing | 10 | - | - |
| 5. | Composition | 10 | - | - |
| 6. | Remecial Grammer & Vocabulary Building | 15 | - | - |
| | | 70 | - | 42 |

1. PART I : COMMUNICATION IN ENGLISH (40 Marks)

1.1 Concept of communication, importance of effective communication, types of communucation, formal, informal, verbal and nonverbal, spoken and written. Techniques of communication, Listening, reading, writting and speaking, Barriers in communication, Modern tools of communication- Fax, e-mail, Telephone, telegram, etc.

1.2 Technical communication Vs. General Communication : Development of comprehension and knowledge of English through the study of text material and language exercises based on the prescribed text book of English.

1.3 Development of expression through:

1.3.1 Paragraph writing, Essay writing, Proposal writing.

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1.3.2 Business and personal correspondence (Letters) :
Kinds of letters:-
Official, demi-offical, unofficial , for reply or in reply, quotation, tender and order giving letters. Application for a job, Resume.

1.3.3 Report writing and Note making and minutes writing.

1.4 Functional Grammer : Study of sentences and parts of speech (word class), Preposition, Verb, Articles, Abbreviations.

1.5 Vocabulary Building : Homophones, One word substitution, Idioms and Phrases.

1.6 Composition on narrative, descriptive, imaginative, argumentative, discussion and factual topics.

2. PART II : COMMUNICATION IN HINDI (10 Marks)

2.1 Development of comprehension and knowledge of Hindi usage through rapid reading and language exercises based on prescribed text material developed by IRDT.

2.2 Development of expression through ;

Letter writing in Hindi:
Kinds of letters:-
Official, demi-offical, unofficial , for reply or in reply, quotation, tender and order giving letters, Application for a job, Press release in Hindi, Report writing.

Note: Paper should be in two parts, part I - English and part II Hindi.

REFERENCE BOOKS

1. Bookshelf worksheet of Professional Communication, New Delhi : Bookshelf 2008

2. Functional Skills in language and literature by R. P. Singh, New Delhi : Oxford University Press.

3. Oxford Engilsh Hindi English Dictionary, New Delhi : Oxford 2008

LANGUAGE LAB PRACTICE

For the practice/exercise the following is suggested :-

1.A. Phonetic transcription
B. Stress and intonation :
(At least 10 word for writting and 10 word for pronunciation)

2. ASSIGNMENT : (Written Communication)

Two assignment of approximately 400 word each decided by the teacher concerned.

THE FOLLOWING MODEL IS PROPOSED :

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1. a picture/photograph
2. an opening sentence or phrase
3. a newspaper/magzine clipping or report
4. factual writting which should be informative or argumentative.

(The students may refer to "Bookshelf worksheet" for technical communication)

3. Oral Conversation:

1. Short speeches/declamation : Bid farewell, Felicitate somebody, Celebrate a public event, Offer condolences
2. Debate on current problems/topics
3. MockInterview : Preparation, Unfolding of personality and Expressing ideas effectively
4. Group discussion on current topics/problems
5. Role Play/ general conversation : Making polite enquiries at Railway Station, Post Office, Banks and other Public places, Replying to such enquiries, enquiring about various goods sold in the market and discussing their prices. Complaining about service at Hotel, restaurant, Offering apologies in reply to such complaints, complain to a company about a defective product you have brought, reply to such complaints.
6. Presentation skill, Use of OHP and LCD.
7. Through drilling of model words involving different phonetic symbols (Vowels, Consonants, Difthongs).

4. Aural :

Listening to conversation/talk/reading of short passage and then writting down the relevant or main points in the specified number of words and answering the given questions

The assignments/project work are to be evaluated by the internal/ external examiner. The distribution of 30 marks e.g.

10 marks for assignment (Given by subject teacher as sessional marks)
10 marks for conversation and viva-voce
10 marks for phonetic transcription

## STRUCTURE OF THE PAPER OF PROFESSIONAL COMMUNICATION

### Distribution of Marks

Theory Paper : 50 Marks
Sessional : 20 Marks
Pratices : 30 Marks

Q1. Question based on the topics of the prescribed syllabus will be set for testing candidates ability to understand the content, explain words and phrases, making sentence of given words and ability to summarise will be included. All questions will have to be answered.

| | | |
|---|---|---|
| A. | from English Text Book | 10 Marks |
| B. | from Hindi Text Book | 5 Marks |

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Q2. Candidates will be required to write one letter (English) and one letter in (Hindi) from a choice of two -

| | | |
|---|---|---|
| A. | English Letters | 5 Marks |
| B. | Hindi Letters | 5 Marks |

Q3. Report Writting on given outlines 5 Marks

Q4. There will be a number of short answer questions to test the candidates knowledge of functional grammer, structure and usage of the language. All the items in this question will be compulsory. The grammar questions has four parts -

(Total Part: A For 5 Marks, B For 3 Marks, C For 3 Marks and D For 4 Marks)

A. This part of the question has to do with the transformation of sentences. English uses several patterns of sentence formation and the same meaning can be expresed by several patterns e.g. Active to Passive voice and vice versa, Direct to Indirect and vice versa, Reframing sentences by changing part of speech e.g Noune to Adjective, Interchanging degree of comparison.

Interchanging Moods - Affirmative to Negative, Assertive to Interrogative or to exclamatory

B. The second part usually requires blanks in a sentence to be filled in with a suitable preposition and articles.

C. The third part is usually an exercise on tenses.

D. The fourth part concerns with one word substitution and abbrevation, uses of idioms and Phrases, Homophones.

Q5. COMPOSITION : (About 300 Words) (5 marks)

Candidates will be required to select one composition topic from a choice of five. The choice will normally include narrative descriptive, argumentative, discussion and factual topics. The main ceteria by which the composition will be marked are as follows

A. the quality of the language employed, the range and appropriateness of vocabulary and sentence structure the correctness of grammatical construction, punctuation and spelling.

B. The degrees to which candidate have been successfully in organising both the composition as a whole and the individual paragraphs.

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## 1.2 APPLIED MATHEMATICS I(A)

[ Common to All Engineering Courses]

| L | T | P |
|---|---|---|
| 3 | 2/2 | - |

Rationale:

The study of mathematics is an important requirement for the understanding and development of any branch of engineering. The purpose of teaching mathematics to diploma engineering students is to impart them basic knowledge of mathematics which is needed for full understanding and study of engineering subjects.

| S.N. | Units | Coverage L | Time T | P |
|---|---|---|---|---|
| 1. | Algebra- I | 8 | 3 | - |
| 2. | Algebra- II | 8 | 3 | - |
| 3. | Trignometry | 6 | 2 | - |
| 4. | Differential Calculus-I | 10 | 3 | - |
| 5. | Differential Calculus-II | 10 | 3 | - |
| | | 42 | 14 | - |

DETAILED CONTENTS:

1. ALGEBRA-I : (10 Marks)

1.1 Series : AP and GP; Sum, nth term, Mean

1.2 Binomial theorem for positive, negative and fractional index (without proof). Application of Binomial theorem.

1.3 Determinants : Elementary properties of determinant of order 2 and 3, Multiplication system of algebraic equation, Consistency of equation, Crammer's rule

2. ALGEBRA-II:(10 Marks)

2.1 Vector algebra : Dot and Cross product, Scaler and vector triple product.

2.2 Complex number.

Complex numbers, Representation, Modulus and amplitud Demoivre theorem, its application in solving algebraic equations, Mod. function and its properties..

3. TRIGONOMETRY :(8 Marks)

3.1 Relation between sides and angles of a triangle : Statement of various formulae showing relation ship between sides and angle of a triangle.

3.2 Inverse circular functions : Simple case only

4. DIFFERENTIAL CALCULUS - I : (12 Marks)

4.1 Functions, limits, continuity, - functions and their graphs, range and domain, elementary methods of finding limits (right and left), elementary test for continuity and differentiability.

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4.2 Methods of finding derivative, - Function of a function, Logaritimic differentiation, Differentiation of implicit functions.

5. DIFFERENTIAL CALCULUS -II :(10 Marks)

5.1 Higher order derivatives, Leibnitz theorem.

5.2 Special functions (Exponential, Logarithmic, Inverse circular and function), Definition, Graphs, range and Domain and Derivations of each of these functions.

5.3 Application - Finding Tangants, Normal, Points of Maxima/Minima, Increasing/Decreasing functions, Rate, Measure, velocity, Acceleration, Errors and approximation.

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## 1.3 APPLIED PHYSICS-I

[ Common to All Engineering Courses]

| L | T | P |
|---|---|---|
| 3 | 2/2 | - |

Rationale:

Engineering physics is a foundation Course. Its purpose is to develop proper understanding of physical phenomenon and scientific temper in the students. While teaching the subject,teachers should make maximum use of demonstrations to make the subject interesting to the students.

TOPIC WISE DISTRIBUTION OF PERIODS

| Sl.No. | Topics | L | T | P |
|---|---|---|---|---|
| 1. | Units & Dimensions | 3 | 1 | - |
| 2. | Errors in Measurement | 3 | 1 | - |
| 3. | Circular Motion | 4 | 1 | - |
| 4. | Motion of Planets | 4 | 1 | - |
| 5. | Dynamics of rigid body (Rotational Motion) | 5 | 1 | - |
| 6. | Fluid Mechanics and Friction | 4 | 1 | - |
| 7. | Friction | 4 | 1 | - |
| 8. | Harmonic Motion | 5 | 2 | - |
| 9. | Heat & Thermodynamics | 6 | 4 | - |
| 10. | Acoustics | 4 | 1 | - |
| | | 42 | 14 | - |

DETAILED CONTENTS:

1. Units and Dimensions (4 Marks)

S.I. Units & Dimensions of physical quantities, Dimensional formula and dimensional equation. Principle of homogenity of dimensions and applications of homogenity principle to:

i) Checking the correctness of physical equations,

ii) Deriving relations among various physical quantities,

iii) Conversion of numerical values of physical quantities from one system of units into another. Limitations of dimensional analysis.

2. ERRORS AND MEASUREMENT (4 Marks)

Errors in measuremnts, accuracy and precision, random and systematic errors, estimation of probable errors in the results of measurement(Combination of erros in addition, substraction, multipication and powers). Significant figures, and order of accuracy in respect to instruments,

3. Circular Motion (5 Marks)

Central forces. Uniform Circular motion (Horizental and Vertical cases),angular velocity,angular acceleration and centripetal acceleration.Relationship between linear and angular velocity and acceleration. Centripetal and

centrifugal forces. Practical applications of centripetal forces. Principle of centrifuge.

4. MOTION OF PLANETS AND SATELLITES :(5 Marks)

Gravitational force, Acceleration due to gravity and its variation w.r. to height and depth from earth, Kapler's Law, Escope and orbital velocity, Time period of satellite, Geo-stationary, Polar satellites (Concept Only)

5. Dynamics of Rigid Body (Rotational Motion) (6 Marks)

Rigid body,Rotational motion, Moment of inertia,Theorems(Perpendicular and Parallel axis) of moment of inertia (Statement). Expression of M.I. of regular bodies (Lamina, Sphere, Disc, Cylindercal),Concept of Radius of gyration, angular momentum, Conservation of angular momentum, Torque, Rotational kinetic energy. Rolling of sphere on the slant plane . Concept of Fly wheel.

6. Fluid Mechanics :(5 Marks)

Surface tension, Capillary action and determination of surface tension from capilary rise method, Equation of continuity (A1V1=A2V2), Bernoulli's theorem, and its application stream line and Turbulent flow, Reynold's number.

7. Friction :(4 Marks)

Introduction, Physical significance of friction, Advantage and disadvantage of friction and its role in every day life. Coefficients of static and dynamic friction and their measurements. viscosity, coeff. of viscosity, & its determination by stoke's method.

8. Harmonic Motion (6 Marks)

Periodic Motion , characterstics of simple harmonic motion; equation of S.H.M. and determination of velocity and acceleration. Graphical representation. Spring-mass system. Simple pendulum. Derivation of its periodic time. Energy conservation in S.H.M.. Concept of phase, phase difference, Definition of free, forced, undamped and damped vibrations, Resonance and its sharpness, Q-factor.

9. Heat & Thermodynamics: (6 Marks)

Modes of heat transfer (Conduction, Convection and Radiation), coefficient of thermal conductivity Isothermal and adiabatic process. Zeroth First, Second Law of Thermodynamics and Carnot cycle, Heat Engine (Concept Only).

10. Acoustics (5 Marks)
Definition of pitch, loudness, quality and intensity of sound waves. Echo, reverberation and reverberation time. Sabine's formula without Derivation. Control of reverberation time (problems on reverberation time). Accoustics of building defects and remedy.

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## 1.4 APPLIED CHEMISTRY

[ Common to All Engineering Courses]

| L | T | P |
|---|---|---|
| 6 | - | 4 |

Rationale:

Engineering Chemistry has profound and deep relationship with the industrial and environmental technology. This curriculum intends to impart technical knowledge alongwith productive practice to the students of the diploma engineering. The teachers are expected to guide the students in the classroom and the laboratories according to the curriculum by demonstrations and by showing relevant materials and equipments to inculcate interests in learning among students.

TOPIC WISE DISTRIBUTION OF PERIODS

| Sl.No. | Topics | L | T | P |
|---|---|---|---|---|
| 1. | Atomic Structure | 4 | - | - |
| 2 | Chemical Bonding | 6 | - | - |
| 3. | Classification of Elements | 4 | - | - |
| 4. | Electro Chemistry-I | 7 | - | - |
| 5. | Electro Chemistry-II | 8 | - | - |
| 6. | Chemical Kinetics | 4 | - | - |
| 7. | Catalysis | 4 | - | - |
| 8. | Solid State | 4 | - | - |
| 9. | Fuels | 4 | - | - |
| 10. | Water Treatment | 6 | - | - |
| 11. | Colloidal State | 4 | - | - |
| 12. | Lubricants | 4 | - | - |
| 13. | Hydrocarbons | 7 | - | - |
| 14. | Organic Reactions & Mechanism | 8 | - | - |
| 15 | Polymers | 4 | - | - |
| 16 | Synethetic Materials | 6 | - | - |
| | | 84 | - | 56 |

DETAILED CONTENTS:

1. ATOMIC STRUCTURE :(3 MARKS)

Basic concept of atomic structure, Matter wave concept, Quantum number, Haisenberg's Uncertainty Principle, Shaples of orbitals.

2. CHEMICAL BONDING :(4 MARKS)

Covalent bond, Ionic & Co-ordinate, Hydrogen bonding, Valence bond theory, Hybridisation, VSEPR theory, Molecular orbital theory.

3. CLASSIFICATION OF ELEMENTS :(3 MARKS)

Modern classification of elements (s,p,d and f blcok elements), Periodic properties : Ionisation potential electro negativity, Electron affinity.

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4. ELECTRO CHEMISTRY-I:(3 MARKS)

Arrhenius Theory of electrolytic dissociation, Transport number, Electrolytic conductance, Ostwald dilution law. Concept of Acid and bases : Bronsted, Arrhenius and Lewis theory. Concept of pH and numericals. Buffer solutions, Indicators, Solubility product, Common ion effect with their application,

5. ELECTRO CHEMISTRY-II:(3 MARKS)

Redox reactions, Electrode potential(Nernst Equation), Electro-chemical cell (Galvanic and Electrolytic). EMF of a cell and free energy change. Standard electrode potential, Electro chemical series and its application. Chemical and Electrochemical theory of corrosion, Galvenic Series. Prevention of corrosion by various method.

6. CHEMICAL KINETICS :(3 MARKS)

Law of mass action, order and molecularity of rection. Activation energy, rate constants, Ist order reactions and 2nd order reactions.

7. CATALYSIS :(2 MARKS)

Definition Characteristics of catalytic reactions, Catalytic promotors and poison , Autocatalysis and Negative catalysis, Theory of catalysis, Application.

8. SOLID STATE :(2 MARKS)

Types of solids (Amorphous and Crystalline), Classification (Molecular, Ionic, Covalent, Metallic), Band theory of solids (Conductors, Semiconductors and Insulators), types of Crystals, FCC, BCC, Crystal imperfection.

9. FUELS :(3 MARKS)

Definition, its classification, high & low Calorific value.Determination of calorific value of solid and liquid fuels by Bomb calorimeter.

Liquid fuel - Petroleum and its refining, distillate of petroleum (Kerosene oil, Disel and Petrol), Benzol and Power alchol. Knocking, Anti-knocking agents, Octane number and Cetane number.

Cracking and its type, Gasoling from hydrogenation of coal (Bergius process and Fischer tropsch's process)

Gaseous Fuel - Coal gas, Oil gas, Water gas, Producer gas, Bio gas, LPG and CNG.

Numerical Problems based on topics

10. WATER TREATMENT :(3 MARKS)

Hardness of water, Its limits and determination of hardness of water by EDTA method. Softening methods (Only Sods lime, Zeolote and Ion exchange resin process). Disadvantage of hard water in different industries, scale and sludge

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formation, Corrosion, Caustic embritlement, primming and foarming in biolers.

Disinfecting of Water By Chloramine-T, Ozone and Chlorine. Advantage and disadvantage of chlorinational, Industrial waste and sewage, Municipality waste water treatment, Definition of BOD and COD. Numerical Problems based on topics.

11. COLLOIDAL STATE OF MATTER :(3 MARKS)

Concept of collidal and its types, Different system of colloids, Dispersed phase and dispersion medium.
Methods of preparation of colloidal solutions, Dialysis and electrodialysis. Properties of colloidal solution with special reference to absorption, Brownian Movement, tyndal effect, Electro phoresis and coagulation. relative stability of hydrophillic and hydrophobie colloids. Protection and protective colloids. Emulsion, Types, preparation,properties and uses. Application of colloids chemistry in different industries.

12. LUBRICANTS :(3 MARKS)

Definition, classification, Necessasity and various kinds of lubricants. Function and mechanism of action of lubricants and examples. Properties of lubricants, Importance of additive compunds in lubricants, Synthetic lubricants and cutting fluids. Industrial application, its function in bearing.

13. HYDROCARBONS:(4 MARKS)

A. Classification and IUPAC nomeuclature of organic compounds hamologous series (Functional Group)

B. Preparation, properties and uses of Ethane, Ethene, Ethyne (Acetylene), Benzene and Toluene.

14. ORGANIC REACTIONS & MECHANISM:(4 MARKS)

1. Fundamental auspects -

   A. Electrophiles and nucleophiles, Reaction Intermediates, Free radical, Carbocation, Carbanion
   B. Inductive effect, Mesomeric effect, Electromeric effect.

2.A. Mechanism of addition reaction (Markonicove's Rule, Cyanohydrin and Peroxide effect),

B. Mechanism of Substitution reactions; (Nucleophillic) hydrolysis of alkyle halide, electrophillic substitution halogenation, Sulphonation, Niration and friedel-Craft reaction.

C. Mechanism of Elimination reaction - Dehydration of primary alcohol, Dehyrohalogenation of primary alkyl halide.

15. POLYMERS :(3 MARKS)

1. Polymers and their classification. Average degree of polymerisation, Average molecular weight, Free radical polymerisation (Mechanisms)

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2. Thermosetting and Thermoplastic resen -

A. Addition polymers and their industrial application- Polystyrene, PVA, PVC, PAN, PMMA, Buna-S, Buna-N, Teflon.

B. Condensation polymer and their industrial application : Nylon 6, Nylon 6,6, Bakelite, Melamine formaldehyde, Urea formaldehyde, Terylene or Decron, Polyurethanes.

3. General concept of Bio polymers, Biodegradable polymers and inorganic polymers(Silicon)

16. SYNETHETIC MATERIALS :(4 MARKS)

A. Introduction - Fats and Oils
B. Saponification of fats and oils , Manufacturing of soap.
C. Synthetic detergents, types of detergents and its manufacturing.
3. EXPLOSIVES: TNT, RDX, Dynamite.
4. Paint and Varnish

LIST OF PRACTICALS

1. To analyse inorganic mixture for two acid and basic radicals from following radicals

A. Basic Radicals :

NH4+, Pb++, Cu++, Bi+++, Cd++, As+++, Sb+++,

Sn++, Al+++, Fe+++, Cr+++, Mn++, Zn++, Co++

Ni++, Ba++, Sr++, Ca++, Mg++

B. Acid Radicals :

CO3--, S--, SO3--, CH3COO-, NO2-,

No3- , Cl-, Br_ , I- , So4--

2. To determine the percentage of available Chlorine in the supplied sample of Bleaching powder.

3. To determine the total hardness of water sample in terms of CaCo3 by EDTA titration method using Eriochroma black-T indicator.

4. To determine the strength of given HCl solution by titration against NaOH solution using Phenolphthalium as indicator.

5. To determine the Chloride content in supplied water sample by using Mohr's methods.

6. Determination of temporary hard ness of water sample by O-Hener's method.

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## 1.5 ENGINEERING DRAWING

[ Common to Three years Diploma Course in Civil Engg., Electrical Engg., Chemical Engg., Dairy, Ceramic, Textile Technology, Textile Chemistry]

[ Also Common to Four year Part-time Diploma Course in Electrical Engineering, Mechanical Engineering (Specilization in Production Engineering)]

[ Also common to First year Diploma Course in Chemical Technology : (1) Fertilizer Technology, (2) Rubber and Plastic Technology]

| L | T | P |
|---|---|---|
| - | - | 14 |

Rationale

Drawing, which is known as the language of engineers, is a widely used means of communication among the designers, engineers, technicians, draftmen and craftmen in the industry. The translation of ideas into practice without the use of this graphic language is really beyond imagination. Thus, for the effective and efficient communication among all those involved in an industrial system, it becomes necessary that the perosonnel working in different capacities acquire appropriate skills in the use of this graphic language in varying degrees of proficiency in accordance with their job requirements.

Generally speaking, an engineering technician working at the middle level of the threetier technical manpower spectrum, is required to read and interpret the designs and drawings, providedto him by technologists and subsequently to translate them to the craftsmen for actual execution of the job.

This course in Engineering Drawing has been designed, keeping in view, the above refered job functions of a technician in the industry. This preliminary course aims at building a foundation for the further courses in drawing and other allied subjects. The contents of the course have been selected as to form a core for the various deversified fields of engineering. It is expected that at the end of this session, the students acqures sufficient skill drafting and some ability in spetial visualization of simple objects.

| Sl.N. | | Units | Coverage Time L | T | P |
|---|---|---|---|---|---|
| 1. | | Drawing Instruents and their use | - | - | 4 |
| 2. | A. | Lettering techniques | - | - | 16 |
| | B. | Introduction to scales | - | - | 8 |
| 3. | | Conventional Presentation | - | - | 8 |
| 4. | A. | Principles of projections | - | - | 12 |
| | B. | Point Line, Plane | - | - | 28 |
| 5. | | Orthographic projection of simple geometrical solids | - | - | 12 |
| 6. | | Section of Solids | - | - | 20 |
| 7. | | Isometric Projection | - | - | 20 |
| 8. | | Free Hand Sketching | - | - | 8 |
| 9. | | Development of surfaces | - | - | 24 |
| 10. | | Orthographics Projection of Machine Parts | - | - | 12 |
| 11. | | Practice on Auto Cad | - | - | 24 |
| | | | - | - | 196 |

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C O N T E N T S

NOTE : Latest Indian Standards Code of Practice to be followed.

1. Drawing, instruments and their uses. 1 Sheet

1.1 Introduction to various drawing, instruments. 1

1.2 Correct use and care of Instruments.
1.3 Sizes of drawing sheets and their layouts.

2. (a) Lettering Techniques 2 Sheet

Printing of vertical and inclined, normal single stroke capital letters.

Printing of vertical and inclined normal single stroke numbers.

Stencils and their use.

(b) Introduction to Scales 2 Sheet

Necesssity and use, R F

Types of scales used in general engineering drawing. Plane, diagonal and chord scales.

3. Conventional Presentaion : 1 Sheet

Thread (Internal and External), Welded joint, Types of lines, Conventional representation of materials, Conventional representation of machine parts.

4. (a) Principles of Projection 1 Sheet

Orthographic, Pictorial and perspective.

Concept of horizontal and vertical planes.

Difference between I and III angle projections.

Dimensconing techniques.

(b) Projections of points, lines and planes. 1 Sheet

5 (a) Orthographic Projections of Simple 2 Sheet

Geometrical Solids

Edge and axis making given angles with the reference planes. Face making given angles with reference planes. Face and its edge making given angles with referance planes.

(b) Orthographic views of simple composite solids from their isometric views.

(c) Exercises on missing surfaces and views

6. Section of Solids 2 Sheet

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Concept of sectioning

Cases involving cutting plane parallel to one of the reference planes and prependicular to the others.

Cases involving cutting plane perpendicular to one of the reference planes and inclind to the others plane, true shape of the section

7. Isometric Projection. 2 Sheet

Isometric scale

Isometric projection of solids.

8. Free hand sketching 1 Sheet

Use of squared paper

Orthographic views of simple solids

Isometric views of simple job like

carpentary joints

9. Development of Surfaces 2 Sheet

Parallel line and radial line methods of developments.

Development of simple and truncated surfaces (Cube, prism, cylinder, cone and pyramid).

10. ORTHOGRAPHIC PROJECTION OF MACHINE PARTS: 2 Sheet

Nut and Bolt, Locking device, Wall bracket

11. PRACTICE ON AUTO CAD : 2 Sheet

Concept of AutoCAD, Tool bars in AutoCAD, Coordinate System, Snap, Grid and Ortho mode.Drawing Command - Point, Line, Arc, Circle, Ellipse. Editing Commands - Scale, Erase, Copy, Stretch, Lengthen and Explode. Dimensioning and Placing text in drawing area. Sectioning and hatching. Inquiry for different parameters of drawing.

NOTE :

A. The drawiang should include dimension with tolerence whereever necessary, material list according to I.S. code. 25% of the drawing sheet should be drawn in first angle projection and rest 75% drawing sheet should be in third angle figure

B. Practice on AutoCAD latest software is to be done in AutoCAD lab of Mechanical Engineering Department of the Institute.

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## 1.6 AGRICULTURAL SCIENCE

| L | T | P |
|---|---|---|
| 6 | - | 2 |

RATIONALE:

Agricultural science is a basic subject for a diploma holder in agricultural engineering. This subject a learner has already read in highschool agricultural course. The revision and an advance knowledge of the subject is necessary for studying agricultural technology subjects.

The course contents of this subject has been developed to inculcate the skill of identification of the crops, common weeds, insceticide, fungicide and fertilizer as well as the skill in preparation of seed beds and seed treatment for different seeds and crops.

### TOPIC WISE DISTRIBUTION OF PERIODS

| SL.NO. | TOPIC | L | T | P |
|---|---|---|---|---|
| 1. | Introduction | 3 | | |
| 2. | Physiological Processes | 9 | | |
| 3. | Agrnomical Processes | 9 | | |
| 4. | Classification of crops | 21 | | |
| 5.. | Weeds & weed control | 9 | | |
| 6. | Croping schemes & crop rotaion | 9 | | |
| 7. | Plant Propagation | 12 | | |
| 8. | Mushroom Cultivation | 5 | | |
| 9. | Green house,Seri Culture, Flowriculture and Crop protection | 5 | | |
| 10. | Waste Land Development | 2 | | |
| | TOTAL | 84 | - | 28 |

### DETAIL CONTENTS

1. Introduction to Crop production related to engineering.

2. Elementary idea of Certain physiological processes, osmosis, photosynthesis, transipiration, evaporation and respiration. Factors affecting these processes.

3. Agronomical Sequences-Monoculture,mixed cropping, multiple cropping, relay cropping;their adoptability advantages and disadvantages.

4. Classification of crops: Detail study of cereals crops (wheat, paddy and maize) legume crops (soyabean, moong and arhar),cash crops (potato, sugarcane), oil seed crops, sunflower (mustard,groundnut) and fruit crops (mango, apple and guava) including their production practices, Elementary exposure pest deseases and their control.

5. Identification of weeds and method of weed control for various crops (crops of item 4), Use of weed as green fertilizer and composite material fabrication.

6. Cropping scheme and crop rotation their importance for different agro climatic condition.

7. Plant Propagation : Seed propogation and vegitative

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propagation, their merits and demerits.

8. Mashroom Cultivation : Introduction and requirements, Method of cultivation.

9. Green House : Introduction, Construction details, Environmental requirements and maintenance. Seri Culture : General introduction to seri cuture. Flowriculture- Type of soils, peat and other mixture, raise bed system and hand/foot operated sprayers.

10. Waste Land Development : Concept and uses.

PRACTICAL

List of experiments to be performed.

1. Identification of crops, vegetable seeds & fertilizers.

2. Identification of common weeds,insecticide,fungicide & weedcide.

3. Seed treatment before sowing the crops.

4. Seed bed preparation of sugarcane, potato, maize, Paddey and wheat.

5. Practice of prunning and some vegetative propagation like cutting, budding and airlayering.

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II Semester

## 2.1 APPLIED MATHEMATICS I (B)

[ Common to All Engineering Courses]

| L | T | P |
|---|---|---|
| 3 | 2/2 | - |

Rationale:

The study of mathematics is an important requirement for the understanding and development of any branch of engineering. The purpose of teaching mathematics to diploma engineering students is to impart them basic knowledge of mathematics which is needed for full understanding and study of engineering subjects.

| S.N. | Units | Coverage Time L | T | P |
|---|---|---|---|---|
| 1. | Integral Calculus-I | 12 | 4 | - |
| 2. | Integral Calculus-II | 12 | 4 | - |
| 3. | Coordinate Geometry (2 Dimensional) | 10 | 3 | - |
| 4. | Coordinate Geometry (3 Dimensional) | 8 | 3 | - |
| | | 42 | 14 | - |

DETAILED CONTENTS:

1. INTEGRAL CALCULUS - I : (14 Marks)

Methods of Indefinite Integration :-

1.1 Integration by substitution.

1.2 Integration by rational function.

1.3 Integration by partial fraction.

1.4 Integration by parts.

2. INTEGRAL CALCULUS -II :(14 Marks)

2.1 Meaning and properties of definite integrals, Evaluation of definite integrals. Integration of special function.

2.2 Application : Finding areas bounded by simple curves, Length of simple curves, Volume of solids of revolution, centre of mean of plane areas.

2.3 Simposns 1/3rd and Simposns3/8th rule and Trapezoidal Rule : their application in simple cases.

3. CO-ORDINATE GEOMETRY (2 DIMENSION):(14 Marks)

3.1 CIRCLE :

Equation of circle in standard form. Centre - Radius form, Diameter form, Two intercept form.

3.2 Standard form and simple properties

Parabola x2=4ay, y2=4ax,

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Ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$

Hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$

4. CO-ORDINATE GEOMETRY (3 DIMENSION):(8 Marks)

4.1 Straight lines and planes in space -

Distance between two points in space, direction cosine and direction ratios, Finding equation of a straight line and Plane ( Different Forms),

4.2 Sphere $x^2 + y^2 + z^2 + 2gx + 2fy + 2wz = d$ (Radius, Centre and General Equation)

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## 2.2 APPLIED PHYSICS-II

[ Common to All Engineering Courses]

| L | T | P |
|---|---|---|
| 3 | 2/2 | 4 |

Rationale:

Engineering physics is a foundation Course. Its purpose is to develop proper understanding of physical phenomenon and scientific temper in the students. While teaching the subject,teachers should make maximum use of demonstrations to make the subject interesting to the students.

TOPIC WISE DISTRIBUTION OF PERIODS

| Sl.No. | Topics | L | T | P |
|---|---|---|---|---|
| 1. | Optics | 4 | 1 | - |
| 2. | Introduction To Fiber Optics | 4 | 1 | - |
| 3. | Laser & its Application | 4 | 1 | - |
| 4. | Electrostatics | 4 | 1 | - |
| 5. | D.C. Circuits | 4 | 1 | - |
| 6. | Magnetic Materials & Their Properties | 4 | 1 | - |
| 7. | Semi Conductor Physics | 4 | 1 | - |
| 8. | Introduction Diode & Transistors | 4 | 2 | - |
| 9. | Introduction To Digital Electronics | 4 | 2 | - |
| 10. | Non-conventional energy sources | 6 | 3 | - |
| | | 42 | 14 | 56 |

1. Optics (4 Marks)

Nature of light, Laws of Reflection and Refraction, Snell's Law, Interference (Constructive and Deotructive), Diffraction and Polarization (Concept Only), Law of Mallus and Polaroids.

2. Introduction To Fibre Optics :(5 Marks)

Critical angle, Total internal reflection, Principle of fibre optics, Optical fibre, Pulse dispersion in step-index fibres, Graded index fibre, Single mode fibre, Optical sensor.

3. Lasers and its Applications (4 Marks)

Absorbtion and Emission of energy by atom, Spontaneous and Stimulated Emission, Poluation inversion, Main component of laser and types of laser- Ruby Laser, He-Ne laser and their applications. Introduction to MASER.

4. Electrostatics :(4 Marks)

Coutomb's Law, Electric field, Electric potential, Potential energy, Capacator, Energy of a charged capacitor, Effect of dielectric on capacators.

5. D.C. Circuits (5 Marks)

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Ohm's Law, Kirchoff's Law and their simple application, Principle of Wheat Stone bridge and application of this principle in measurement of resistance (Meter bridge and Post Office Box); Carey Foster's bridge, potentiometer.

6. Magnetic Materials and Their Properties: (5 Marks)

Dia, Para and Ferro-magnetism, Ferrites, Magnatic Hysteresis Curve and its utility. Basic idea of super conductivity, Meissner's effect.

7. Semiconductor Physics (4 Marks)

Concept of Energy bands in soldis, classification of solids into conductors, insulators and semiconductors on the basis of energy band structure. Intrinsic and extrinsic semi conductors, Electrons and holes as charge carriers in semiconductors, P-type and N-type semiconductors.

8. Junction Diode and Transister : (6 Marks)

Majority and Minority charge carriers,P-N junction formation, barrier voltage, Forward and reverse biasing of a junction diode, P-N junction device characteristics, Formation of transistor, transistor-action, Base, emitter and collector currents and their relationship LED's.

9. Introduction To Digital Electronics : (6 Marks)

Concept of binary numbers, Interconversion from binary to decimal and decimal to binary. Concepts of Gates (AND, NOT, OR).

10. Non-conventional energy sources: (7 Marks)

(a) Wind energy : Introduction, scope and significance, measurement of wind velocty by anemometer, general principle of wind mill.

(b) Solar energy: Solar radiation and potentiality of solar radiation in India, uses of solar energy: Solar Cooker, solar water heater, solar photovoltaic cells, solar energy collector.

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# PHYSICS LAB

Note: Any 4 experiments are to be performed.

1. Determination of coefficient of friction on a horizontal plane.

2. Determination of 'g' by plotting a graph T2 verses l and using the formula g=4n2/Slope of the graph line

3. Determine the force connstant of combinationof springs incase of 1. Series 2. Parallel.

4. To verify the series and parallel combination of Resistances with the help of meter bridge.

5. To determine the velocity of sound with the help of resonance tube.

6. Determination of viscosity coefficient of a lubricant by Stoke's law.

7. Determination of E1/E2 of cells by potentio meter.

8. Determination of specific resistance by Carry Foster bridge.

9. Determination of resitivity by P.O.Box.

10. Verification of Kirchoff's Law.

11. To draw Characteristics of p-n Junction diode.

12. To measure instantaneous and average wind velocity by indicating cup type anemometer/hand held anemometer.

NOTE :

Students should be asked to plot a graph in experiments (where possible) and graph should be used for calculation of results. Results should be given in significant figures only.

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## 2.3 APPLIED MECHANICS

[ Common to three years Diploma Course in Civil Engg., Agriculture, Dairy, Ceramic, Civil & Rural Engg., Chemical Engineering, Architecture Assistantship, Computer Science & Engineering]

[ Also Common to Mechanical Engineering (Spacialization In Production Engineering ]

[ Also common to First year Diploma Course in Chemical Technology : (1) Fertilizer Technology, (2) Rubber and Plastic Technology ]

| L | T | P |
|---|---|---|
| 5 | 1 | 2 |

RATIONALE

The subject Applied Mechanics deals with fundamental concepts of mechanics which are useful for the students for further understanding of the second & final year subjects like S.O.M. and theory and design of steel & masonry structures as well as RCC designs. The subject enhances the method ability of the students.

TOPIC WISE DISTRIBUTION OF PERIODS

| SL.No. | Topic | L | T | P |
|---|---|---|---|---|
| 1. | Introduction | 4 | 1 | |
| 2. | System of Forces & General Condition of Equilibrium | 18 | 4 | |
| 3. | Moment and Couple | 8 | 1 | |
| 4. | Friction | 8 | 1 | |
| 5. | Machines | 8 | 1 | |
| 6. | Center of Gravity | 8 | 2 | |
| 7. | Moment of Inertia | 8 | 2 | |
| 8. | Beam & Trusses | 8 | 2 | |
| | Total | 70 | 14 | 28 |

DETAILED CONTENTS

1. Introduction:

Mechanics and its utility. Concept of scaler and vector quantities. Effect of a force. Tension & compression. Rigid body. Principle of physical independence of force. Principle of transmissibility of a force.

2.A. System of Forces :

Concept of coplaner and non-coplaner forces including parallel forces. Concurrent and non-concurrent forces. Resultant force. Equilibrium of forces. Law of parallelogram of forces. Law of triangle of forces and its converse. Law of polygon of forces. Solution of simple engineering problems by analytical and graphical methods such as simple wall crane, jib crane and other structures. Determination of resultant of any number of forces in one plane acting upon a praticle,conditions of equilibrium of coplaner concurrent

force system.

B. General Condition of Equilibrium:

General condition of equilibrium of a rigid body under the action of coplaner forces, statement of force law of equilibrium, moment law of equilibrium, application of above on body.

3. Moment & couple:

Concept of Varignon's theorem. Generalised theorem of moments. Application to simple problems on levers-Bell crank lever, compound lever, steel yard, beams and wheels, lever safety valve, wireless mast, moment of a couple; Properties of a couple ; Simple applied problems such as pulley and shaft.

4. Friction:

Types of friction:statical,limiting and dynamical friction, statement of laws of sliding friction, Coefficient of friction, angle of friction; problems on eqilibrium of a body resting on a rough inclined plane, simple problems on friction. Conditions of sliding and toppling.

5. Machines:

Definition of a machine. Mechancial advantage, velocity ratio, input, output, mechanical efficiency and relation between them for ideal and actual machines. Law of a machine Lifting machines such as levers, single pulley, three system of pulleys. Weston differential pulley, simple wheel and axle, differential wheel and axle. Simple screw jack, differential screw jack, simple worm and worm wheel.

6. Centre of Gravity:

Concept, definition of centroid of plain figures and center of gravity of symmetrical solid bodies. Determination of centroid of plain and composite lamina using moment method only, Centroid of bodies with removed portion. Determination of center of 'gravity' of solid bodies - cone, cylinder, hemisphare and sphere, composite bodies and bodies with portion removed.

7. Moment of Inertia:

Concept of moment of inertia and second moment of area and radius of gyration, theorems of parallel and perpendicular axis, second moment of area of common geometrical section : rectangle, triangle, circle (without derivations). Second moment of area for L, T, I and channel section, section of modulus.

8. Beams & Trusses:

Definition of statically determinate and indeterminate trusses. Types of supports. Concept of tie & strut, Bow's notation, space diagram, polar diagram, funicular polygon;

calculation of reaction at the support of cantilever and simply supported beams and trusses graphically and analytically; graphical solution of simple determinate trusses with reference to force diagram for determining the magnitude and nature of forces in its various members. Analytical methods: method of joints and method of sections.(simple problems only)

Applied Mechanics Lab : Practicals

1. To verify the law of Polygon of forces.
2. To verify the law of parallelogram and triangle of forces.
3. To verify the law of principle of moments.
4. To find the coefficient of friction between wood,steel, copper and glass.
5. To find the reaction at supports of a simply supported beam carrying point loads only.
6. To find the forces in the jib & tie of a jib crane
7. To find the forces in the members of a loaded roof truss. (King / Queen post truss)
8. To find the mechanical advantage, velocity ratio and efficiency of any three of the following machines:
   (i) Simple wheel & axle
   (ii) Differential wheel & axle
   (iii) Differential pulley block
   (iv) Simple Screw jack
   (v) Simple Worm & worm wheel
   (vi) System of Pulleys (any type).
9. To find out center of gravity of regular lamina.
10. To find out center of gravity of irregular lamina.

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## 2.4 MATERIAL & CONSTRUCTION TECHNOLOGY

| L | T | P |
|---|---|---|
| 6 | 2 | 4 |

RATIONALE

This course aims to equip the technician of agricultural engineering with the knowledge of building materials and construction methods so that they may be able to construct the related structures efficiently and economically as well as can select the materials properly for the desired works.

TOPIC WISE DISTRIBUTION OF PERIODS

| Sl.No. | TOPIC | L | T | P |
|---|---|---|---|---|
| (A) | MATERIALS | | | |
| 1. | Non Metallic Materials : Types, characterstics & uses of following building materials (No manufacture). | | | |
| | (a) Stones | 3 | 1 | |
| | (b) Bricks | 3 | 1 | |
| | (c) Lime | 3 | | |
| | (d) Cement | 3 | | |
| | (e) Timber | 3 | 1 | |
| | (f) Paints and Varnishes | 3 | | |
| | (g) Hardwares | 3 | 1 | |
| | (h) Plastics | 3 | 1 | |
| 2. | Metallic Materials | | | |
| | (a) Ferrous Materials | 4 | 1 | |
| | (b) Non Ferrous Materials | 4 | 2 | |
| 3. | Misc. Materials | 4 | 1 | |
| (B). | CONSTRUCTION METHODS | | | |
| | (a) Introduction | 3 | 1 | |
| | (b) Foundation | 3 | 1 | |
| | (c) Stone & Brick Masonry | 4 | 1 | |
| | (d) D.P.C. | 3 | 1 | |
| | (e) Plastering and pointing | 3 | 1 | |
| | (f) Concrete | 4 | 1 | |
| | (g) Floors | 3 | 1 | |
| | (h) Roofing Materials & Trussess (Timber) | 3 | 1 | |
| | (i) Doors & windows | 3 | 1 | |
| | (j) Lintels | 3 | 1 | |
| (C). | RURAL CONSTRUCTION | | | |
| | (a) Rural buildings | 4 | 2 | |
| | (b) Rural Sanitation | 4 | 2 | |
| | (c) Rural Roads | 3 | 2 | |
| | (d) Rural Drainage | 3 | 2 | |
| | (e) Rural Water Supply | 3 | 1 | |
| | TOTAL | 84 | 28 | 56 |

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DETAILED CONTENTS

(A) MATERIALS

1. Non Metallic Materials

(a) Stone:

Formation of rocks, classifcation of rocks, quarrying of stones, characteristics and uses of following building stones:
Granite, Sand stone, Lime Stone, Marble & Slate.

(b) Bricks

Characteristics,classification as per IS, special types of bricks - Fire Bricks, surkhi, brick ballast, general idea of tiles.

(c) Lime

Slaking of lime, commercial names, IS classification, characteristics, storage, precautions in handling and uses of lime.

(d) Cement

Natural and aritficial cement, characteristics of cement, types of cement, their properties and uses. Method of storage, names of different factories of Northern India.

(e) Timber

Definition, types - hard wood, soft wood, defects of timber seasoning of timber - water seasoning and kiln seasoning, preservation of timber, market forms of timber, brief study of common Indian timbers, ply wood, hard board and batten boards (only properties and uses.)

(f) Paints and Varnishes:

Objects of paints & varnishes, types of paints, characteristics, defects, selection of paints, storage of paints.
Types of varnishes, characteristics and uses of varnishes.

(g) Plastics

Polymers and various composite material, classification, properties, and uses, linoleum, plastic coated paper, polythene sheets, thermocole and PVC.

(2) METALLIC MATERIALS

(a) Ferrous Metals:

Classification of iron.
i. Cost Iron : Types as per BIS,their properties and uses.
ii. Classification according to carbon contents and as per BIS ,properties of various steel and uses.
iii. Alloy Steel: Effects of various alloying elements, properties of common steel alloy steel.

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(b) Non ferrous Metals:
Basic idea of important ores ,properties and uses of following metals:
Alluminium,Zink,Copper, Tin and Lead.

(3) Miscellaneous:
Prop-erties and uses of following materials:
Asbestos, cork,felt, gattaparcha,mica,adhesives,bakelite, china clay and fibre glass. Leather, Canvass, Jute, rubber and other advance materials

(B) CONSTRUCTION METHODS

(a) Introduction: Components of a building, section of a wall showing foundation, footing,D.P.C.,position of doors and windows,ventilators,lintels, flooring, roofing, and parapet etc. and give general idea of terms related to buildings.

(b) Foundation: Constructional details of spread footing .(Thumb rules only )

(c) Brick masonry: Study of various types of brick bonds with special emphasis on English and Flemish bonds,L,T & Cross junctions.

(d) Damp Proof Course: Materials & Method used.

(e) Doors and windows: Types and uses of doors, windows and ventilators.

(f) Plastering and Pointing : Types and Methods.

(g) Concrete :
(i) Lime Concrete - Ingradient, specifications, preparation and uses.
(ii) Cement Concrete - Ingradient, prepration, laying, compaction, curing, use of local materials as formwork, application of ferro cement.
(h) Lintels : Wooden, RCC and RB lintels.

(i) Floors : Common types, construction metods, drainage and cleaning of floors.

(j) Roofs : Roofing materials and timber trusses ( sheds for cattle and work places).

(C) Rural Construction:

(a) Rural Buildings : Cattle shed, barns, poultry house, grain bin and godowns, their construction details, capacity and functional requirement.
(b) Rural Sanitation : Constructional details of septic tank, soak pit, aqua privy and PRAI latrines.
(c) Farm Road : Kachcha Road, Tar Macadum and Pakka Road.
(d) Rural Drainage : Specification as per BIS standards.
(e) Rural Water Supply : Construction and working of India Mark -II pump, Over head tank and laying of pipe lines.
(f) Appropriate technology for low cost building construction by locally available materials

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PRACTICAL WORK

1. Identification of different types of stones .

2. Identification of different types of timber.

3. To conduct field test of cement.

4. To determine normal consistancy of cement.

5. To determine setting time of cement.(a) Initial setting time (b) Final setting time.

6. To determine water absorbtion of bricks.

7. To determine compressive strength of brick.

8. To determine fineness of cement by sieve method.

9. To make brick bonds (English and Flemish bonds only)

10. To visit construction sites and write specific report about following activities:Earth work in foundation, flooring, plastering, pointing, white washing and colour washing and installation of India Mark-II pump and Laying of water pipe line.

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## 2.5 WORKSHOP PRACTICE

[Common with Civil Engg., Civil Engg. (sp. in Rural Engg.), Electrical, Ceramic, Dairy, Agriculture, Chemical Technology (Rubber & Plastic), Chemical Technology (fertilizer), Four year chemical Engg.]

[Four year Past time Mechanical Engg. (sp. in Production Engg.)]

| L | T | P |
|---|---|---|
| - | - | 14 |

Rationale

A diploma holder in any branch of engineering has to work in between a skilled workman and an Engineer. In order to have effective control over skilled workmen it is necessary that the supervisory staff must have adequate knowledge and skill. For development of skills workshop practice is very essential.

| Sl.No. | Units | Coverage L | T | Time P |
|---|---|---|---|---|
| 1. | Carpentry shop | - | - | 20 |
| 2. | Painting & polishing shop | - | - | 16 |
| 3. | Sheet metal and soldering shop | - | - | 56 |
| 4. | Fitting shop, Plumbing & Fastening Shop | - | - | 24 |
| 5 | Foundry shop | | | 20 |
| 6. | Smithy shop | - | - | 24 |
| 7. | Welding shop | - | - | 20 |
| 8. | Machine shop | - | - | 16 |
| | | - | - | 196 |

DETAILED CONTENTS

1. Carpentry Shop :

EX-1 Introduction & demonstration of tools used in carpentry shop and different types of joints, types of wood, seasoning and preservation of wood

EX-2 Planing and sawing practice

EX-3 Making of lap joint

EX-4 Making of mortise and tenon joint

Ex-5 Making of any one utility article such as wooden-picture frame, hanger, peg, name plate, etc.

2. Painting and Polishing Shop:

EX-1 Introduction of paints, varnishes, Reason for surface preparation, Advantange of painting, other method of surface coating i.e. electroplating etc.

EX-2 To prepare a wooden surface for painting apply primer on one side and to paint the same side. To prepare french polish for wooden surface and polish the other side.

Ex-3 To prepare metal surface for painting, apply primer and paint the same.

EX-4 To prepare a metal surface for spray painting,first spray primer and paint the same by spray painting gun and compressor system.

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* The sequence of polishing will be as below:
i) Abrassive cutting by leather wheel.
ii) Pollishing with hard cotton wheel and with polishing material.
iii) Buffing with cotton wheel or buff wheel.

3. Sheet Metal and Soldering Shop :

EX-1 Introduction and Types of sheets, measuring of sheets
EX-2 Study and sketch of various types of stakes/anvil.
EX-3 Introduction & demonstration of tools used in Sheet metal working shop.
EX-4 Cutting, shearing and bending of sheet.
EX-5 To prepare a soap case by the metal sheet.
EX-6 To make a funnel with thin sheet and to solder the seam of the same.
EX-7 To make a cylinder and to solder the same.
EX-8 Preparation of different type of joints such as Lap joint-single seam, double seam. Hemp and wired joints.
EX-9 To braze small tube/conduit joints.

4. Fitting Shop, Plumbing Shop & Fastening Shop:

EX-1 Study of materials, limits, fits and toterances.
EX-2 Introduction & demonstration of tools used in Fitting Shop.
EX-3 Hacksawing and chipping of M.S. flat. Filing and squaring of chipped M.S. job. Filing on square or rectangular M.S. piece.
EX-4 Making bolt & nut by tap and die set and make its joints
Ex-5 To drill a hole in M.S. Plate and taping the same to creat threads as per need.
EX-6 Utility article-to prepare double open mouth spanner for 18" hexagonal head of a bolt.
EX-7 Cutting and threading practice for using socket, elbow and tee etc. and to fit it on wooden practice board.
EX-8 Study of-bib cock, cistern or stop cock, wheel valve and gate valve etc.
EX-9 Practice of bolted joints
EX-10 To prepare a rivetted joint
EX-11 To make a pipe joint
EX-12 To make a threaded joint
EX-13 Practice of sleeve joint

5. Foundry Work

Ex-1 Study of metal and non metals
Ex-2 Study & sketch of the foundry tools.
Ex-3 Study & sketch of cupula & pit furnace.
Ex-4 To prepare the green moulding sand and to prepare moulds (single piece and double piece pattern sweep mould)
Ex-5 Casting of non ferous (lead or aluminium) as per exercise 3.

6. Smithy Shop :

EX-1 Study & Sketch of Tools used in smithy shop.
EX-2 To prepare square or rectangular piece by the M.S. rod.
EX-3 To make a ring with hook for wooden doors.

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EX-4 Utility article-to preapre a ceiling fan hook.

7. Welding Shop :

EX-1 Introduction to welding, classinfication of welding, types of weld joints.
EX-2 Welding practice-gas and electric.
EX-3 Welding for lap joint after preparing the edge.
EX-4 Welding of Butt joint after preparation of the edge.
EX-5 'T' joint welding after preparation of edge.
EX-6 Spot welding, by spot welding machine.

8. Machine Shop

EX-1 Study & sketch of lathe machine.
EX-1 Study & sketch of grinders, milling M/c, Drilling M/c and CNC Machines
Ex-2 Plain and step turning & knurling practice.
Ex-3 Study and sketch of planning/Shaping machine and to plane a Ractangle of cast iron.

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III Semester

## 3.1 HYDRAULICS

| L | T | P |
|---|---|---|
| 6 | 2 | 2 |

RATIONALE

Subject of Hydraulics is a basic science subject and helps in solving problems in the subject of Public health Engg./Environmental Engg. and Irrigation Engg. Principles of Hydraulics also finds its application in Bridge Engg. and in many other Civil Engg. subjects. The subject deals with basic concepts and principles in hydrostatics,hydrokinematics and hydrodynamics and their application,in solving fluid flow problems.

TOPIC WISE DISTRIBUTION OF PERIODS

| Sl.No. | Topics | Periods Lect. | Tut. | |
|---|---|---|---|---|
| 1. | Introduction | 3 | 1 | |
| 2. | Properties of Fluids | 4 | 1 | |
| 3. | Hydrostatic Pressure | 9 | 2 | |
| 4. | Measurement of pressure | 9 | 2 | |
| 5. | Fundamentals of fluid flow | 12 | 4 | |
| 6. | Orifices | 9 | 4 | |
| 7. | Flow through pipes | 9 | 3 | |
| 8. | Flow through open channels | 9 | 3 | |
| 9. | Flow measurement | 8 | 4 | |
| 10. | Hydraulic Machines | 12 | 4 | |
| | Total | 84 | 28 | 28 |

1. Introduction:

1.1 Fluid; Real Fluid, Ideal Fluid,

1.2 Fluid Mechanics, Hydraulics, Hydrostatics, Hydrokinematics and Hydrodynamics

2. Properties of Fluids:

2.1 Mass density, specific weight, specific gravity, cohesion, adhesion, viscosity, surface tension, capillarity, vapour pressure and compressibility

3. Hydrostatic Pressure:

3.1 Pressure, intensity of pressure, pressure head, Pascal's law and its applications.

3.2 Total pressure, resultant pressure, and centre of pressure.

3.3 Total pressure and centre of pressure on vertical and inclined plane surfaces:

3.3.1 Rectangular
3.3.2 Triangular

3.3.3 Trapezoidal
3.3.4 Circular

4. Measurement of Pressure:

4.1 Atmospheric pressure, gauge pressure, vacuum pressure and absolute pressure.

4.2 Piezometers, simple manometer, differential manometer and mechanical gauges. Measurement of pressure by manometers and pressure gauges.

5. Fundamental of Fluid Flow:

5.1 Types of Flow:

5.1.1 Steady and unsteady flow
5.1.2 Laminar and turbulent flow
5.1.3 Uniform and non-uniform flow.

5.2 Discharge and continuity equation (flow equation)

5.3 Types of hydraulic energy.

5.3.1 Potential energy
5.3.2 Kinetic energy
5.3.3 Pressure energy

5.4 Bernoulli's theorem; statement and description (without proof of theorems).

5.5 Venturimeter (horizontal and inclined) and Orifice Plate meter.

6. Orifice:

6.1 Definition of Orifice, and types of Orifices,
6.2 Hydraulic Coefficients.
6.3 Large vertical orifices.
6.4 Free, drowned and partially drowned orifice.
6.5 Time of emptying a rectangular/circular tanks with flat bottom.

7. Flow through Pipes:

7.1 Definition, laminar and turbulant flow explained through Reynold's Experiment.

7.2 Reynolds Number, critical velocity and velocity distribution.

7.3 Head Losses in pipe lines due to friction, sudden expansion and sudden contraction entrance, exit, obstruction and change of direction (No derivation of formula)

7.4 Hydraulic gradient line and total energy line.

7.5 Flow from one reservoir to another through long pipe of uniform and composite section.

7.6 Water Hammer Phenomenon and its effects. (only

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elementary treatment)

8. Flow through open channels:

8.1 Definition of a channel, uniform flow and open channel flow .

8.2 Discharge through channels using

(i) Chezy's formula (no derivation)
(ii) Manning's formula

8.3 Most economical sections

(i) Rectangular
(ii) Trapezoidal

9. Flow Measurements:

9.1 Measurement of velocity by

(i) Pitot tube (iii) Surface Float
(ii) Current-meter (iv) Velocity rods.

9.2 Measurement of Discharge by a Notch

9.2.1 Difference between notches and orifices.

9.2.2 Types of Orifice, Discharge formulae for rectangular notch, triangular Notch, trapezoidal Notch, and conditions for their use. (with derivation)

9.3 Measurment of Discharge by weirs.

9.3.1 Difference between notch and weir.
9.3.2 Discharge formula for free, drowned, and broad crested weir with and without end contractions ; velocity of approach and condition of their use.

9.3.3 Venturi flumes to measure flow.

9.4 Measurement of Discharge by velocity area-method.

10. Hydraulic Machines:

10.1 Reciprocating pumps.
10.2 Centrifugal Pumps
10.3 Submercible Pump
Sketching and description of principles of working of above mentioned machines.

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LABORATORY WORK (HYDRAULICS LAB)

(i) To verify Bernoullis Theorem.

(ii) To find out venturimeter coefficient.

(iii) To determine Darcy's coefficient of friction for flow through pipes.

(iv) To determine velocity of flow of an open channel by using a current meter.

(v) Study and sketch any one of the following.

Reciprocating Pump
or
Cetrifugal pump
or
Pressure Gauge/water meter/mechanical flow meter/
Pitot tube

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## 3.2 SOIL SCIENCE & SOIL MECHANICS

| L | T | P |
|---|---|---|
| 6 | - | 4 |

RATIONALE

A diploma holder in agricultural engg. has to work with various types of soils in the field. This subject is aimed to equip the students with the capability of identifying various types of soils, their properties and behaviour in the field conditions.

In addition to above the knowledge of soil mechanics is also necessary in connection with the contruction of rural roads, farm structures, storage bins and embankment or filling of earth while leveling the land.

The curriculum of this subject has been developed to cater the above mentioned needs.

TOPIC WISE DISTRIBUTION OF PERIODS

| SL.NO. | TOPIC | LECT. | |
|---|---|---|---|
| | A. Soil Science | | |
| 1. | Origin and classification of soils. | 6 | |
| 2. | Physical porperties of soils | 6 | |
| 3. | Chemistry of soils | 6 | |
| 4. | Introdution to Bio-Fertilizer | 5 | |
| | B. Soil Mechanics | | |
| 5. | Introduction: Natural, residual and transported soils weight volume relationship, determination of unit weights of soil, water contents and void ratio. | 9 | |
| 6. | Engineering properties of soils: Consistancy of soil-Atterberg's limits. Permeability of soil, compaction of soil. Shear strength of soil, bearing capacity of soil. | 15 | |
| 7. | Sub Surface exploration & investigation of soil.. | 10 | |
| 8. | Earth Pressure | 10 | |
| 9. | Shallow and Deep Foundations | 10 | |
| 10. | Stabilization of Soils by Lime & Cement | 7 | |
| | TOTAL | 84 | 56 |

DETAILED CONTENTS

A. SOIL SCIENCE

1 Origin and classification of soils : Origin of soils, weathering of rocks and formation of horizon, composition of soils, structure of soils, classification of soils (based on agricultural needs), IS classifcation of soil, triangualar classifcation of soil. Distinction between clay, loam & silt.

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2. Physical propertion of soil: Texture, particle density, structure, bulk density, porosity, air & water in soil, temperature, cosistancy and organic matter.
3. Chemistry of soils: Soil-water plant relation, soil mineral and chemical classification.(Acid soil, calcareous soil and salion soil) elementary exposure. Method of reclamation of acid & alkaline soil.
4. Introduction to Bio-Fertilizers, its importance.

B. SOIL MECHANINCS

5. Introduction : Natural, residual and transported soil. weight volume relationship, determination of soil unit weights, water content and void ratio. Structure of soil : granular and cohesive soil. Soil colloids and Brownian motion.
6. Grain Size distribution: Sieve analysis, Stock's law, hydro-meter analysis (basic concept only), grain size accumulation curves their plotting and interpretation, IS soil classifcation.
7. Engineering properties of soil:

a. Consistancy of soil: Atterburg's limite, method of determination of liquid limit and plastic limit,plasticity index, plotting of flow curve on semilog graph.
b. Permeability of soil: Darcy's law, coefficient of permeability, parameters affecting permeability, determintion of permeability by constant and variable head permameters,quick sand condition, seepage through soils.
c. Compaction and consolidation of soil: Concept of compaction and consolidation, difference between them, optimum moisture content, dry density, Procter compaction test, use of optimum moisture content in embankment,
d. Shear strength of soil : Definition of shear strength, Coulomb's law, direct shear box test and shear vane test.
e. Bearing capacity of soil : Definition, net, ultimate and safe bearing capacity,plate load test.
f. Subsurface investigation : Preliminary expolaration, test pit, different methods of boring, augers, mehtods of sampling, sealing of samples, disturbed, representative and undisturbed samples, split spoon sampler.

8. Earth Pressure and Retaining Structures

8.1 Definition of earth pressure, active and passive earth pressures, terms and symbols relating to a retaining wall.

8.2 Relation between movement of wall and earth pressure

8.3 Ka and Kb by Rankin's Method.

9. Shallow and Deep Foundations

9.1 Definitions of shallow and deep foundations

9.2 Types of shallow and deep foundations

9.3 Application of Terzaghi's bearing capacity formulae for different types of foundations.

10. Stabilization of Soils by Lime & Cement

Concept of stablization, materials used, advantages of lime & cement as stablizing agents. Strength of stablized soil.

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PRACTICLE

LIST OF EXPERIMENTS:

A. SOIL SCIENCE :

1. Determination of moisture tension with Tensionmenter.

2. Determination of wilting point.

3. pH value determination.

4. Classifcation of soil and field identification test.

B. SOIL MECHANICS:

5. Determination of grain size distribution by sieve analysis.

6. Determination of liquid limit and plastic limit.

7. Determination of permeability by constant and variable head permameter.

8. Determination of shear strength by direct shear box test.

9. Determination of OMC by Procter compaction test.

10. Determination of field density by core cutter method and sand replacement method

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## 3.3 SURVEYING AND LEVELLING

| L | T | P |
|---|---|---|
| 4 | - | 8 |

RATIONALE

The course aims to enable the students to do land and water survey, prepare maps/plans for (i) Simple Irrigation works like laying of pipe lines and drainage channels, (ii) Road alignment. It also enable them to carry out field levelling and make contour maps of the farms and forest etc.

TOPIC WISE DISTRIBUTION OF PERIODS

| Sl.No. | TOPICS | LECT. | PDS. |
|---|---|---|---|
| 1. | Introduction | 2 | |
| 2. | Measurement of distances | 4 | |
| 3. | Chain Survey | 8 | |
| 4. | Measurement of areas | 2 | |
| 5. | Compass Survey | 6 | |
| 6. | Levelling | 8 | |
| 7. | Plane Table Survey | 8 | |
| 8. | Contouring | 8 | |
| 9. | Theodolite. | 8 | |
| 10. | Minor Instruments | 2 | |
| | TOTAL | 56 | 112 |

DETAILED CONTENTS

1. INTRODUCTION:
Definition of Surveying and levelling,perpose,leniar and angular units of measurement, instruments used for taking these measurements.Basic principle of Surveying, classification of survey.

2. MEASUREMENT OF DISTANCES:
Instruments used, types of chain, chaining of a line, ranging , line ranger, reciprocal ranging, setting out a right angle, optical square, cross staff, offset- right and oblique, errors in chaining,types of errors, correction of length measured by a faulty chain,chaining on sloping ground.

3. CHAIN SURVEY:
Definition of terms -Survey station, base line, tie line, check line, running measurement, refrence sketch etc. Triangulation of an area,well conditioned triangle, metod of booking a survey line,plotting of a survey line, symbols and conventional sign , permissible errors . Obstacles in chain survey.

4. MEASUREMENT OF AREA:
Direct measurement of area on paper by planimeter,Simpson's rule, average ordinate rule, trapezoidal rule, enlargment and reduction of a plan, pentagraph and ediograph.

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5. COMPASS SURVEY:

Perpose , concept of meridians- magnetic, true and arbritrary. Bearing of a line, types of bearing, systems of bearing,fore bearing and back bearing,dip and declination,conversion of bearing from one system to other, calculation of included angles from bearings, calculation of bearings when included angles and bearing of some line is given,local attraction,causes, detection and correction of local attraction, constuction, principle and working of prismatic and surveyor's compass. Traversing by compass, closed and open traverse, plotting of a traverse- included angle metod and deflection angle method.

6. LEVELLING:

Definition of terms,levelling, level and horizontal surfaces. Datum-standard and ordinary, reduced level, bench mark,types of bench marks.Methods of levelling,direct and indirect levelling,their scope and utility. Direct levelling -simple ,compound and reciprocal levelling, Levelling instruments,hand level, clinometer,levelling staves,merit and demerits of different types of staves and their use. Levelling field book. Fly levelling and check levelling.Differential levelling and its precision. Profile levelling, longitudinal levelling, cross sectional levelling,plotting of profile.Method of drawing longitudinal and cross section of a channel,drainage and road.

7. PLANE TABLE SURVEY :

Plane table and its acessories, adjustments of aplane table,centering, levelling and orientation. Methods of planetabling- radiation, intersection, traversing and resection.Errors in plane table survey, advantages and disadvantages of plane table survey.

8. THEODOLITE :

Types of theodolyte, different parts of a transit theodolite,different axes of a theodolite, relation between them, temporary adjustment of a theodolite, elementary knowledge of reading bearing by a theodolite.

9. CONTOURING:

Definition of contour line, grade contour,horizontal equivalent,vertical interval.Contours of a hill, pond, valley, ridge, vertical cliff, valley line, ridge or water shed line. Method of drawing contours- direct and indirect method of contouring.

10. MINOR INSTRUMENTS:

Abney's level, Cylone ghat tracer, Tangent Clinometer.

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PRACTICAL

List of survey practicals:

1. To find out distance between two unapproachable objects.
2. Plan of a small area by means of chain surveying.
3. Plan of a small area by means of compass surveying.
4. Plan of a small area by means of plane table survey.
5. Contour map of an area with atleast 3 meter up and down area.
6. Plan for land aquisition and checking it with sajra plan.
7. To plot the longitudinal section of a canal showing the ground level for atleast 1 km length.
8. To determine the elevation difference between two points by levelling with atleast five shifting of instruments.
9. To find out bearing with the help of theodolite
10. Use of minor instruments.
11. Calculation of area of a map with the help of planimeter.

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## 3.4 INTRODUCTION TO COMPUTER

[Common with Civil Engg., Civil (Spl. With Rural), Mechanical Engg.,(Specialisation in Production, Automobile, Refrigeration and Air conditioning), Electronics Engg.,Instumentation and Control Engg., Dairy Engg., Leather Technology, Footwear and Leather Goods Tech., Cermics, Chemical Engg.(Four year Sandwitch), Chemical Tech. (Rubber & Plastic), Chemical Tech. (Fertilizer) ]

| L | T | P |
|---|---|---|
| 2 | - | 5 |

Rationale:

Computers are being used for design and information processing in all branches of engineering. An exposure to fundamentals of computer programming is very essential for all diploma holders. this subject has been included to introduce students in the use and application of computers in engineering.

TOPIC WISE DISTRIBUTION OF PERIODS

| Sl.No. | Units | Coverage L | Time T | P |
|---|---|---|---|---|
| 1. | Introduction to Computer | 4 | - | - |
| 2. | Introduction To Operating System (MS DOS/Windows) | 3 | - | - |
| 3. | Word Processing | 4 | - | - |
| 4. | Worksheet | 4 | - | - |
| 5. | Presentation | 4 | - | - |
| 6. | Data Base Operation | 3 | - | - |
| 7. | Introduction to Internet | 2 | - | - |
| 8. | Introduction to advance tools | 4 | - | - |
| | | 28 | - | 70 |

DETAILED CONTENTS

1. Introduction to Computer:

   A. Block Diagram of Computer.
   B. Types Of Computer
   C. Types of Input and Output devices
   D. Memories Devices (Its Types and Basic).

2. INTRODUCTION TO OPERATING SYSTEMS (MS-DOS/MS-WINDOWS:)

   What is operating system, its significance, Commands of DOS, Features/Application of window.

3. WORD PROCESSING:

   File : Open, Close, Save, Save as, Search, Send to, Print Preview, Print and Page Setup
   Edit : Cut, Copy,Paste, Office Clipboard, Select All, Find, replace, Goto, etc.
   View : Normal/Web Layout/Print Layout; Tool Bars; Header/Footer; Zoom, etc.
   Insert: Break, Page Number, Date & Time, Symbol, Comment,

Reference, etc.
Format: Font, Paragraph, Bullets & Numbering, Borders & Shading, Column, Change case, Back ground, etc.
Tools : Spelling & Grammer, Language, Word Count, Letters & Mailing, Options, Customize, etc.
Table : Draw, Insert, Delete, Select, Auto Format, AutoFit, Convert, Sort, Formula, etc.
Mail Merge

4. WORKSHEET:

Introduction, Use of Tools/Icons for preparing simple Mini Project.

5. PRESENTATION :

Introduction, Use of Tools/Icons for preparing simple presentation on Power Point.

6. DATABASE OPERATION :

Create database using MS Access, Create Table and Creating Reports.

7. Introduction to Internet:

What is Network, How to send & receive messages, Use of Search Engines, Surfing different web sites. Creating Mail ID, Use of Briefcase, Sending./replying emails.

8. INTRODUCTION TO ADVANCE TOOLS :

I. Steps requires to solving problems.
A. Flow Chart
B. Algroithm
C. Programming

II. Use of advance Tools such as Skype, Teamviewer, Installation of Modem, use of WiFi, Etc.

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INTRODUCTION TO COMPUTER LAB

List Of Practicals

1. Practice on utility commands in DOS.

2. Composing, Correcting, Formatting and Article (Letter/Essay/ Report) on Word Processing tool Word and taking its print out.

3. Creating, editing, modifying tables in Database tool.

4. Creating labels, report, generation of simple forms in Database tool.

5. Creating simple spread sheet, using in built functions in Worksheet tool..

6. Creating simple presentation.

7. Creating mail ID, Checking mail box, sending/replying e-mails.

8. Surfing web sites, using search engines.

Note : In the final year, related students have to use the concept of MS Word/MS Excel/MS Access/ MS Power Point in their respective branch's project work such as creating project report through MS Word/Creation of statistical data in MS Excel/Creation of database in MS Excel/ Demonstration of project through Power Point Presentation.

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## 3.5 AGRICULTURAL EQUIPMENT WORKSHOP PRACTICE

| L | T | P |
|---|---|---|
| - | - | 8 |

( Atleast 9 jobs are to be made)

I.Machine Shop:

1. Lathe Machine:

| | |
|---|---|
| (a) Step turning, Taper turning and knurling. | 1 job |
| (b) Drilling, boring, counter boring and internal turning | 1 job |
| (c) V thread cutting (internal and external) | 1 job |
| (d) Multi-thread cutting | 1 job |

| | |
|---|---|
| 2. Planer Shaper and Slotter | 1 job |

3. Group Work on Milling Machine involving down and climb milling:

| | |
|---|---|
| (i) Slab milling | 1 job |
| (ii) Gear cutting | 1 job |

II.Fitting Shop:

| | |
|---|---|
| (i) To make different keys | 2 jobs |
| (ii) To make Limit gauge | 2 jobs |
| (iii)To make cup and cut tool | 1 job |
| (iv) To grind a drill | 1 job |

III.Welding Shop:

| | |
|---|---|
| (a) Welding practice on mild steel & Cast Iron | 2 jobs |
| (b) Practice of gas cutting | 1 job |
| (c) Practice on spor welding machine | 1 job |

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VI Semester

## 4.1 MECHANICS OF SOLIDS

| L | T | P |
|---|---|---|
| 5 | 2 | 3 |

Rationale :

The subject gives the sight for selection of materials for engineering use and helps in deciding dimensions of the components in design work.

TOPIC WISE DISTRIBUTION OF PERIODS

| Sl.No. | Units | Coverage Time L | T | P |
|---|---|---|---|---|
| 1. | Stress, Strain & Properties of Materials | 9 | 4 | - - |
| 2. | Complex Stresses | 9 | 4 | - |
| 3. | Shear Force & Bending Moment | 9 | 4 | - |
| 4. | Theory of Simple Bending | 10 | 4 | - |
| 5. | Strain Energy | 9 | 3 | - |
| 6. | Torsion | 10 | 4 | - |
| 7. | Deflection of Beam | 5 | 2 | - |
| 8. | Columns & Struts | 9 | 3 | - |
| | | 70 | 28 | 42 |

DETAILED CONTENTS

NOTE:

The treatment of subject is limited to simple numerical problems. This subject previously known as "Strength of Materials" has been renamed as "Mechanics of Solids" .

1. STRESS STRAIN AND PROPERTIES OF MATERIALS:

Mechanical properties of materials Ductility, Tenacity, Brittleness, Toughness, Hardness, Factor of safety. Different types of loads and stresses, strain in a stepped bar. Determination of stress and elongation of a bolt in a bolted joint when subjected to direct external load only, stresses in compound bars and columns. Equivalent modulus of a compound bar, temperature stresses. Shrinkage of a tyre on a wheel. Temperature stress in compound bar, stress-stain curves for mild steel, Aluminium, cast iron & rubber.

2. COMPLEX STRESSES:

Stresses on an oblique plane in a body subjected to direct load, concept of compound stresses. Principal stress and Principl planes under direct and shear stresses. Graphical determination by Mohr's circle.

3. SHEAR FORCE AND BENDING MOMENT:

Shear force and bending moment for concentrated and

uniformly distributed loads on simply supported beams, cantileveer and overhanging beam. Shear force and bending moment diagrams.Relationship between shear force and bending moment. Point of contra flexure, calculations for finding the position of contra flexure.Condition for maximum bending moment.

4. THEORY OF SIMPLE BENDING:

Simple bending, examples of components subjected to bending such as beam, axle, carriage spring etc.. Assumptions made in the theory of simple bending in the derivation of bending formula. Section Modulus Definition of neutral surface and neutral axis and calculation of bending stressess at different layers from the neutral surface for beam of different sections, Pure bending.

5. STRAIN ENERGY:

Meaning of strain energy and resilience. Derivation of formula for resilience of a uniform bar in tension. Proof resilience, modulus of resilience, suddenly applied load, Impact or shock load. Strain energy in a material subjected to uniaxial tension and uniform shear stress. General expression for total strain energy of simple beam subjected to simple bending.

6. TORSION:

Strength of solid and hollow circular shafts. Derivation of torsion equation. Polar modulus of section. Advantages of a hollow shafts over solid shaft. Comparison of weights of solid and hollow shafts for same strength. Horse power transmitted. Calculation of shaft diameter for a given horse power.

7. DEFLECTION:

Deflection of simple cases of cantilever and simply supported beams with concentrated and uniformly distributed loads (standard elementry cases only with no proof of formulae) conditions for circular bending.

8. COLUMNS AND STRUTS:

Definition of long column, short column and slenderness ratio. Equivalent length, Critical load, Collasping load, End conditions of columns. Application of Euler's and Rankines formule (No Derivation). Simple numerical problems.

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# MECHANICS OF SOLID LAB

1. To find the shear force at a given section of simply supported beam for different loading.

2. To find the value of 'E' for a steel beam by method of deflection for different loads.

3. To determine the Max-Fibre stress in X-section of simply supported beam with concentrated loads and to find the neutral axis of the section.

4. To determine the ultimate tensile strength, its modulus of Elasticity, Stress at yield point,% Elongation and contraction in x-sectional area of a specimen by U.T.M. through necking phenomenon.

5. To determine the ultimate crushing strength of materials like steel and copper and compare their strength.

6. To determine Rock Well Hardness No. Brinell Hardness No. of a sample.

7. To estimate the Shock Resistance of different qualities of materials by Izod's test and charpy test.

8. To determine the bending moment at a given section of a simply supported beam for different loading.

9. To determine the various parameters of Helical coil spring

10. To determine the angle of twist for a given torque by Torsion appratus and to plot a graph between torque and angle of twist.

11. Study of diamond polishing apparatus.

12. Study metallurgical microscope.

13. (a) To prepare specimens for microscope examination (For Polishing andetching).

    (b) To examine the microstructure of the above specimens under metallurgical microscope.

    (c) To know composition of alloy steel by spebber steeloscope

    (d) To know carbon in steel by carbon steel estimation apparatus

14. Perparation of specimens and study of microstructure of eight given metals and alloys on metallurgical microscope.
    i. Brass.
    ii. Bronze.
    iii. Grey Cast Iron.
    iv. Malleable Cast Iron.
    v. Low Carbon Steel.
    vi. High Carbon Steel.
    vii. High Speed Steel.
    viii. Bearing Steel.

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15. To perform heat treatment process on materials of known carbon percentage -
    1. Annealins  2. Normalising  3. Case Hardening

16. Mini Project

    i. Collect samples of heat insulating materials

    ii. Collect samples of various steels and cast iron.

    iii. Collect sample of Non-Ferrous alloys.

    iv. Collect samples of Non-Metalic enginering materials

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## 4.2 FARM POWER ENGINEERING & NON CONVENTIONAL SOURCES OF ENERGY

| L | T | P |
|---|---|---|
| 6 | - | 4 |

Rationale:

Diploma holders in agricultural Engineering should have the knowledge of different sources of power available at farms for driving the farm machinary and equipment. I.C. Engines are the primary sources of power available on farms. Some times these conventional sources are not available adequately in rural areas. Therefore it becomes necessary to harness power from non conventional energy sources such as wind, solar and biogas etc.

The aim of introducing this subject is to equip them with the knowledge of both conventional and non-conventional sources of power.The contents of this subject have been developed to cater above mentioned needs.

TOPIC WISE DISTRIBUTION OF PERIODS

| Sl. No. | TOPIC | Lecture periods | |
|---|---|---|---|
| 1. | Introduction | 1 | |
| 2. | I.C.Engines | | |
| | (a)Principle | 12 | |
| | (b)Engine System | 18 | |
| 3. | Tractors | 15 | |
| 4. | Hourly operation cost | 9 | |
| 5. | Non conventional sources of energy | | |
| | (a)Bio gas technology | 9 | |
| | (b)Wind energy technology | 12 | |
| | (c)Solar energy technology | 9 | |
| | TOTAL | 84 | 56 |

DETAIL CONTENTS

1. INTRODUCTION:

Sources of power on farms, comparative study and uses, limitation and brief description of animal, fossil fuel (Diesel/petrol) wind, solar, Biogas and electrical power.

2. I.C. ENGINES

(a) Principle : Heat engine, principle of operation, classifcation of I.C. engines, prinicples of operation two stroke and four stroke cycle Engine. Difference between two stroke and four stroke engine. Diesel and petrol engine, stationary, reciprocating and rotary parts, their material of construction and fuctions. Concept of terms related with I.C. engine. Numerical problems related with different terms. Performance of engine.

(b) Engine System :

(i) Valve system-Arrangement of valve, Functions of different parts-Valve timing. Effect of incorrect valve timing. Valve clearance and threir adjustment. Firing order. Scavenging systems. Ratio and efficiency.

(ii) Fuel supply systems-System of petrol and diesel engines. Properties of fuel. Fuel filter. Carburetion. Function of Carburettor. Construction and working of simple, compensating and Zenith carburettor. Adjustments in carburettor. Specific fuel consumption.

(iii) Fuel Injection-Method of injection, construction and working of fuel injection pump, injector automiser, types of nozzles.

(iv) Air Cleaner - Importance of clean air in engine. Characteristics of air cleaner. Types of air cleaners, their construction and working. Maintenance of air cleaner.

(v) Ignition system - Ignition methods. Electric spark ignition, Battery & Magnetic ignition system. Spark plug, combustion in I.C. engine, combution chamber. Silencer.

(vi) Governing system - Governing, hit & miss system. Throttle system. Centrifugal & pneumatic governor. Governor hunting and governor regulations.

(vii) Lubricating system - Importance. Function & quality of lubricant. Types of lubricant used in engine. Sources of lubricant. Selection of lubricant. Splash system. Internal forced feed and splash syste, full internal forced feed system. Oil filter.

(viii) Cooling System - Importance. methods of cooling - Air cooling, water cooling. Thermo siphon and forced circulating system. Thermostate valve. Antifreeze mixture. Pressure Cooling.

3. TRACTOR :

(a) Introduction. Classifcation of tractor and adoptability. Factors affecting selection of Tractor. General idea about different makes, models, in different H.P. ranges of tractors.

(b) Tractor Clutches-Necessity, properties of clutch, types of clutches, construction and working of single ,dual and multi plate disc clutches, power transmition by single plate clutch, clutch troubles.

(c) Transmission System-Purpose, gear ratio, types of transmission-Selective gear type and constant mesh type. Differential gear type - construction and working. Final drives, power take-off. Belt-pulleys.

(d) Steering system of wheel tractor.

(e) Tractor brake mechanism.

(f) Hydraulic system of tractor-construction and working.

(g) Hitching system-Drawbar. Principle of hitching,vertical and horizontal hitching adjustments.

4. HOURLY COST OF OPERATION

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Hourly cost of operation of small petrol engine,diesel engine and tractor.

5. NON-CONVENTIONAL ENERGY :

(a) Bio-Gas Technology

Introduction to Bio-gas, prodcution to Bio-gas, Bio-digestion of plants and animals waste, reaction taking place during bio-digestion, gases produced during the process, elimination of unwanted gases such as Co2 and H2S, factors affecting prodcution of gas, efficiency of Bio-gas plants in winter, uses of biogas, use of digested sludge.

Bio-gas Plant

Construction & working: Main parts of gas plant-digester, gas holder, pressure gauge, gas main controlling cocks and gas meter,dimensional details of plant, working of gas plant.

Bio-gas application and appliances.

(b) WIND ENERGY TECHNOLOGY:

Types of Wind Mills-vertical axis and horizontal axis. Various uses of wind mills-lifting water for drinking and irrigation, corn grinding, sewage pumping,electrical power generation. Site selection for a wind mill. Construction of wind mill. Working and maintenance of wind mills.

(c) SOLAR ENERGY TECHNOLOGY:

Solar radiation and potentiality of solar radiation in India. Application of solar energy-solar cooker,solar crop dryer, solar water heater and solar pump.

Solar collector-flat plate collector, concentration or focussing type collector.

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## PRACTICALS

### LIST OF EXPERIMENTS:

1. Familiarisation with different gauges and controls of tractors and pre starting checks.

2. Tractor driving practice
   (a) Without implements in limited space like L shape, T shape & circle etc.

3. Practice of power tiller operations.

4. Hitching of trailor and different implements. Practice of trailer reversing.

5. Study of components and working of engines; two & four stroke cycle engines

   (a) With the help of cut way model.

   (b) Practice of starting, running adjusting and stopping, common trouble shooting.

   (c) Operation of biogas engine.

6. Study of valve arrangment, valve tuning and firing order. Valve grinding and setting of valve timing.

7. Study of diesel fuel supply system, air bleeding.

8. Study of battery, periodic battery care, ignition system and spark plug gap adjustment.

9. Study of cooling system in tractors and stationary engines.

10. Study and servicing of Lubrication system.

11. Study of transmission system.

12. Pereodic maintenance of engines and tractors.

13. Visit to gobar gas plant and draw its sketch.

14. Study of wind mill

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## 4.3 ELECTRICAL ENGG. & RURAL ELECTRIFICATION

| L | T | P |
|---|---|---|
| 6 | - | 4 |

RATIONALE

The electricity plays vital role in every sphere of life. In fact without electricity, no one can think of any development. Keeping in view the importance it became essential to make it availbale in rural areas. Without the knowledge of its production, transmission and equipments/appliances it shall not be possible to make the most efficient use of available energy which is scarce. Hence this subject provides a satisfactory knowledge to the agricultural engineering diploma holders to cater to the needs of the modern age.

TOPICWISE DISTRIBUTION OF PERIODS

| SL.NO. | TOPIC | L. | T. | P. |
|---|---|---|---|---|
| A. | MACHINES | | | |
| 1. | D.C. Machines | 12 | | |
| 2. | Elements of A.C. | 10 | | |
| 3. | A.C. Machines | 12 | | |
| 4. | Transformers | 12 | | |
| 5. | Transmission & distribution | 9 | | |
| 6. | Rural electrification | 9 | | |
| B. | MESSURING INSTRUMENTS | | | |
| 1. | Working principle and construction of Instruments | 10 | | |
| 2. | Measurement of power | 10 | | |
| | TOTAL | 84 | - | 56 |

DETAILED CONTENTS:

A MACHINES

1. D.C. Machines:

Principle of operation of D.C. Motor, E.M.F. equation, types and their uses. Principle of operation of D.C. Generators, types & application.

2. Elements of A. C.:

Definition, prodcution of A.C., parameters. Instantaneous values peak, value, R.M.S. Value, Average Value, difference between direct current and alternating current.

3. A.C. machines:

Principle of operation and application of
(i) Alternator
(ii) Synchronous motor,
(iii)Induction motor.

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4. Transformer:

Principle, operation, transformation ratio, application, cooling system. Types: Step down and step up transformers.

5. Transmission and Distribution:

Importance, necessity of transmission, transmission losses and how to minimize it. Basic idea about power transmission and substation. Method of distribution of electrical power.

6. Rural Electrification:

1. Electrical appliances: Switches, fuses, regulator boards.
2. Types of house wiring and wiring materials: wires, battens, conduit pipe ( plastic and metal), clips etc.
3. Wiring tools and equipments.
4. Calculation of energy consumption and preparation of bills.
5. Street light connection.
6. Cables - Utility, specifications and installation with respect to save energy and economy.
7. Generalidea about the rules of U.P. Electricity Board for rural electrification.

B MEASURING INSTRUMENTS

1. Working principles and construction of the following instruments:
   (a) Ammeter and voltmeter ( moving coil and moving iron type)
   (b) Dynamometer type wattmeter
   (c) Energy Meter
2. Measurement of power in single phase and three phase circuits by wattmeter

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PRACTICALS

LIST OF EXPERIMENTS:

1. To Connect a single phase load with single phase supply and measure current, voltage, power and power factor.

2. To study and sketch single phase energy meter and caliberate it at different loads.

3. Stair-case wiring.

4. Study of D.O.L.starter and to connect three-phase moter with it.

5. To study star Delta starter -
   (a) Manually operated.
   (b) Automatic type.

6. To measure power and power factor of single phase circuit by a 3 voltmeter method, by 3 ammeter

7. To determine turn ratio and efficiency and regulation of a single phase transformer.

8. Estimation of cost of materials of wiring for a farm house specially batten and conduct wiring.

9.a) Electrical precautions to be strictly observed while working with appliances/equipments/supply lines especially for human safety.

   b) Knowledge of First-Aid to be provided to the person involved in an accident by electricity.

10. Earthing of electrical equipments.

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## 4.4 AGRICULTURAL ENGG. DRAWING

| L | T | P |
|---|---|---|
| - | - | 12 |

RATIONALE

In the feild an agricultural engineering diploma holder shall come across to various civil ingineering structureas irrigation structures, farm road, earthen dams and storage bins etc. For constructing the above mentioned structures economically and effectively he must be able to enterpret civil engineering drawing correctly.

An agricultural engineering diploma holder shall also come across different machines in different section and he may be involved in fabrication /manufacture/ repair and maintenance / floor level assembly of parts etc. For performing the above job effectively and economically he must he able to enterpret the machine drawings correctly.

Therefore the knowledge of civil engineering drawing as well as mechanical engg. drawing is vary essential for an agricultural engg. diploma holder.

TOPICWISE DISTRIBUTION OF PERIODS

| S.NO. | TOPIC | NO. OF PLATES | PERIODS |
|---|---|---|---|
| A. | Machine Drawing: | | |
| 1. | Introduction | | 2x2 |
| 2. | Cotter and knuckle joints | 1 | 3x2 |
| 3. | Bearings | 1 | 4x2 |
| 4. | Couplings | 1 | 4x2 |
| 5. | I.C. Engine Piston and Piston ring, connecting rod | 1 | 4x2 |
| 6. | Screw Jack | 1 | 2x2 |
| 7. | Free hand proportional sketches of different machine | | |
| a. | Shovel and Tynes of Cultivator. | 1 | 2x2 |
| b. | Wheat thresher. | 1 | 2x2 |
| c. | Spool for the disc harrow. | 1 | 2x2 |
| d. | Mould Board Plough, Dis Plough & Reaper Cutter bar | 1 | 2x2 |
| B. | Civil Engineering Drawing: | | |
| 1. | Farm House | 1 | 2x2 |
| 2. | Cattle barn | 1 | 4x2 |
| 3. | Poultry House | 1 | 4x2 |
| 4. | Doors and windows | 1 | 4x2 |
| 5. | Gobar Gas Plant | 1 | 4x2 |
| 6. | Cross section of rural road & rural sanitation | 1 | 5x2 |
| 7. | Sectional view of India Mark-II Hand Pump. | | |
| | TOTAL | 15 | 50X2 =100 |

DETAIL CONTENTS

A. MACHINE DRAWING:

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1. Introduction:

Concept of half sectional and full sectional views.
Concept of working drawing of assemblies from given components showing models of any machine.

2. Detail drawings of the following :
   1. Two views of each, out of which one should be sectional view.

   2. Cotter and knuckle joints

   3. Bearings : Foot step bearing and pedestal bearing

   4. Couplings : Flanged coupling and flexible coupling

   5. I.C. Engine: piston, piston rod and connecting rods

   6. Screw Jack

   7. Free hand proportional sketches ofthe following agricultural implements and their components:

   a. Shovel and cultivator

   b. Simple drum type wheat thresher exploded view.

   c. Spool for the disc harrow.

   d. Mould Board Plough, Dis Plough & Reaper Cutter bar

B. CIVIL ENGINEERING DRAWING

Plan, elevation and section of following rural structures:

1. Farm House
2. Cattle barn
3. Poultry farm
4. Doors and windows : braced and battened door, fully panelled door and window, partially glazed and partially panelled door and window.
5. Drawing of Gobar gas plant of fixed dome type showing different parts and their sizes through visit to a near by plant.
6. Rural roads and sanitation - cross section of a rural road showing drains and trees etc., plan and section of septic tank and soakpit for a moderate rural family (6 to 10 users) as per BIS specification.
7. Sectional view of India Mark-II Hand Pump.

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## 4.5.DAIRY AND FOOD ENGINEERING

| L | T | P |
|---|---|---|
| 6 | - | - |

Rationale :

Milk & food is an important ingradient for health and therefore it is universally utilised by human being of all age groups. The supply terminals are normally satuated at distant places from the processing units. Therefore effective methods of milk & food collection and storage are required to avoid microbiological contamination of milk & food . The students are required to be trained in handling of milk & food at preprocessing stage.

### TOPIC WISE DISTRIBUTION OF PERIODS

| Sl.No. | Units | Coverage Time L | T | P |
|---|---|---|---|---|
| A. | DAIRY ENGINEERING | | | |
| 1. | Introduction. | 5 | - | - |
| 2. | Milk receiving equipment. | 5 | - | - |
| 3. | Storage equipment. | 12 | - | - |
| 4. | Heat exchanging equipments. | 12 | - | - |
| 5. | Installation of infloor and on floor conveyor. | 6 | - | - |
| 6. | Ice Cream Equipments. | 6 | - | - |
| 7. | Homogenisers. | 6 | - | - |
| 8. | Cream, Butter and Ghee Equipments. | 12 | - | - |
| 9. | Evaporators & Dryers | 5 | - | - |
| B. | FOOD ENGINEERING | 15 | - | - |
| | | 84 | - | - |

### DETAILED CONTENTS

1. INTRODUCTION:

Sanitary features, sanitary pipes and fittings stainless steel pipes, glass pipes, plastic tubing, pipe and fitting standards, sanitary pipe and fitting. Sanitary pumps, centrifugal pump. Positive displacement pump specification, stuffing box, rotary seal.

2. MILK RECEIVING EQUIPMENT:

Weigh can and receiving tank, chilling equipment, weighing and measuring milk standards. Canwashers-principles of operation. Rotary and straight through can washer.

3. STORAGE EQUIPMENT:

Insulated storage tank. refrigarated storage tanks specification for the storage tanks. Milk transport tank. Milk processing equipments, separators-warm, milk seprators-cold milk spearators, Centrifugals cream sepraters.

4. HEAT EXCHANGING EQUIPMENT:

Heat exchangers, Pasteurization - Batch type and contineous type Pasteurizing plants, purpose and special requirement. High temperature short time pasteurizer, utilities, regeneration, holding time. Metering pump and drive F.D.V. UHT (Ultra High Temperature) Pasteurizers.

5. INSTALLATION OF INFLOOR AND ONFLOOR CONVEYOR:

Different types of conveyors used in dairy industry, their drives, take up units. conveyor components, Case stackers and unstackers, platising milk cases, handling of dispenser milk containers, handling of ice cream.

6. ICE CREAM EQUIPMENTS:

Ice cream freezer batch freezer, Continuous freezers, type of designs, air incorporation, over run, control systems, freezing cylinder, dasher, scrapping blades, controls of refrigeration.

7. HOMOGENISERS:

Theory of homogenization, design, material, single stage and two stage homogenizers, efficiency of homogenization.

8. CREAM, BUTTER AND GHEE HANDLING EQUIPMENT:

Cream ripening tanks, design, material, automatic control, operation, cleaning, maintenance of Continious Butter making equipment. Wooden churn, metal churn. Ghee pan and Ghee making equipments

9. EVAPORATORS & DRYING EQUIPMENTS :

Introduction of evaporators, single and multiple operation, Introduction of drum dryer and spray dryer.

B. FOOD ENGINEERING :

Physical properties of food materials, Unit operation in food engineering : Grinding, Crushing, Mixing, Blending, Thermal processing, Dehydration. Packaging materials and methods of packing of different food products. Preservation of food product, site selection and plant layout and their cost economics.

NOTE : For Practical knowledge of above subject one week summer in plant training must be provided in Dairy Plant and report should also be submitted in the department by each student.

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V Semester

## 5.1 MINOR IRRIGATION AND TUBE WELL ENGG.

| L | T | P |
|---|---|---|
| 6 | - | 4 |

RATIONALE:

The knowledge of this subject will help the learner to equip them with the importance of minor irrigation net works and tubewells in increasing the agricultural production. Design of the network and tube wells with optimum efficiency will help generating extra income through cash crops etc. to farmers.

TOPICWISE DISTRIBUTION OF PERIODS

| SL.NO. | TOPIC | L. | T. | P. |
|---|---|---|---|---|
| (A) | MINOR IRRIGATION | | | |
| 1. | Introduction | 5 | | |
| 2. | Minor Irrigation & Tubewell Engineering | 6 | | |
| 3. | Planning & lay out | 8 | | |
| 4. | Minor Irrigation Equipments | 12 | | |
| 5. | Water pumping equipments | 7 | | |
| 6. | Sources of Minor Irrigation | 7 | | |
| (B) | TUBEWELL ENGINEERING | | | |
| 1. | Introduction | 4 | | |
| 2. | Site Selection | 4 | | |
| 3. | Drilling Methods and Rigs | 4 | | |
| 4. | Types of Tube wells | 4 | | |
| 5. | Strainers | 4 | | |
| 6. | Open wells | 4 | | |
| 7. | Pumps and pumping equipments | 10 | | |
| 8. | State Tube wells | 4 | | |
| | TOTAL | 84 | - | 56 |

DETAILED CONTENTS:

(A) MINOR IRRIGATION

1. Introduction

Importance, necessity and advantages of minor irrigation.

2. Minor Irrigation & Tubewell Engineering:

Concept, appliaction and scope of minor irrigation & Tubewell engineering.

3. Planning & Layout:

Planning and layout of minor irrigation channel,

4. Minor Irrigation Equipments:

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Introduction of the following traditional water lifting devices:
Swing basket, mhot, rahat, charas, dhenkuli, Egyptian screw, Propeller pump, Axial flow pump.

5. Water Pumping Equipments

Wind mills, hydrams, solar water pumps, principles, constructional details & working.

6. Sources of minor irrigation:

Shallow & deep wells, water tanks and ponds, Confined and unconfined aquifer, development of well.

(B) TUBE WELL ENGINEERING:

Introduction:

Definition of tube well, need, adwantages & disadvantages.

2. Selection of Site:

Charctristics of tube well site, factor affecting site selection.

3. Drilling Methods:

Types of drilling methods, advantages of different methods.
Types of rigs; Rotary & percussion rigs, their construction, installation and working.

4. Types of Tube well

Types of tube well, advatages & disadvantages of each type, selection of tubewell for a given site.

5. Strainers:

Types, method of design, comparison of defferent types of strainers.

6. Open Wells:

Design and construction of open wells.

7. Pump and Pumping equipments

Types, main features, working principle, selection of pumps and pumping equipment, centrifugal pump, Submersible and turbine pumps, performance, installation and Aligment of centrifugal pump. Submercible pumps, installation, operation and maintenance.

State Tube wells:

Importance in increasing agriculture prodcution,command area and government policy about tubewells.

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PRACTICALS

(Irrigation Engg. Lab)

LIST OF EXPERIMENTS 4 Periods/week

1. Study and sketch of spill ways and outlet.

2. Study of different types of methods of irrigation adopted for different crops at formers field.

3. Study and sketch of infiltration and actual determinations of infilteration rate of soil in field.

4. Study and sketch different weirs, notches, orfices and flumes and flow measurement us channel.

5. Determination of discharge of a channel by
   (a) Float method
   (b) Current meter method

6. Studty and sketch of Tenso meter and its use in determination of soil moisture.

7. To measure pressure head in saturated soil by pizometer.

8. To determine irrigation efficiencies in field:
   i. Water application ii. Water conveyance iii.water distribution

9. To determine consumptive use by weighing type evapotranspiration pan.

10. Preperation of drainage plans.

11. To determine yield of a tube well.

12. Study and sketch of the following:
    ( Any two )
    i. Sprinkler Irrigation
    ii. Drip Irrigation
    iii. Wind Mill

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## 5.2 POST HARVEST TECHNOLOGY & AGRO BASED INDUSTRIES

| L | T | P |
|---|---|---|
| 6 | - | 8 |

RATIONALE:

In agriculture harvesting and threshing at field are very important operations. Now a days at medium & large farms, these machines are used by agro-industries, corporations,agricultural engineering departments and large and medium size holdings and private organizations. For menning operation and maintenance of post harvest equipments supervisory personnels are required.

In view of the emphasis given by the government for conservation, storage and adding value to the agricultural produce, the post harvest technology has asumed special significance. Primary operation like drying, cleaning grading as well as storage management, layout of marketing yards and trans port system are worth mentioning. All these operation are done by the farmer at farm level, through corporation or by govt. level.

The contents of this subject have been developed to cater the above needs and equip them with the knowledge of post harvest techniques and equipments, so as to economise the processes and optimise the use of equipments and available infra structure.

TOPICWISE DISTRIBUTION OF PERIODS:

| SL.NO. | TOPIC | L. | T. | P. |
|---|---|---|---|---|
| 1. | Introduction | 5 | | |
| 2. | Drying | 3 | | |
| 3. | Cleaning and Grading | 7 | | |
| 4. | Sead Treatments | 4 | | |
| 5. | Bagging & Packaging | 4 | | |
| 6. | Storage | 4 | | |
| 7. | Material handling Equipment | 6 | | |
| 8. | Pertreatment/conditioning of Agricultural Produce | 6 | | |
| 9. | Milling of cereals, pulses and oilseeds | 9 | | |
| 10. | Canning of Fruits & vegetables | 4 | | |
| 11. | Dehydration of Fruits & Vegetables | 4 | | |
| 12. | Processing of Fruits & Vegatbles | 5 | | |
| 13. | Utilization of By Products | 5 | | |
| 14. | Agro-based industries | 18 | | |
| | TOTAL | 74 | - | 112 |

DETAILED CONTENTS

1. Introduction:

Importance of grain and seed processing principles of agricultural processing, sequence of operations, flow diagram, services offered by processor to farmers and Under water grain storage

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DIFFERENT STEPS INVOLVED IN SEED PROCESSINGS.

2. Drying

Importance of moisture in seed and grain representation. Determination of moisture, direct and indirect methods, process of drying such as constant rate period and falling rate period. Drying kinds: thin layer and deep-bed drying. Temperature and air flow requirement, natural air and heated air drying, solar drying. Direct and Indirect dryers, their efficeincy and economics.

3. Cleaning and Grading :

Importance, elementry, study of related machines, their operations and maintenance such as scalper, air screen cleaner, rotary cleaner, spiral separator, indented cylinder separator, gravvity separator, Debearder.

4. Seed Treatment:

Seed treatment methods, elementary study of seed treating equipments such as as powder and slurry seed treater and their advantages.

5. Bagging & Packaging:

Manual bagging, semi-automatic bagging Machines and automatic begging machines. Packaging materials and their utilization

6. Storage:

Storage of seed and grain, respiration and factors affecting it, changes in stored product during storage, loss of germination and seed viability. Design of storage system and equipments. I.S.I. code practice. Storage of fresh fruits, vegetables and dairy products.

7. Material Handling Equipment:

Belt conveyor, screw conveyor, pneumatic conveyor, bucket elevator, their operation and maintenance

8. Pretreatment/Conditioning of Agricultural Produce For Milling:

Parboiling of paddy, Methods and machinery used for parboiling, pretreatment of pulses and oil seeds for milling.

9. Milling of Cereals, Pulses and Oil Seeds:

Methods and machinery used for milling for cereals pulses and oil seeds such as paddy, wheat, arhar and mustared. Elementary knowledge of solvent extraction plant.

10. Canning of Fruits and Vegetables :

Methods and machinary used for canning, advantage of

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canning.

11. Dehydration of Fruits and Vegetables :

Methods and machinery used for dehydration of fruits and vegetables such frey drier, solam drier, Advantage of dehydration.

12. Processing of Fruits & vegetables For Preparation of Jam, Jelley Squash, Betchup, Etc.:

Methods and machinery used for preparation of Jam, Jelly, Squash, Betchup, Catney, Morabba, etc.

13. Utilization of By-Products :

Utilization of paddy husk, rice bran, paddy straw, corn cob; Bio-methanation of fruits and vegetable waste, Crasification of agricultural based celulosie materials.

10. Agro-Based Industires:

Sugarcane crushing, khandsari and Gur making process and equipment; Preparation of Soybean and Potato based products such as Soyamilk, Soypaneer, Soybiscuits Papad, chips Waffers, etc.; Briquetting of agricultural waste to use as fuel, Card Board preparation from paddy straw.

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PRACTICALS

Study and operation of the following:

1. Air screen cleaner and other cleaning equipments.

2. Heated air dryer.

3. Screw conveyor, bucket elevator & belt coveyer

4. Slurry seed treater and mixer

5. Case Study of the following available in through visits:

a. Modern Rice Mill

b. Cold Storage/Appropriate technology for short duration storage at village level.

c. Specific gravity separator

d. Processing and storage plant

e. Gur making unit

f. Soybeean processing unit

g. Canning and packaging of fruits and vegitables.

h. Khandsari sugar making unit

i. Vegetable dehydrating unit

j. Seed germinating unit

6. Preparation of Mango, Guava, Karaunda and Apple jelly.

7. Preparation of Orange squash and Lamon squash.

8. Preparation of ketchup of different fruits.

9. Agrowaste composite materials

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## 5.3 ESTIMATING & COSTING

| L | T | P |
|---|---|---|
| 8 | - | - |

RATIONALE:

This is one of the core subject of Agricultural Engineering as it enables the students to estimate the cost of Civil Engg. Agricultural structures and cost of producing a mechanical machine or equipment used in maintenance work or expenditure on spares. They will know the working of contractors, estimators, supervisors & valuers. The study of this subject makes them efficient supervisors & good executives in Agricultural Engineering field.

TOPICWISE DISTRIBUTION OF PERIODS

| SL.NO. | TOPIC | PERIODS |
|---|---|---|
| (A) | CIVIL ENGG. | |
| 1. | Introduction | 10 |
| 2. | Measurement of work | 6 |
| 3. | Rate analysis | 8 |
| 4. | Estimates of diff. item of works of a building | 12 |
| 5. | Estimates of a complete village house | 6 |
| 6. | Calculation of material | 6 |
| 7. | Estimates of earth work of a road | 8 |
| 8. | Estimates of irrigation and drainage channels | 12 |
| (B) | MECHANICAL ENGG. | |
| 1. | Estimation of Material requirment | 14 |
| 2. | Estimation of a welding | 12 |
| 3. | Estimation of forging | 8 |
| 4. | Estimates of cost | 10 |
| | TOTAL | 112 |

DETAILED CONTENTS:

1. Introduction:

Definition of estimating, purpose, types of estimate, preliminary estimate, cubical content estimate, plinth area estimate, approximate quantity method estimate, detailed or item rate estimate, rewised supplementary estimate, annual repair cost and special repair estimate. Bill of quantities, abstract of cost, prerequisites of estimating that is drawing, specification, rates, general and detailed specifications.

2. Measurement of work:

Units of measurement, general rules of taking measurement, units of payment, method of measuring quantities- centre line method, long and short wall or out and in to in methods.

3. Analysis of Rates:

Shedule of rate, need of analysis of rates, requirement of labour for different works as per NBO, requirement of material for different works, preparation of analysis of rate of 10 important works.

4. Estimate of different work of a building & roads & farm structures:

(a) Earth work in foundation, steps, dwarf wall, boundary wall
(b) Concrete in foundation
(c) Brick masonary in footings
(d) Brick masonary upto plinth
(e) Brick masonary in super structure
(f) D.P.C.
(g) R.B. and R.C. works
(h) Flooring
(i) Sand/earth filling
(j) Plastering and pointing
(k) White washing and colour washing
(l) Site development
(m) Antitermite treatment
(n) Arches and roofs
(o) Water supply and sanitary works:
(i) Bath room and W.C. including fittings
(ii) Septic tank and soakpit
(iii) P.R.A. type latrine
(p) Doors and windows
(q) Misc. other works

5. Estimate of a complete Village House

6. Calculation of materials:

Calculation of quantities of different materials from estimated quanties of items like brick work, cement concrete R.B. and R.C. work.

7. Estimate of earth work of road:

Calculation of land areas and volumes-Prismoidal formula, mass diagram, methods of taking out and scheduling quantities for various items such as culverts and bunds. Earth work volumes by spot levels and contours.

8. Estimates of irrigation and drainage channels:

Specifications and estimating quantity and cost of irrigation and drainage channels.

(B) MECHANICAL ESTIMATING:

1. Estimation of materials: Estimation of weight of a simple machine part.,

2. Estimation of Welding:

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Material cost, fabrication cost,welding cost & finishing cost,overhead cost, labour accomplishment factor and cummulative effects of poor practices on cost. Calculation of cost of welding, gas consumption and welding electrodes.

3. Estimation of Forging:

Concept of losses in forging operation. Estimation for the stock required for hard forging considering scale and shear losses.

4. Estimation of cost:

Concept of costing, brief discription of direct materials, indirect materials, direct labour, indirect labour and overhead expences

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## 5.4 BANKING, FARM & INDUSTRIAL MANAGEMENT

| L | T | P |
|---|---|---|
| 6 | - | - |

RATIONALE

While working on Agricultural works an agricultrual techincian has to supervise the work of labours and guide them from time to time. He must be well aquainted with the various aspects of management related to agricultural works.

He has to find the resources for execution of an agricultural project as well as to have proper control on finances. therefore he must have the knowledge of agricultural financing as well as he must be well aquainted with the role of financing institutions, money lenders, cooperative and commercial banks, regional rural banks and land development banks.

He shall also know the rules and procedures of lending by cooperative banks, commercial banks and other financing instituio and their working procedures. He has also to maintain the account ledger, cash book and imprest so he must have the knowledge of banking also.

The contents of this subject have developed to cater to above needs.

TOPIC WISE DISTRIBUTION OF PERIODS

| Sl.No. | TOPIC | L. | T. | P. |
|---|---|---|---|---|
| (A) | Banking | | | |
| | 1. Role and functions | 3 | | |
| | 2. Maintenance of accounts | 5 | | |
| (B) | Farm management | | | |
| | 1. Definition and objectives | 2 | | |
| | 2. Selection of forms | 3 | | |
| | 3. Cost computation | 8 | | |
| | 4. Farm management practices | 4 | | |
| | 5. Classification of farming | 8 | | |
| (C) | Industrial Management | | | |
| | 1. Organisation | 5 | | |
| | 2. Layout | 5 | | |
| | 3. Material Management | 6 | | |
| | 4. Replacement of machinary | 9 | | |
| | 5. Personnel Management | 6 | | |
| | 6. Inspection | 5 | | |
| | 7. Wages and incentives | 5 | | |
| | 8. Purchase organisation | 5 | | |
| | 9. Human Resoruce Management | 5 | | |
| | TOTAL | 84 | - | - |

DETAILED CONTENTS

(A) Banking:

1. Role and functions

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Agricultural Financing, agriculture credit, credit agencies, private and institutional finances.Role of Commercial, Reserve, Cooperative and Land development banks in financing agriculture and agro based industries.

2. Maintenance of accounts:

Account maintenance of farms and farm projects,departmental account maintenance procedure and types of accounts.

B. Farm Management:

1. Definition and objectives

2. Selection of forms Essential factors in selection of farm,factors affecting the size of farms, merits and demerits of large small farms.

3. Cost Computation:

Cost computation for various farm operation by using various power implements. Cost of production and profits.

4. Farm Management Practices:

Farm lay out, marketing practices market classifcation, services, structure, function of middleman and their importance present system of marketing in India. Regulated market of cooperative marketing.

5. Classifcation:

Classification of farming under Indian condition. Types of farming. Specialized, diversified and dry farming. System of farming, cooperative and collective farming.

(C) INDUSTRIAL MANAGEMENT:

1. Organisation:

Definition of good organisation. Principle of good organisation with merit & demerits.

2. Lay out:

Site selection of factory, influence of location on plant layout, factors considering for plant building. Definition of plant layout, objectives 2 principles. Types of plant layout.

3. Material Management:

Importance and function of material handling. Engineering & economics consideration devices. Relation between plant layout and material handling.

4. Replacement of Machinary:

Reason for machinary replacement. Depriciation, definition different method of calculation depriciation.

5. Personnel Management:

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Importance, function organisation chart. Duties of personal officer.

6. Inspection:

Definition, objects function, method kinds of inspection.

7. Wages and incentives:

Types of wages, factors effecting wages. Characteristics of good wages. Method of wages payment.

8. Purchase organisation:

Importance of good purchasing policy. Function of purchasing department. Duties of purchasing officer. Purchasing procedure.

9. Human Resoruce Management:

Human resoruce management, selection, performance appraisal, motivation and leadership and controlling.

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## 5.5 Rural Development and Entrepreneurship:

| L | T | P |
|---|---|---|
| 6 | - | 4 |

RATIONALE:

A diploma holder in Agricultural Engineering very often has to work with village folk. For this perpose he must have a goodn rapport with the villagers. So a diploma holder in Agricultural Engg. should be able to apply the principles of rural socialogy and social behaviour for rural people in his job and provide leadership in the development of rural areas.

Therefore, the knowledge of development of rural area is very much needed to an agricultural engineering technician.

The curriculum of diploma course in Agricultural Engineering is being developed keeping in view the job opportunities in the field. It has been experienced that students who opt for diploma course are fairly intelligent and enterprising. It has also been experienced that all students who pass out diploma do not go for jobs. Persons who posses entreprenurial traits and attributes prefer setting up their own small scale industries/ business venture instead of seeking jobs.

The percentage of students who like to set up their own industrial/ business venture could be increased by way of introducing entrepreneurship development in agricultural engineering curriculum .

The contents of this subject have been development to cater the above needs.

TOPIC WISE DISTRIBUTION OF PERIODS

| Sl. No. | TOPIC | L. | T. | P. |
|---|---|---|---|---|
| | (A) RURAL DEVELOPMENT | | | |
| 1. | Introduction | 3 | | |
| 2. | Spheres of rural development | 4 | | |
| 3. | Govt and private agencies engaged in this activity | 4 | | |
| 4. | Financing agencies and their working procedures. | 4 | | |
| 5. | Govt. Schemes for rural develpment | 4 | | |
| 6. | Community development | 7 | | |
| 7. | Rural Extension | 6 | | |
| | (B) ENTREPRENEURSHIP DEVELOPMENT | | | |
| 1. | Introduction | 8 | | |
| 2. | Industries (Agro based) | 12 | | |
| 3. | Market Survey | 6 | | |
| 4. | Industrial Management | 12 | | |
| 5. | Industrial Legislation & Taxes. | 6 | | |
| 6. | Project Report | 6 | | |
| | TOTAL | 84 | - | 56 |

DETAILED CONTENTS

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(A) RURAL DEVELOPMENT

1. Introduction: Importance of rural development , need of development.

2. Spheres of rural development:

   (a)Social (b) Education (c) Health (d) Housing (e) Sanitation and drainage (f) Industrial (g) Energy

3. Govt Agencies envolved im rural development:

   Block Development officer and its staff, Rural Enginnring department.

4. Financing Agencies and their working: Development banks, regional rural bank, commercial banks, lead bank, cooperative banks.

5. Govt Schemes for rural development: Trysem, IRDP, IRD, ACID (Agriculture credit intensive development scheme),DRI (Differential rate of Intrest scheme of banks, Insurance schemes.

6. Community Development: Philosphy, principle and objectives,organisational set up of blocks,Panchayat samiti, Gram vikas samiti etc.

7. Rural Extension: Rural Extension methods such Audio, Visual and Audio Visual. Use and role of information technology in rural development.

(B) ENTREPRENEURSHIP DEVELOPMENT

1. Introduction: Entrepreneur, entrepreneurship, its meaning & importance. Qualities of an entrepreneur. Entrepreneur Motivation Training (E M T ). Ring toss, Achievement Planning, Tower Building.

2. Industries: Role and importance of small scale and other Industries. Classification of industries-village industry, tiny industry, small, medium and large scale industry. Ancillary industry. Identification of industry-resources,demand and skill based industry.

   Financing Agencies for - Land, Infra Structure, Machinary, raw material, import of raw material and machinary. Marketing. Role and function of Govt. department connected with the devewlopment of industries in the State. Component of project report - Land, Building, Electricity, water, Equipment and other utilities. Materials, its availability, cost, labour availability and wage rates. Price of finished product.

3. Market Survey: Project selection based on market survey, demand and supply estimation, fast moving brands etc.

4. Industrial Management: Production planning and control, marketing management and laison, Basic concept of marketing and salesmanship, marketing mix, working capital management, cash flow. Personnel management.

   Limiting cost ,budget and its control, book keeping, balance

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sheet, Break even analysis.

5. Industrial Legislation and Taxes:Indusatrial and Labour Laws, Production Tax. local tax, sales tax, excise duty, Income tax.

6. Project Report: Prject report preparation and provisional registration.

   Preparation of detailed project preport (D. P. R.) for financial assistance.

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PRACTICALS

RURAL DEVELOPMENT|

1. Socioeconomic Survey of a village selected in visinity to polytechnic.

2. To find the problems of the village and suggest the solution in the development of the village from the study of the above survey in respect of :

a) Improvement suggested in agricultural activities.

b) Rural sanitation problems.

c) Rural Housing.

d) Energy development.

e) Promotion of traditional and other industries.

f) Farm mechanisation

Entrepreneurship Development:

To prepare a Project report for opening agro based industry and arrange resources for the same from financing agencies.

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VI Semester

6.1 ENVIRONMENTAL EDUCATION & DISASTER MANAGEMENT

| L | T | P |
|---|---|---|
| 4 | - | - |

RATIONALE:

A diplima student must have the knowledge of different types of pollution caused due to industrialisation and construction activities, so as he may help in balancing of eco-system and control pollution by providing controlling measures. They should be also aware of the environmental laws for effectively controlling the pollution of environment. The topics are to be taught in light of legislation Para-3.

TOPIC WISE DISTRIBUTION OF PERIODS:

| SL. NO. | TOPIC | L | T | P |
|---|---|---|---|---|
| 1. | Introduction | 6 | | |
| 2. | Pollution | 4 | | |
| 2.1 | Water Pollution | 8 | | |
| 2.2 | Air Pollution | 8 | | |
| 2.3 | Noise Pollution | 4 | | |
| 2.4 | Radio Active Pollution | 6 | | |
| 2.5 | Solid Waste Management | 6 | | |
| 3. | Legislations | 4 | | |
| 4. | Environmental Impact Assessment | 4 | | |
| 5. | Disaster Management | 6 | | |
| | TOTAL | 56 | - | - |

DETAILED CONTENTS

1. INTRODUCTION :

- Basics of ecology, Ecosystem, Biodiversity Human activities and its effect on ecology and eco system, different development i.e. irrigation, urbanization, road development and other engineering activities and their effects on ecology and eco system, Mining and deforestation and their effects.

- Lowering of water level , Urbanization.

- Biodegradation and Biodegradibility, composting, bio remediation, Microbes .Use of biopesticidies and biofungicides.

- Global warning concerns, Ozone layer depletion, Green house effect, Acid rain,etc.

2. POLLUTION :

Sources of pollution, natural and man made, their effects on living environments and related legislation.

2.1 WATER POLLUTION :

- Factors contributing water pollution and their effect.

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- Domestic waste water and industrial waste water. Heavy metals, microbes and leaching metal.

- Physical, Chemical and Biological Characteristics of waste water.

- Indian Standards for qulity of drinking water.

- Indian Standards for quality of treated waste water.

- Treatment methods of effluent (domestic waste water and industrial/ mining waste water), its reuse/safe disposal.

2.2 AIR POLLUTION :

Definition of Air pollution, types of air pollutants i.e. SPM, NOX, SOX, GO, CO2, NH3, F, CL, causes and its effects on the environment.

- Monitoring and control of air pollutants, Control measures techniques. Introductory Idea of control equipment in industries i.e.

A. Settling chambers
B. Cyclones
C. Scrubbers (Dry and Wet)
D. Multi Clones
E. Electro Static Precipitations
F. Bog Fillers.

- Ambient air qulaity measurement and their standards.

- Process and domestic emission control

- Vehicular Pollution and Its control with special emphasis of Euro-I, Euro-II, Euro-III and Euro IV.

2.3 NOISE POLLUTION :

Sources of noise pollution, its effect and control.

2.4 RADISACTIVE POLLUTION :

Sources and its effect on human, animal, plant and material, means to control and preventive measures.

2.5 SOLID WASTE MANAGEMENT :

Municipal solid waste, Biomedical waste, Industrial and Hazardous waste, Plastic waste and its management.

3. LEGISLATION :

Preliminary knowledge of the following Acts and rules made thereunder-

- The Water (Prevention and Control of Pollution) Act - 1974.

- The Air (Prevention and Control of Pollution) Act - 1981.

- The Environmental Protection (Prevention and Control of

Pollution) Act -1986. Rules notified under EP Act - 1986 Viz.

# The Manufacture, Storage and Import of Hazardous Chemical (Amendment) Rules, 2000

# The Hazardous Wastes (Management and Handling ) Amendment Rules, 2003.

# Bio-Medical Waste (Management and Handling) (Amendment) Rules, 2003.

# The Noise Pollution (Regulation and Control) (Amendment) Rules, 2002.

# Municipal Solid Wastes (Management and Handling) Rules, 2000.

# The Recycled Plastics Manufacture and Usage (Amendment) rules, 2003.

4. ENVIRONMENTAL IMPACT ASSESSMENT (EIA) :

- Basic concepts, objective and methodology of EIA.

- Objectives and requirement of Environmental Management System (ISO-14000) (An Introduction).

5. DISASTER MANAGEMENT :

Definition of disaster - Natural and Manmade, Type of disaster management, How disaster forms, Destructive power, Causes and Hazards, Case study of Tsunami Disaster, National policy- Its objective and main features, National Environment Policy, Need for central intervention, State Disaster Authority- Duties and powers, Case studies of various Disaster in the country, Meaning and benifit of vulnerability reduction, Factor promoting vulnerability reduction and mitigation, Emergency support function plan.

Main feature and function of National Disaster Management Frame Work, Disaster mitigation and prevention, Legal Policy Frame Work, Early warning system, Human Resource Development and Function, Information dissemination and communication.

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## 6.2 IRRIGATION AND DRAINAGE ENGINEERING

| L | T | P |
|---|---|---|
| 6 | - | 4 |

RATIONALE:

This subject is essential to equip the learner with the knowledge of Irrigation and drainage of agricultural lands and conservation of water for optimizing the agricultural production in the most efficient and economical way. Probleme of alkalinity and salinity can be aslo minimized to provide the efficient drainage systems on farms.

TOPIC WISE DISTRIBUTION OF PERIODS:

| SL. NO. | TOPIC | L | T. | P. |
|---|---|---|---|---|
| (A) | IRRIGATION ENGG. | | | |
| 1. | Introduction | 2 | | |
| 2. | Sources of irrigation water | 6 | | |
| 3. | Ground water | 6 | | |
| 4. | Water Requirements of crops | 6 | | |
| 5. | Irrigation Methods & Design of Drip Irrigation System | 8 | | |
| 7. | Storage structures | 6 | | |
| 8. | Evaluation of Farm Irrigation Systems | 6 | | |
| 9. | Soil Moisture Movement | 6 | | |
| 10. | Design of Irrigation Channels | 6 | | |
| (B) | DRAINAGE ENGG. | | | |
| 1. | Introduction | 2 | | |
| 2. | Drainage investigations | 6 | | |
| 3. | Drainage Requirements | 6 | | |
| 4. | Drainage systems | 12 | | |
| 5. | Special Methods of Drainage | 6 | | |
| | TOTAL | 84 | - | 56 |

DETAILED CONTENTS

1. Introduction:

Definition of Irrigation, History of Irrigation, Necessity and scope of Irrigation, Types of Irrigation.

2. Sources of Irrigation Water

Wells, rivers, ponds, canals, tube wells. Investigation and survey, selection of site and determination of capacity of storage reserviors and tanks.

3. Ground Water:

Water bearing formation, confined and unconfined aguifers,

static water level, piezometric surface, pumping water level,drawdown, area of influence, prediction of yeild in confined and unconfined aquifer, well development.

4. Water requirement of plants:

Types of soils, soil properties in relation of irrigation and drainage, classes and availability of soil water, preparation of land for irrigation and drainage, quality of irrigation water, evaporation, transporation, evapotranspiration, consumptic use, esimating crop water rquirements, duty of water, delta, factors affecting duty methods of improving duty. Assessment irrigation water requirements of different crops, estimation of depth and time of irrigation, different criteria for irrigation scheduling depending upon soil-plant-atmospheric factos.

5. Irrigation Methods & Design of Drip Irrigation System :

Surface and subsurface methods, sprinkler and drip system of irrigation. Design of drip irrigation system : Laterals and Submain.

6. Storage Structures

Introduction of different types of dams e.g. earther dams, rockfilled, hydraulic filled etc.. Different types of spillways and outlets, cross sections of earthen dams, causes of failures of earthen dams.

7. Evaluation of Farm Irrigation Systems:

Measurement of irrigation efficiencies, water conveyance, storage, application, distribution and water use efficiency.

8. Soil Moisture Movement:

Soil moisture measurements, soil moisture tension, soil moisture characteristics curve, saturation and field capacity, wilting point, moisture equivalent, percolation, seepage, infiltration, hydraulic conductivity, permieability.

10. Design of Irrigation Channels:

Non-erodible channels, design of open channels, maximum permissible velocity, channel slopes, free board, hydraulic sections, most economical section.

(B) DRAINAGE ENGINEERING:

1. Introduction:

Definition necessity water logging salinity, its control interrelationship of irrigation drainage, drainage coefficient, water table fluctuations.

2. Drainage Investigation & Requirements:

Estimation of drainage requirements, required water table depths, lowering of water table, ground water contours, drainage depths for different crops.

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3. Drainage Systems:

Different types of surface and subsurface drainage systems, land smoothing, levelling and grading, design of surface drainage systems, different types of subsurface drainage systems and their design, tile drainage depth and spacing of tile drains, field survey, installation and layout of drains, installation of tile outlets.

4. Special Methods of Drainage:

Vertical drainage, mole drains, drainage of irrigated lands in arid and semi arid areas. Drainage for leaching.

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## 6.3 SOIL WATER CONSERVATION AND LAND RECLAMATION ENGINEERING

| L | T | P |
|---|---|---|
| 6 | - | 8 |

RATIONALE

This course is aimed to equip the learner with knowledge and skill required for taking effectinve measures against soil errosion,construction and maintenance of water conservation structures and development of land for irrigation and agricultural purposes.

The contents of the subject have been developed to inculcate capabilities for performing the above mentioned task economically and effectively.

OPIC WISE DISTRIBUTION OF PERIODS

| Sl.No. | TOPIC | L. | T. | P. |
|---|---|---|---|---|
| 1. | Water Shed Management | 5 | | |
| 2. | Runoff & Hydrology | 4 | | |
| 3. | Soil-erosion | 4 | | |
| 4. | Soil & water conservation | 4 | | |
| 5. | Agronomic Measures | 4 | | |
| 6. | Mechanical Measures of errosion control | 5 | | |
| 7. | Conservation Measures for hill slopes | 4 | | |
| 8. | Gully erosion control & reclaimation | 5 | | |
| 9. | Forestry management in soil conservation | 5 | | |
| 10. | Grassed waterways | 4 | | |
| 11. | Dry farming | 5 | | |
| 12. | Water conservation reservoirs | 5 | | |
| 13. | Flood Control | 5 | | |
| 14. | Land grading and land development | 5 | | |
| 15. | Wind errosion control | 5 | | |
| 16. | Land reclaimation | 5 | | |
| 17. | Ravine reclaimation | 5 | | |
| 18. | Command Area Development | 5 | | |
| | TOTAL | 84 | - | 112 |

DETAILED CONTENTS

1. WATER SHED MANAGEMENT :

Concept, objectives, use of remote sensing in water shed management, Planning, Ground water recharging, Water harvesting.

2. RUN OFF & Hydrology :

Definition, phenomenon and forms of run off characteristics of run off, factors affecting run off, measurement of run off by float, current meter and weirs, time of concentration and its impact on run off, estimation of peak run off rate by rational equation. Hydrology : Hydrologic cycle,importance,its components, ocurance and forms of precipitation; Characteristics of rainfall in India, rain fall intensity, measurement of rain fall by non-recording and recording type of raingauges, method of computing average rainfall, reoccurance interval.

3. SOIL EROSION

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Mechanics, types and causes of erosion, factors affecting erosion, damages caused by soil erosion.

4. SOIL AND WATER CONSERVATION

Definition and aims of soil and water conservation in agriculture, soil conservation servey and land use capability classification, conservation forming.

5. AGRONOMIC MEASURES FOR SOIL & WZATER CONSERVATION

Crop classification on the basis of soil conservation value, contour forming, mulching, strip cropping, cover cropping, mixed cropping, conservation bcrop rotation, ley forming, monoculture, role of grasses in soil conservation.

6. MECHANICAL METHODS OF EROSION CONTROL

Elementary idea of basin listing, sub-soiling, field bunding, contour bunding, graded bunding, ridge and channel terraces. Cost of narrow base broad base bund as earthwork and sadding cost.

7. CONSERVATION MEARURES FOR HILL SLOPES:

Contour trenching, specification of trenching, alignment and construction of trenches, , bench terracing- types, construction and maintenance, elementary idea of stone terracing and its specification.

8. GULLY EROSION CONTROL & RECLAIMATION:

Classification of gullies, principles of prevention and control of gullies by vegetative and mechanical measures, contour and peripheral bunding, ditches,gully plugging.
Temporary and permanent structures: Earthen check dams, wooven wire check dams, Brush dams, loose rock dams, log and plank dams, straight drop spillway. Reclaimation of gullies for cultivation.

9. FORESTRY MANAGEMENT IN SOIL CONSERVATION:

Effects of forests on soil and water conservation and climate, classification of forests,elementary idea of farm and social forestry,Taungya system and forest protection, selection, development, tillage, irrigation protection and management of nurseries.

10. GRASSED WATERWAYS:

Use, design of waterways, grasses for waterways, construction of water ways,establishment of grasses on waterways, maintenance of waterways.

11. DRY FARMING:

Definition, climetic classification, elementary idea of various crop management & tillage practices. Land management practices in dry farming eg. sub-soiling and tied ridging. Water shed based soil and water conservation.

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12 WATER CONSERVATION RESERVOIRS:

Types and uses of water conservation reservoirs, site selection & storage capacity of farm ponds, design principles of water harvesting bunds and structures, digging of ponds, construction and maintenance of water conservation structures.

13. FLOOD CONTROL:

Types of flood, damages caused by floods,elementary idea of head water flood control methods.

14. Land Grading & Land Levelling:

Water harvesting, Scope, need types, long term and short term water harvesting techniques, design of ponds.

15. Wind Erosion Control:

Principles, vegetative and mechanical practices.

16. Land reclamation

Classification of usar soils, salt resistant crops, reclamation of usar soils. Reclamation of waste lands forest lands and sandy soils, sanddunes stabilization.

17. Ravine reclamation:

Classifcation of ravines and various measures for ravine reclamation.

18. Command Area Development :

Advantage and disadvantages, Command area development, Component of C.A.D.A., Various C.A.D.A. prgrammes in India.

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PRACTICALS

1. Study of Rain gauges, their operation & installation.

2. Computation of average rainfall depth over an area by symous raigauge.

3. Study and use of float & currentmenter to measure runoff.

4. Demonstration of various types of soil erosion.

5. Preparation of land use capability map for a given area.

6. Survey and planning of soil counservation measures in a given area.

7. Cost estimation of bunding.

8. Cost estimation of levelling of a field with slope either lengthwise or breadthwise.

9. Cost estimation of digging of farm ponds of difinite dimensions.

10. Study of layout and management of forest nurseries.

11. Visit to various areas of soil-water couservation and land reclamation activities and structures.

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## 6.4 R.C.C & STEEL STRUCTURES

| L | T | P |
|---|---|---|
| 6 | - | 4 |

RATIONALE:

Agricultural Engineering technicians has to construct farm houses, irrigation works and cattle shades etc. so he must have the knowldege of design of elementary steel structures and reinforced concrete works.

Contents of this subject have been develop in such a wayas to make them capable of supervising fabrication of steel structures and casting of R.C.works.

TOPICWISE DISTRIBUTION OF PEIRODS:

| SL.NO. | TOPIC | L. | T. | P. |
|---|---|---|---|---|
| (A) | STEEL STRUCTURES | | | |
| 1. | Introduction | 4 | | |
| 2. | Structural connections | 9 | | |
| 3. | Tension members | 8 | | |
| 4. | Compression | 8 | | |
| 5. | Beams | 6 | | |
| 6. | Trusses | 6 | | |
| (B) | R.C. STRUCTURES | | | |
| 1. | Introduction | 8 | | |
| 2. | Singly reinforced beams and slabs | 12 | | |
| 3. | Doubly reinforced beams | 6 | | |
| 4. | T Beams | 6 | | |
| 5. | Column and column footing | 6 | | |
| 6. | Prestressing | 5 | | |
| | TOTAL | 84 | - | 56 |

DETAILED CONTENTS:

(A) STEEL STRUCTURES

1. Introduction:

Importance, types of loads, structral steel, properties of structral steel, structural steel section, permissible stresses.

2. Structural Connections:

Types of structural connection, strength and design of revetted and welded joints for axially loaded members.

3. Tension member

Common section used as tension memeber, strength of tension members.

4. Compression member:

Common section used as compression member, strength of

compresion memebers (axially loaded columns & struts). Concept of lacing & battens.

5. Beams:

Design critaria, allowable stresses.

6. Roof Truss:

Types of trusses for different spans, roof coverings, supports, spacing, loads on trusses.

(B) Reinforced Concrete:

1. Introduction:

Behaviour and principles, assumptions in R.C. design, designation of concrete mixes, types and need of reinforcement, permissible stresses in concrete and steel, modular ratio, shear & bond stresses. Provision of shear and bond reinforcement. Concept of LIMIT DESIGN.

2. Singly Reinforced Concrete Beam & slab:

Stress distribution, nutral axis, depth of nutral axis, tensile force, compresive force, lever arm, moment of resistance, actual & critical nutral axis. Types of singly reinforced beam, under, over and balanced sections, analysis of a given section, permissible stresses, design of a signly reinforced beam and slab.

3. Doubly Reinforced Beam:

Importance of doubly reinforced beam, advantages and disadvantages of use of doubly reinforced beams.

4. T Beam

Concept, advantages, calculation of nutral axis, moment of resistance of T beam, reinforcment (no design).

5. Column and Column footing:

Types of column, effective length, different theoeys of desing, lateral & transverse reinforcement, lateral ties, spiral/helical or hoop reinforcment, effective area of column, strength of short column, strength of column wounded by spirals, reduction factor. Concept of placement of steel in column footing.

6. Prestressing:

Definition, basic principle, advantages and disadvantages, method of prestressing, systems of prestressing (Methods only).

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PRACTICAL

LIST OF EXPERIMENT:

1. To determine soundness of aggregates.

2. To determine specific gravity and water absorption of aggregates.

3. Comprative study of compressive strength of concrete for atleast 3 diffrent mix under various curing periods.

4. Setting out of a building with two rooms and a varandah.

5. To determine cube strength of concrete.

6. To find slump of a given mix of concrete.

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## 6.5 FARM & LAND DEVELOPMENT MACHINARY
## (Including Agricultural Implements)

| L | T | P |
|---|---|---|
| 4 | - | 4 |

RATIONALE:

Supervisor of agriculture machinary at farms has to organise and supervise field operation. For doing this he needs to have understanding of the proper use of various machinary and have skill in their operation. Similarly in the workshop of Agro- industry and service centre farms he should have knowledge of repair and maintenance of equipments and machinary for supervisory work.

TOPIC WISE DISTRIBUTION OF PERIODS:

| Sl. NO. | TOPIC | L. | T. | P. |
|---|---|---|---|---|
| 1. | Farm Mechanization | 3 | | |
| 2. | Primary tillage | 3 | | |
| 3. | Secondary tillage | 4 | | |
| 4. | Sowing & Planting equipment | 5 | | |
| 5. | Interculture, weed control & Hand Hoes | 3 | | |
| 6. | Fertilizer equipment | 3 | | |
| 7. | Plant protection equipment | 4 | | |
| 8. | Harvesting equipment | 4 | | |
| 9. | Threshing equipment | 5 | | |
| 10. | Processing equipment | 4 | | |
| 11. | Land development equipment | 6 | | |
| 12. | Field capacity & efficiency | 3 | | |
| 13. | Economics, management and testing of farm equipment | 3 | | |
| 14. | Garden equipments | 3 | | |
| 15. | Rainsed Bed Preparation Equipment | 3 | | |
| | TOTAL | 56 | - | 56 |

DETAIL CONTENTS:

1. Farm Mechanization

Definition, status of farm mechanization in India, scope, limitations, advantages.

2. Primary Tillage Equipment:

i) Definition & Functions of tillage, tillage systems, types of tillage, Tillage implements.

ii) a. Mould Board Plough: Types of mould board plough, construction. Types of share, and Mould board and their material of construction, Concept of sunction, plough size, hitching of plough, point of bearing, Draft, side draft, unit draft, factors affecting draft, forces acting on plough. (Introduction only) Horse power requirements, and related numerical problems.

b. Disc Plough: Purpose, principles, types, construction and adjustment.

c. Other Plough: Chisel, subsurface, Rotary plough.

d. Ploughing: Concept of terms related with ploughing, Methods of Ploughing.

3. Secondary Tillage equipments:

a. Harrow: Types, construction and Adjustment repair and maintenance of Animal & tractor driven harrow.

b. Land Rollers Hackers & Pulveriser: Types construction and operation.

c. Rotavator and Puddlers

4. Sowing & Planting Equipment:

a. Pregermenated paddy seeder

b. Seed Drill/Seed cum Fertilizer Drill: Functions, Types, Construction, detail, size Metering devices, Furrow openers, seed covering devices Callibration of seed drill, and related numerical problems. Field adjustment, repair and maintenance & constructional details. Zero fill ferti drill, Fill plant machine, Strip fill drill Raised bed Planting Machine

c. Planters: Function, Types, Metering devices, Method of planting. Field advertisment, repair and maintenance. Potato Planter, Suger Cane Planter, Cotton, Misc. etc. Planter.

d. Trans-Planter : Paddy transplanter ( Mannual and self propelled ), Vegitable trans-planter.

5. Interculture and Weed Control Equipment:

a. Cultivator: Types, Construction, Attachments.

b. Rotary Hoe: Construction and working.

c. Flame Weed Control: Construction and working.

6. Fertilizing Equipments:

a. Manure Spreaders: Construction and working.

b. Fertilizer Distributor: Construction and working.

7. Plant Protection Equipment:

Types, principles of working, parts and material of constrion, fuction and adjustment of sprayer and duster, selection of plant protection equipment, field adjustment, repair and maintenance , safety precaution.

8. Harvesting Equipments:

a. Mower, Windrower and Reaper Principle of cutting,

types, construction working, adjustments, trouble shooting.

b. Combined Harvestar : Types, Construction, Working, Material

c. Field Forage Harvestors: Types, working adjustment and flow path adjustment, maintenance.

d. Potato & Groundnut Digger: Construction and working.

e. Sugarcane Harvester: Construction and working.

9. Threshing Equipments:

Types of threshers: Olpad thresher, Power wheat and paddy thresher, working principle, material,flow path, adjustment, repair and maintenance, trouble shooting and precaution.

10. Processing Equipments:

Types, Construction and working of the following equipments: Chaff cutter, Sugercane crusher, Corn sheller, Potato grader and Winnower.

11. Land development Equipments:

Construction, operation/working and output of the following: Dozer, Scraper, Power shovel, Drag hoe and Drag Line, scoop, Land Laveller, Land Plane, Laser Land Plane.

12. Field Capacity & Efficiency:

Introduction, Concept about Field capacity & Efficiency.

13. Econoomics, Management and testing of farm equipments

a. Selection of farm machines and matching equipments of farm needs, break even point, Pay Back Period.

b. Calculation of cost of operation of farm-machines.

c. Field capacity & field efficiency.

d. Farm machinery testing in India. Details of catagory and field testing of few machines e.g. seed drill, thresher and plant protection equipments.

14. Garden Equipment :

Details of Garden & Halticultural equipments.

15. Rainsed Bed Preparation Equipment :

Use and utility of rainsed bed preparation equipment.

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PRACTICALS

LIST OF EXPERIMENTS:

1. Identifying mould board and disc plough and their parts, assembling & dismantling, measurement of size, sections, angles, setting adjutment.

2. Hitching, field operation, adjustment and measurement of draft, line of pull etc. of a mould board plough.

3. Hitching, field operation and adjustment, measurement of depth and width of ploughing with a disc plough.

4. Identifying harrow and cultivator and their parts, assembling and dismantling, angle setting, hitching, field operation and adjustments.

5. Identifying seed drills, seed cum fertiliser drill and planters and their parts, assembling and dismantling, setting and adjustments.

6. Calibration, field operation and adjustment of seed cum fertiliser drill.

7. Setting, field operation and adjutment of planter and transplanter.

8. Study of power sprayers and dusters different types of nozzles and calicuation.

9. Field, operation, setting alignment, registration and other adjustments of a reaper and windrover.

10. Study of chaff cutter and sugarcane crusher.

11. Repair of farm equipment : Ploughs, harrows, Seed drills and weeding tools.

12. Visit of a mechanised farm for study of combine harvestor.(Visit Only

13. Operation of power thresher and safety aspects.

14. Study, sketch and operation of one of the following land development equipment through field visit:

    Dozer, Scraper, Shovel, Drag hoe and Drag line

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## 6.6 PROJECT

| L | T | P |
|---|---|---|
| 2 | - | - |

The project should be taken in close calleboration with the employing agencies.The project shall envolve selection, analysis and solution of special problems related to farm implement,machinary and power/soil and water engineering/ agricultureal process engineering applicable to indian conditions.

The project will be assigned to individual student or to a group of students not exceeding 5 as per problem.

Project will consist of:

(a) Rural Development

(b) Demonstration of new techniques for the cultivation of crops,operation of agricultural machinary power tiller and tractors.

(c) Problem concernig to any one of the following:
To run his own workshop for repair and maintenance of agricultural implements.
Levelling and Irrigation-Drainage and soil-water conservation needs of farms.
To establish an agro based small scale rural industry.
Any other problem concernig agriculture.

At the end of the project student will submit a written report of his/ their accomplishment and face a viva voce examination individually.

Note: (1) Project periods alotted in study scheme per week shall be provided in a strech at the end of the session.

(2) Two different problems shall be framed by the head of department based on local needs and application in rural areas for technological advancement (approved by/ set by Board of Technical Education ,U P, Lucnow).

(3) Devices for iliminating pollution and control must be included in the project.

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STAFF REQUIREMENTS

THREE YEARS (SIX SEMESTER) DIPLOMA IN AGRICULTURAL ENGG.

| Sl.No. | Designation | Load/Week | No. Required |
|---|---|---|---|
| 1. | Principle | | one |
| 2. | Head of department | 12 | one |
| 3. | Lecturer in Tech. Communication | 3 | Part Time |
| 4. | Lecturer in Mathematics | 5 | Part Time |
| 5 | Lecturer in Applied Physics | 6 | Part Time |
| 6. | Lecturer in Applied Chemistry | 4 | Part Time |
| 7. | Lecturer in Computer Engg. | 4 | Part Time |
| 8. | Lecturer in Electrical Engg. | 4 | Part Time |
| 9. | Lecturer in Mechanical Engg. | 23 | one |
| 10. | Lecturer in Civil Engg. | 22 | one |
| 11. | Lecturer in Agricultural Engg. | | |
| | (a) Specialization in farm power & post harvest tech. | 21 | one |
| | (b) Specialization in soil,Irrigation and drainage Engg. | 20 | one |
| 12. | Workshop suptd. | | one |
| 13. | Workshops Instructors | | 6 |
| 14. | Supporting staff for 14 labs | | |
| 15. | Lab Asst.( one for two labs) | | 7 |
| 16. | Lab Attendents (one for two labs) | | 7 |

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## SPACE STRUCTURE

### [A] ADMINISTRATIVE BLOCK

| Sl. No. | Details of Space | Floor Area Sq. metres | Remark |
|---|---|---|---|
| 1. | Principal's Room | 30 | |
| 2. | Confidencial Room | 10 | |
| 3. | Steno's Room | 6 | |
| 4. | Office including Drawing Office | 80 | |
| 5. | Staff Room<br>(a) Head<br>(b) Lecturer 10 sq.m./ Lect. | 15 | |
| 6. | Library and Reading room | 150 | |
| 7. | Store | 100 | |
| 8. | Students Common room | 80 | |
| 9. | Model Room | 90 | |

### [B] Acedemic Block

| Si.No. | Detail of Space | No. | @ Sq.m | Floor Area Sq.m. |
|---|---|---|---|---|
| 1. | Class Room | 3 | 60 | 180 |
| 2. | Drawing Hall | 1 | 120 | 120 |
| 3. | Physics Lab | | | 75 |
| 4. | Chemistry Lab | | | 120 |
| 5. | Mechanics & S.O.M Lab | | | 120 |
| 6. | Survey Lab | | | 40 |
| 7. | Civil Lab I | | | 75 |
| 8. | Hydraulics and Irrigation Engg. Lab<br>Over Head Tank 2000 Litre Cap;<br>Under Ground Tank 600 Litre Cap; | | | 120 |
| 9. | Agrl. Science,Rural & Entp. Dev. Lab | | | 75 |
| 10. | Electrical Engg. & Rural Elect. Lab | | | 100 |
| 11. | Soil Mech. & Soil Science Lab | | | 75 |
| 12. | Form Power Engg. Lab | | | 120 |
| 13. | Post Harvest & Agro Based Ind. Lab | | | 120 |
| 14. | Soil & water Conservation Lab | | | 120 |
| 15. | Farm & Land Development Machinary Shop | | | 180 |
| 16 | Computer Lab (Air Cond.Glass Partition and Special type pvc flooring and false ceiling ) | | | 60 |

### [C] Work shop

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| | | |
|---|---|---|
| I | Workshop Supdt. Room | 20 |
| II | Store | 20 |
| III | Shops | |
| (a) | Carpentry Shop | 50 |
| (b) | Smithy Shop | 50 |
| (c) | Fitting Shop | 50 |
| (d) | Welding Shop | 50 |
| (e) | Painting Shop | 50 |
| (f) | Sheet Metal ,Soldering & Brazinf shop | 50 |
| (g) | Plumbing shop | 50 |
| (h) | Machine Shop | 150 |

[D] Student's Aminities

| | | | | |
|---|---|---|---|---|
| 1. | Hostel | 40 | % | of Strength of Students |
| 2. | Cycle Stand | 50 | % | of Strength of Students |
| 3. | Canteen and Tuck shop | 50 | | |
| 4. | N.C.C. Room | 70 | | |
| 5. | Dispensary | 40 | | |
| 6. | Guest Room(Attached Bath) | 30 | | |

[E] STAFF RESIDENCES

| | | | | |
|---|---|---|---|---|
| 1. | Principal | 1 | 100 | 100 |
| 2. | Head od Department | 1 | 100 | 100 |
| 3. | Lecturer/Workshop Supdt. | 5 | 80 | 400 |
| 4. | Non teaching & Supporting staff | 8 | 60 | 480 |
| 5. | Class IV | 5 | 30 | 150 |

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## SPACE STRUCTURE

### [A] ADMINISTRATIVE BLOCK

| Sl. No. | Details of Space | Floor Area Sq. metres | Remark |
|---|---|---|---|
| 1. | Principal's Room | 30 | |
| 2. | Confidencial Room | 10 | |
| 3. | Steno's Room | 6 | |
| 4.(a) | Office including Drawing Office | 80 | |
| (b) | Record Room | 20 | |
| 5. | Staff Room | | |
| | (a) Head 1 | 15 | |
| | (b) Lecturer 10 sq.m./ Lect. for 8 Lecturers | 80 | |
| 6. | Library and Reading room | 150 | |
| 7. | Store | 100 | |
| 8. | Students Common room | 80 | |
| 9. | Model Room | 90 | |

### [B] Acedemic Block

| Sl.No. | Detail of Space | No. | @ Sq.m | Floor Area Sq.m. |
|---|---|---|---|---|
| 1. | Class Room | 2 | 75 | 150 |
| 2. | Drawing Hall | 1 | 120 | 120 |
| 3. | Physics Lab | | | 75 |
| 4. | Chemistry Lab | | | 120 |
| 5. | Mechanics & S.O.M Lab | | | 120 |
| 6. | Survey Lab | | | 40 |
| 7. | Civil Lab I | | | 75 |
| 8. | P.H.E. Lab | | | 75 |
| 9. | Highway Engg. Lab. | | | 75 |
| | Hydraulics and Irrigation Engg. Lab Over Head Tank 2000 Litre Cap; Under Ground Tank 600 Litre Cap; | | | 120 |
| 10 | Computer Lab (Air Cond.Glass Partition and Special type pvc flooring and false ceiling ) | | | 60 |

### [C] Work shop

| | | |
|---|---|---|
| I | Workshop Supdt. Room | 12 |
| II | Store | 20 |
| III | Shops | |
| (a) | Carpentry Shop | 50 |
| (b) | Smithy Shop | 70 |
| (c) | Fitting Shop | 50 |

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| | | |
|---|---|---|
| (d) Welding Shop | | 50 |
| (e) Painting Shop | | 50 |
| (f) Sheet Metal ,Soldering & Brazing shop | | 50 |
| (g) Plumbing shop | | 50 |
| (h) Machine Shop | | 150 |
| (i) Foundry | | 75 |

[D] Student's Aminities

| | | | |
|---|---|---|---|
| 1. | Hostel | 40 % | of Strength of Students |
| 2. | Cycle Stand | 50 % | of Strength of Students |
| 3. | Canteen and Tuck shop | 50 | |
| 4. | N.C.C. Room | 70 | |
| 5. | Dispensary | 40 | |
| 6. | Guest Room(Attached Bath) incuding kitchen & store | 45 | |

[E] STAFF RESIDENCES

| | | | | |
|---|---|---|---|---|
| 1. | Principal | 1 | 100 | 100 |
| 2. | Head od Department | 1 | 100 | 100 |
| 3. | Lecturer | 4 | 80 | 320 |
| 4. | Non teaching & Supporting staff | 8 | 60 | 480 |
| 5. | Class IV | 6 | 30 | 180 |

Priorty to be given in following order

(1)
a. Administrative Building
b. Labs
c. Workshop
d. Over head Tank
e. Boundary Wall
f. Principal Residence
g. Fourth Class Quarters (2/3)
(2)
a. Hostel
b. Students Aminities
(3)
Residences of employee

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## LIST OF EQUIPMENTS

Only those of the equipments given below which are essentially required for the conduction of practicals mentioned in the curriculum are to be procured by the institutions.

"Machine/Equipments/Instruments of old BTE list which are not included below are to be retained in the Lab/Shop for Demonstration purpose but not to be demanded fresh for purchase."

NOTE : Equipment for different shop and lab of latest verson should be purchased.

### I. APPLIED PHYSICS LAB

| S.No. | Name of Equipment | No. | @ Rs. Aprox. | Amt.in Rs. Aprox. |
|---|---|---|---|---|
| 1. | Brass ball with hook dia 1.8 Cm to 2 Cm diameter | 2 | 50 | 100 |
| 2. | Stop watch least count Least Count 0.1 Sec.(non-megnetic) 0.01 sec to 0.001 sec (Electronic Desirable) | 4 | 750 | 3000 |
| 3. | Wall bracket with clamping arrangement 8" to 10" length | 2 | 50 | 100 |
| 4. | Meter scale Least count 0.1cm,wooden 1meter | 5 | 40 | 200 |
| 5. | Meter scale Least count 0.1cm,wooden 50 Cm | 5 | 40 | 200 |
| 6. | Searl's conductivity apparatus with copper & steel rods 25 cm length 4 cm.diameter with all accessaries | 2 set | 1500 | 3000 |
| 7. | Constant Level Water Flow Container of one liter capacity vertical stand & rubber tubing | 2 | 250 | 500 |
| 8. | Thermometer 0-110oC(Least count 0.1oC desirable) | 4 | 100 | 400 |
| 9. | Potentiometer - 10 wires (1 meter length of each wire) with jockey, sunmoical top | 4 | 750 | 3000 |
| 10. | Moving coil galvenometer 30-0-30 with moving mounting | 5 | 300 | 1500 |
| 11. | Rheostat 50 ohm.,100 Ohm.,150 Ohm. capacity | 16 | 300 | 4800 |
| 12. | Lead Accumulator 2V,6V (1 No.Each) | 2 | 250 | 500 |
| 13. | Meterbridge 1 meter length, sunmica top copper strips fitted with scale | 2 | 300 | 600 |
| 14. | Resistance Coil (Standard) 1 ohm. to 10 ohm. | 10 | 50 | 500 |
| 15. | Moving coil ammeter 0-1 amp., 0-2 amp., 0-5 amp. with mounting | 8 | 250 | 2000 |
| 16. | Moving coil voltmeter 0-1 V.,0-2V 0-5 V., 0-10 V. with mounting | 8 | 250 | 2000 |
| 17. | Denial cell with complete accessories | 2 | 250 | 500 |

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| S.No. | Name of Equipment | No. | @ Rs. Aprox. | Amt.in Rs. Aprox. |
|---|---|---|---|---|
| 18. | Leclaunche Cell with complete accessories | 2 | 250 | 500 |
| 19. | Standard Cadmium Cell with complete accessories | 2 | 250 | 500 |
| 20. | Battery Charger with complete accessories | 1set | 1800 | 1800 |
| 21. | Battery Eliminator Multi range | 2set | 750 | 1500 |
| 22. | Multimeter(Digital) | 1set | 800 | 800 |
| 23. | Carey Foster Bridge (With all accessories) | 2set | 4500 | 9000 |
| 24. | Resistance Box (2 No. Each) 0-1 Ohm, 0-100 Ohm. | 4 | 850 | 3400 |
| 25. | Fractional Resistance Box 0-1 Ohm. | 2 | 1200 | 2400 |
| 26. | Post office box Key type | 2 | 1200 | 2400 |
| 27. | Post office box Dial type | 2 | 1200 | 2400 |
| 28. | Resistance Wire(100 Gm.) (Constanton/Maganin) | 1 lacchi | 100 | 100 |
| 29. | Connecting Wire Copper(1/2 Kg.) (Cotton Insulated) | 1 lacchi | 700 | 700 |
| 30. | Screw gauge L.c 1/100 mm | 5set | 150 | 750 |
| 31. | Vernier Callipers L.c. 1/10 mm | 5set | 100 | 500 |
| 32. | Appratus for determining character-stics of P-N junction diode complete with all accessaries | 2 set | 1500 | 3000 |
| 33. | Resonance Column of steel One Meter length and 3-4 Cm diameter fitted with scale & water level arrangement | 2 | 1600 | 3200 |
| 34. | App. for determining coefficient of friction on a horrizontal plane (Complete with all accessories) | 2 set | 700 | 1400 |
| 35. | Tuning Fork's Sets Set of different frequency (with rubber pad) | 3set | 350 | 1050 |
| 36. | Physical balance with weight box Complete with Fractional weight | 2 | 800 | 1600 |
| 37. | Anemometer with counter cup type | 1 | 1000 | 1000 |
| 38. | Spring Force Constant Apparatus with graduated mirror & pointer, weight set with hanger | 2 | 1200 | 2400 |
| 39. | Viscosity Apparatus (Stock law) with steel balls and viscous liquid & timer | 2set | 1600 | 3200 |
| 40. | Thermometer of different range Mercury thermometer 0-50oC to 0-110oC | 10set | 100 | 1000 |
| 41. | Wall Thermometer Alcohal Filled 0-50oC | 2set | 20 | 40 |
| 42. | Sprit Level Technical Type | 1set | 60 | 60 |
| 43. | Drilling Machine Electric with different size bits | 1set | 800 | 800 |
| 44. | LPG Gas Burner with Cylinder | 1set | 800 | 800 |
| 45. | Tool Kit with different tools Complete | 1set | 800 | 800 |
| 46. | Lab stools | 30 | | |

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| S.No. | Name of Equipment | No. | @ Rs. Aprox. | Amt.in Rs. Aprox. |
|---|---|---|---|---|
| 47. | Lab tables | 8 | | |
| 48. | Plug Keys One Way | 5 | 50 | 250 |
| 49. | Plug Keys Two Way | 5 | 100 | 500 |
| 50 | Helical Springs - Soft, 10 cm each | 6 | 100 | 600 |

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## II. APPLIED CHEMISTRY LAB

| S.No. | Name of Equipment | No. | @ Rs. Aprox. | Amt.in Rs. Aprox. |
|---|---|---|---|---|
| 1. | Test tube stand (Plastic/Tafflon) | 30 | 20 | 600 |
| 2. | Funnel stand (Plastic/Tafflon) | 30 | 20 | 600 |
| 3. | Burette stand Stainless Steel/Wooden/Iron | 30 | 50 | 1500 |
| 4. | Pipette stand Stainless Steel/Wooden/Plastic | 30 | 20 | 600 |
| 5. | Chemical balances with analytical weights 1gm -200gms | 5 | 1500 | 7500 |
| 6. | Fractional weights set with rider 10 mg to 500 mg with rider | 5sets | 25 | 125 |
| 7. | Kipp's apparatus 1000 ml. Plastic/ Tafflon | 2 | 500 | 1000 |
| 8. | Reagents bottles | | | |
| | 250ml | 120 | 20 | 2400 |
| | 500ml | 25 | 25 | 625 |
| | 1000ml | 5 | 30 | 150 |
| 9. | Wide mouth bottle 250 ml Glass | 50 | 15 | 750 |
| 10. | Winchester bottle 2.5 litre Plastic/Tafflon | 15 | 30 | 450 |
| 11. | Test tubes 1/4" x 6" | | | |
| | i. Corning or Borosil | 200 | 9 | 1800 |
| | ii. Glass | 200 | 2 | 400 |
| 12. | Boiling tube 1" x 6" | | | |
| | i.Corning or Borosil | 100 | 16 | 1600 |
| | ii. Glass | 100 | 5 | 500 |
| 13. | Pestle and morter Dia 10 cms 15 cms (Ceramics) | 2 | 30 | 60 |
| 14. | Watch glass 5.0 cms,7.5 cms glass | 15 | 5 | 75 |
| 15 | Beakers (Glass/Brosil/Corning Plastic) | | | |
| | 250 ml. | 50 | 20 | 1000 |
| | 500 ml. | 50 | 20 | 1000 |
| 16. | Weighing Tube 10 ml with lid (Plastic) | 30 | 10 | 300 |
| 17. | Wash bottles (Plastic/Tafflon) | 30 | 15 | 450 |
| 18. | Conical flask 250 ml. Glass (Brosil/Corning/Plastic) Transparnt | 100 | 30 | 3000 |
| 19. | Flat bottom flask 500 ml.Glass | 15 | 40 | 600 |
| 20. | Flat bottom flask 250 ml.Glass | 15 | 25 | 375 |
| 21. | Burette 50 ml. (Plastic/Tafflon) | 30 | 60 | 1800 |
| 22. | Pipette 25 ml. (Plastic/Tafflon) | 30 | 20 | 600 |
| 23. | Measuring flask 250 ml. with stopper | 30 | 50 | 1500 |
| 24. | Measring cylinder of various sizes (100 ml,250 ml,500 ml,1000 ml) 3 no. of each | 12 | 30 | 360 |
| 25. | Bunsen's burner of brass | 30 | 50 | 1500 |
| 26. | Gas plant petrol/LPG 10 to 20 burners automatic | 1 | 5000 | 5000 |
| 27. | Spirit lamp (Brass) | 30 | 30 | 900 |
| 28. | Tripod stand (Steel/Iron) Large/Medium | 30 | 30 | 900 |
| 29. | Wire gauge 15 X 15 cm. with asbestos | 30 | 15 | 450 |
| 30. | Test tube holder wodden | 50 | 10 | 500 |

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| S.No. | Name of Equipment | No. | @ Rs. Aprox. | Amt.in Rs. Aprox. |
|---|---|---|---|---|
| 31. | Porcelain plates Ceramic | 30 | 20 | 600 |
| 32. | Funnel 15 cm. Glass Borosil Corning/Plastic | 60 | 16 | 960 |
| 33. | Spatula hard & nickel/steel | 2 each | 50 | 100 |
| 34. | Distilled water units (electrical) | 1 | 10000 | 10000 |
| 35. | Distilled water units (solar) | 1 | 5000 | 5000 |
| 36. | Open balance 1000 gms./10 mg. | 1 | 600 | 600 |
| 37. | Brush for cleaning Hydro Fiber Acid & Alkali Resistant | 100 | 10 | 1000 |
| 38. | Jars 20 Lit. for keeping destilled water | 5 | 100 | 500 |
| 39. | Lab table 2 m. x 1.2 m. x 1 m. hight with central sink and cup boards (Teak wood) with drawers and two built in almirah on each side with reagent racks, better tile top | 4 | 8000 | 32000 |
| 40. | Exhaust fans 18" (GEC make/Crompton) | 4 | 2000 | 8000 |
| 41. | Side racks and selves for bench reagents made of teak wood for 24 bottels each set | 4 | 2000 | 8000 |
| 42. | Digital balance electronic Electronics upto 2 decimal places | 1 | 10000 | 10000 |
| 43. | Hot plates 7-1/2", 3" dia controled 2000 watts | 1 | 1000 | 1000 |
| 44. | Hot air oven thermostatically controled with selves and rotary switches 350 x 350 x 25 high | 1 | 8000 | 8000 |
| 45 | pH Meter (Digital) | 1 | 1000 | 1000 |
| 46 | Glass Electrode | 2 | 850 | 1700 |
| 47. | Reference Electro | 2 | 850 | 1700 |
| 48. | Weight Box 1gm,2gmX2, 5gm,10 gm 20gmX2, 50gm, 100gm with for cep Miscellaneous | LS | | 15000 |

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III. APPLIED MECHANICS LAB

| Sl.No. | Name of Equipment | No. | Rate | Amount |
|---|---|---|---|---|
| 1. | Polygon of Forces Apparatus | 4 | 1500 | 60000 |
| 2. | Universal Force Table | 2 | 2500 | 5000 |
| 3. | Principle of Moment Appratus Bell Crank lever | 4 | 1500 | 60000 |
| 4. | Combined Inclind plane & Friction apparatus | 4 | 1500 | 60000 |
| 5. | Simple wheel and axle | 2 | 2500 | 5000 |
| 6. | Differential wheel and axle | 2 | 3500 | 7000 |
| 7. | Double sleave Pulley Block | 1 | 800 | 800 |
| 8. | Simple Screw Jack | 4 | 3000 | 12000 |
| 9. | System of pulleys (Any I,II,III) | 2Set Each | 4000 | 8000 |
| 10. | Worm & Worm wheel | 2Set Each | 5000 | 10000 |
| 11. | Simply Support Beam with different weights (2 Sets) | 2 | 3000 | 6000 |
| 12. | Jib Crane | 2 | 2500 | 5000 |
| 13. | Jointed Roof Truss Apparatus | 2 | 2500 | 5000 |
| | Misc. | Lum Sum | | 5000 |

Note :
1. S. No. 1,2 Acrylic/Wood material/Aluminium Cast
2. S.No. 3,4,5,8,9 working model of Acrylic/Aluminium/Cast
3. Above items are for 2 batches of 15 students each.

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V. WORKSHOP PRACTICE

CARPENTRY SHOP

| S.No. | Name of Equipment | No. | @ Rs. | Amt.in Rs. |
|---|---|---|---|---|
| 1. | 60 cm.rule | 10 | 50 | 500 |
| 2. | Flexible steel rule 2 metre | 2 | 75 | 150 |
| 3. | T square 23 cm. steel | 10 | 50 | 500 |
| 4. | Bevel square 23 cm. steel | 2 | 100 | 200 |
| 5. | Marking knife 25 cm. steel | 10 | 100 | 1000 |
| 6. | Marking gauge wooden & brass 25 cm. | 10 | 150 | 1500 |
| 7. | Mortise gauge wooden & brass 25 cm. | 10 | 150 | 1500 |
| 8. | Caliper inside,steel 20 cm. | 2 | 200 | 400 |
| 9. | Caliper outside , steel 20 cm. | 2 | 200 | 400 |
| 10. | Compass steel 20cm. | 2 | 100 | 200 |
| 11. | Devider steel 20 cm. | 2 | 100 | 200 |
| 12. | Plumb | 2 | 75 | 150 |
| 13. | Wooden bench vice steel 20 cm. | 10 | 500 | 5000 |
| 14. | Bench hold fast steel 30 cm. | 10 | 300 | 3000 |
| 15. | Bar clamp 2 m. | 2 | 500 | 1000 |
| 16. | G clamp of flat spring steel 20x30 cm. | 4 | 150 | 600 |
| 17. | Rip saw 40-45 cm. | 10 | 200 | 2000 |
| 18. | Cross cut saw 40-45 cm. | 2 | 200 | 400 |
| 19. | Tennon saw 30-35 cm. | 10 | 200 | 2000 |
| 20. | Dovetail saw 30-35 cm. | 2 | 150 | 300 |
| 21. | Compass saw 35 cm. | 4 | 150 | 600 |
| 22. | Key hole saw or pad saw 30-35 cm. | 2 | 150 | 300 |
| 23. | Bow saw | 2 | 200 | 400 |
| 24. | Frame saw | 2 | 200 | 400 |
| 25. | Chisel fish brand 1" to 1/8" | | | |
| | firmer | 3 set | 250 | 750 |
| | Dovetail | 3 set | 250 | 750 |
| | Mortise | 3 set | 250 | 750 |
| 26. | Gauge or Golchi 1" to 1/8" | 3 set | 300 | 900 |
| 27. | Wooden jack plane complete | 10 | 100 | 1000 |
| 28. | Wooden smoothing plane | 10 | 250 | 2500 |
| 29. | Iron jack plane complete | 10 | 200 | 2000 |
| 30. | Iron rebate plane complete | 3 | 200 | 600 |
| 31. | Iron grooving plane complete | 3 | 300 | 900 |
| 32. | Iron compass plane complete | 3 | 350 | 1050 |
| 33. | Wooden moulding plane complete | 3 | 500 | 1500 |
| 34. | Bradawl | 3 | 350 | 1050 |
| 35. | Gimlet drills set | 1 set | 300 | 300 |
| 36. | Center bit | 2 | 250 | 500 |
| 37. | Twist bit | 2 | 200 | 400 |
| 38. | Auger bit | 2 | 200 | 400 |
| 39. | Dovetail bit | 2 | 200 | 400 |
| 40. | Counter shank bit | 2 | 200 | 400 |
| 41. | Ratchet brace machine | 2 | 300 | 600 |
| 42. | Grand drill machine 1/4" | 2 | 600 | 1200 |
| 43. | Wooden hand drill burmi | 5 | 700 | 3500 |
| 44. | Wooden mallet | 10 | 100 | 1000 |
| 45. | Claw hammer | 3 | 100 | 300 |
| 46. | Carpenters hammer | 10 | 100 | 1000 |
| 47. | Cutting tool for Universal wood working machine | 3 set | 1500 | 4500 |
| 48. | Screw driver 18" & 15" | 6 | 100 | 600 |

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| S.No. | Name of Equipment | No. | @ Rs. | Amt.in Rs. |
|---|---|---|---|---|
| 49. | Adze 500 gm. | 10 | 100 | 1000 |
| 50. | Pincer 175 mm. | 6 | 250 | 1500 |
| 51. | Plier 150 mm. | 4 | 200 | 800 |
| 52. | Oil stone 8" | 4 | 180 | 720 |
| 53. | Rasp file 12" | 4 | 200 | 800 |
| 54. | Half round file 12" | 4 | 200 | 800 |
| 55. | Round file 12" | 4 | 200 | 800 |
| 56. | Triangular file 5", 4" | 8 | 200 | 1600 |
| 57. | Water stone | 4 | 80 | 320 |
| 58. | Carpentry work benches | 4 | 4000 | 16000 |
| 59. | Band saw machine complete | 1 | 60000 | 60000 |
| 60. | Circular saw machine | 1 | 35000 | 35000 |
| 61. | Double Ended Electric Bench grinder | 1 | 15000 | 15000 |
| 62. | Universal wood working machine | 1 | 30000 | 30000 |
| | misc. for foundation of machines | LS | | 20000 |
| | SMITHY SHOP | | | |
| 1. | Anvil 150 Kg. with stand | 5 | 5500 | 25500 |
| 2. | Swage block 50x30x8cm.&45x45x10cm. | 2 | 3000 | 6000 |
| 3. | Hammers | | | |
| | Ball peen 0.8 Kg. (Approx.) | 10 | 350 | 3500 |
| | Cross peen 0.8 Kg. (Approx.) | 10 | 350 | 3500 |
| 4. | Beak iron 25 Kg. | 1 | 1000 | 1000 |
| 5. | Swages different types | 6 | 100 | 600 |
| 6. | Fullers different types | 6 | 100 | 600 |
| 7. | Leg vice 15 cms. opening | 1 | 300 | 300 |
| 8. | Electric blower with motor | 1 | 10000 | 10000 |
| 9. | Furnace chmney with exhaust pipe | 5 | 10000 | 50000 |
| 10. | Sledge hammer - 5 Kg. | 2 | 400 | 800 |
| | Misc. tools | | LS | 5000 |
| | SHEET METAL, SOLDERING & BRAZING | | | |
| 1. | Dividers - 15cm. | 5 | 100 | 500 |
| 2. | Trammel 1 m. | 1 | 80 | 80 |
| 3. | Angle protector | 5 | 100 | 500 |
| 4. | Try square 30 cm. | 5 | 80 | 400 |
| 5. | Centre punch | 5 | 50 | 250 |
| 6. | Steel rule 30 cm. , 60 cm., | 5 | 25 | 125 |
| 7. | Sheet metal gauge | 1 | 250 | 250 |
| 8. | Straight snips 30 cm. | 2 | 500 | 1000 |
| 9. | Curved snips 30 cm. | 2 | 600 | 1200 |
| 10. | Bench shear cutter 40 cm. | 1 | 10000 | 10000 |
| 11. | Chisel 10 cm. | 5 | 200 | 1000 |
| 12. | Hammer | 5 | 300 | 1500 |
| 13. | Bench vice 13 cm. | 5 | 2000 | 10000 |
| 14. | Plier | 5 | 100 | 500 |
| 15. | Nose plier | 5 | 120 | 600 |
| 16. | Sheet metal anvil/stakes | 5 | 3500 | 17500 |
| 17. | Shearing machine 120 cm. | 1 | 5000 | 5000 |
| 18. | Solder electric | 2 | 1000 | 2000 |
| 19. | Solder furnace type | 2 | 500 | 1000 |
| 20. | Brazing equipments and accessories | 1 | 10000 | 10000 |
| 21. | Blow lamp | 2 | 400 | 800 |
| 22. | Sheet bending machine | 1 | 20000 | 20000 |
| | Misc. | | LS | 10000 |

FITTING SHOP

| S.No. | Name of Equipment | No. | @ Rs. | Amt.in Rs. |
|---|---|---|---|---|
| 1. | Bench vice jaw 10 cm. | 10 | 600 | 6000 |
| 2. | Surface plate 45x45 cm. | 2 | 4500 | 9000 |
| 3. | V. Block 10x7x4 cm. | 5 | 700 | 3500 |
| 4. | Try square | 10 | 100 | 1000 |
| 5. | Bevel protractor 30 cm. | 1 | 250 | 250 |
| 6. | Combination set | 1 | 3000 | 3000 |
| 7. | Divider | 5 | 100 | 500 |
| 8. | Centre punch | 5 | 80 | 400 |
| 9. | Calipers (Different sizes) | 12 | 100 | 1200 |
| 10. | Vernier calipers 30 cm. | 2 | 1500 | 3000 |
| 11. | Micrometer 0-25, 25-50 m.m. | 4 | 1500 | 6000 |
| 12. | Vernier depth gauge | 1 | 700 | 700 |
| 13. | Feeler gauge--15 blades | 1 | 100 | 100 |
| 14. | Radius gauge | 1 | 200 | 200 |
| 15. | Angle gauge | 1 | 200 | 200 |
| 16. | Thread gauge | 1 | 200 | 200 |
| 17. | Bench drilling machine 13 mm. | 1 | 10000 | 10000 |
| 18. | Double ended electric grinder | 1 | 8000 | 8000 |
| 19. | Drill set | 1set | 2000 | 2000 |
| 20. | Reamer set | 1set | 3500 | 3500 |
| 21. | Tap set | 1set | 3500 | 3500 |
| 22. | Adjustable wrenches (15 cm.,20cm. 30 cm.) | 1set | 1200 | 1200 |
| 23. | Allen key set | 1set | 700 | 700 |
| 24. | Spanners | 6 | 100 | 600 |
| 25. | Work benches | 6 | 4500 | 27500 |
| 26. | Power hacksaw | 1 | 8000 | 8000 |
| | Misc. Files, Dieset, Hexa frames etc. | | LS | 20000 |

WELDING SHOP

| | | | | |
|---|---|---|---|---|
| 1. | Ellectric welding set oil cooled | 1 | 20000 | 20000 |
| 2. | Industrial regulator type oil cooled arc welder | 1 | 25000 | 25000 |
| 3. | Air cooled spot welder 7.5 KVA | 1 | 30000 | 30000 |
| 4. | General accssories for air cooled spot welder of 7.5 KVA | | | 15000 |
| 5. | Gas welding set with gas cutting torch and complete with all accessories | 1 | 30000 | 30000 |
| 6. | Misc. work benches | | LS | 35000 |

PAINTING & POLISHING SHOP

| | | | | |
|---|---|---|---|---|
| 1. | Air compressor complete with 2 HP motor | 1set | 25000 | 25000 |
| 2. | Spray gun with hose pipe | 1 | 1500 | 1500 |
| 3. | Stoving oven | 1 | 6000 | 6000 |
| 4. | Buffing machine with leather and cotton wheels | 1 | 8000 | 8000 |
| 5. | Electroplating Equipment for cromium Nikle plating. | 1 | 20000 | 20000 |
| | Misc. | | LS | 5000 |

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## PLUMBING SHOP

| S.No. | Name of Equipment | No. | @ Rs. | Amt.in Rs. |
|---|---|---|---|---|
| 1. | Pipe vice 5 cm. | 4 | 500 | 2000 |
| 2. | Chain wrenches | 5 | 500 | 2500 |
| 3. | Ring spanner Set | 5 | 250 | 1250 |
| 4. | Wheel pipe cutter | 2 | 600 | 1200 |
| 5. | Water pump plier | 4 | 100 | 400 |
| 6. | Pipe die set 2" set | 2 set | 1200 | 2400 |
| 7. | Pipe bending device | 1 | 5000 | 5000 |
| 8. | Work benches | 4 | 6500 | 26000 |
| 9. | Set of various types of plumbing fittings e.g. Bib cock Cistern, Stop cock, Wheel volve, Gat volve etc. | LS | | 4000 |
| 10. | Misc. Hacksaw frame and others | LS | | 4000 |

## FOUNDRY SHOP

| | | | | |
|---|---|---|---|---|
| 1. | Moulding boxes | 25 | | 12000 |
| 2. | Laddles | 5 | | 2000 |
| 3. | Tool kits | 10 sets | | 5000 |
| 4. | Quenching tanks water or oil | 2 | | 2000 |
| 5. | Permiability tester | 1 | | 2000 |
| 6. | Mould hardness tester | 1 | | 12000 |
| 7. | Sand tensile testing equipment | 1 | | 15000 |
| 8. | Portable grinders | 1 | | 6000 |
| 9. | Temperature recorders/controllers | LS | | 10000 |
| 10. | Pit furnace with Blower | 1 | | 10000 |

## MACHINE SHOP

| | | | | |
|---|---|---|---|---|
| 1. | Lathe machine 4.5 feet "V" bed. Height of centres 8.5 inch. Dog chuck 8 inch complete 1 H.P. motor 440v, push button starter with coolent pump,tray and with standard accessories. | 4 | | 50000 |
| 2. | Shaper machine 12 inch stroke with 2 H.P. motor 440 volts push button starter with vice 6 inch (Swivel base) | 2 | 20000 | 200000 |

NOTE:-

1. The institutes running mechanical engg. course need not purchase these two items sepreately because they will have one complete machine shop for the course
2. Above items are for 2 batches of 15 students each.

Additional Equipments For Second Year Mechanical Engg. Only)

| | | | | |
|---|---|---|---|---|
| 1. | Crucibles (10-20 Kg.) | 1 | 5000 | 5000 |
| 2. | Core Boxes | 1 Set | 8000 | 8000 |
| 3. | Plate form Weighing M/C (100 Kg. Capacity) | 1 | 15000 | 15000 |
| 4. | Drying Oven | 1 | 30000 | 30000 |
| 5. | Sand Sieves | 1 Set | 1000 | 1000 |
| 6. | Optical Pyrometer | 1 | 10000 | 10000 |
| 7. | Electrical Discharge M/C(EDM) | 1 | 50000 | 50000 |
| 8. | Misc. | LS | | 5000 |

Note:

1. Above items are for 2 batches of 15 students each.

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## FARM STRUCTURES MATERIALS AND CONSTRUCTION LAB

| Sl.No. | Equipment with brief specification | No. | Rate | Amount |
|---|---|---|---|---|
| 1. | Kit of stone specimens containing at least 10 types of commonly used stones | 1 | 1000 | 1000 |
| 2. | Kit of specimens of timber containing at least 10 types of commonly used timbers | 2 | 1000 | 2000 |
| 3. | Vicat needle apparatus with all accessories | 2set | 1000 | 2000 |
| 4. | Apparatus for determining Specific gravity of cement | 1set | 2600 | 2600 |
| 5. | Air Permeability Apparatus Blains type for finness of cement | 1set | 1600 | 1600 |
| 6. | Compression Testing Machine 200 Tonnes Capacity with pumping unit Ellectically and manually operated | 1set | 70000 | 70000 |
| 7. | Model of bricks made of timber (8cm*4cm*4cm) containing queen closer,King closer, half and 3/4 brick bats set of 1000 bricks packed in a wooden box | 2set | 3000 | 3000 |
| 8. | Electric Oven with thermostat arrangement | 1 | 5000 | 5000 |
| 9. | Single Pan Balance 10 Kg capacity with set of weight .1kg to 10 Kg & weight box for fractional weights, | 1set | 2000 | 2000 |
| 10. | Picnometer 900ml capcity | 2 | 250 | 500 |
| 11. | Slump Cone Apparatus complete with all accessories and base plate | 2set | 1000 | 2000 |
| 12. | Bar bending table with all accessories | 1set | 1000 | 1000 |
| 13. | Steel tape 30 meter | 5 | 200 | 1000 |
| 14. | Mettalic tape 30m,20m,and 10m 2 nos of each size | 6 | 100 | 600 |
| 15. | Misc. for scales, jars,weights beakers, measuring cylinders, enamel plates, sample containers etc. | Lum sum | | 5000 |

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## AGRICULTURAL SCIENCE LAB

| | | | | |
|---|---|---|---|---|
| 1. | Specimen of crop and vegitable seed placed in a wooden box and properly levelled. (10 types of each) | 2 sets | 500 | 1000 |
| 2. | Specimen of different types of fertilizers kept in a wooden box and properly levelled. (10 types) | 2 sets | 500 | 1000 |
| 3. | Specimens bof various types of Insecticides, fungycides and weedicides kept in a wooden box properly levelled .( 4 types of each) | 2 sets | 500 | 1000 |
| 4. | Seed Treatment Machine with all acessories. | 1 no. | 10000 | 10000 |
| 5. | Plastic Containers(Tranparent) | | | |
| | 250 ml. | 50 | 5 | 250 |
| | 500 ml. | 30 | 10 | 300 |
| | 1000 ml. | 20 | 15 | 300 |
| 6. | Packer | 1 | 1500 | 1500 |
| 7. | Roller wooden | 1 | 1000 | 1000 |
| 8. | Hoe (Different types) | Two sets | 500 | 1000 |
| 9. | Patela wooden | 2 | 500 | 1000 |
| 10. | Prunning Knife | 10 | 150 | 1500 |
| 11. | Secateurs | 10 | 200 | 2000 |
| 12. | Budding & grafting knife | 10 | 200 | 2000 |
| 13. | Footapenated ayor and duster hand operasted | 1 each | 2500 | 25000 |
| 14. | Mislaneous (Kudal, Khurpi,spade, garden scissors,hazara and gamla, patri dishes, pvc pipe etc) | | LumSum | 10000 |

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M.O.S. & HYDRAULICS LAB

| | | | | |
|---|---|---|---|---|
| 1. | Universal Testing Machine of 40 T Capacity with changeble load scale to 4t,20t & 40 T. | 1 | 400000 | 400000 |
| 2. | Simply supported beam apparatus for determination of shear force | 1 | 1000 | 1000 |
| 3. | Simply supported beam apparatus for determing bending moment | 1 | 1000 | 1000 |
| 4. | Steal beam apparatus to determine E by method of deflection for different loading condition | 1set | 1000 | 1000 |
| 5. | Brinel Rockwell Hardness Tester with all accessories complete | 1set | 15000 | 15000 |
| 6. | Tortion Testing Apparatus complete with all accessories | 1 | 2000 | 2000 |
| 7. | Bernaulli's Theorem Apparatus with ball accessories and collecting tank | 1set | 4500 | 4500 |
| 8. | Venturimeter Apparatus with all accessories, pipefittings and storage tank | 1set | 12000 | 12000 |
| 9. | Apparatus for determining coef. of velocity, Coef. of contraction and coef. of discharge of an orfice | 1set | 12000 | 12000 |
| 10. | Reynold's apparatus for determining critical velocity and Reynold's number. | 1set | 8000 | 8000 |
| 11 | Apparatus for determining Darcy's Coef. of friction in pipes. | 1set | 8000 | 8000 |
| 12 | Apparatus for determining losses due to sudden enlargement and sudden contraction. | 1set | 8000 | 8000 |
| 13. | Current meter | 1 | 5000 | 5000 |
| 14, | Notch Apparatus with discharge tank, set of notches and other supporting structure | 1set | 9000 | 9000 |
| 15. | Sectional model of the following: | | | |
| | i. Reciprocating pump | 1 | 2000 | 2000 |
| | 11. Centrifugal pump | 1 | 2000 | 2000 |
| | iii. Impulse Turbine | 1 | 2000 | 2000 |
| | iv. Reaction Turbine | 1 | 2000 | 2000 |
| 16. | Misc. equipments, pipe fitting, storage tank & overhead tank for hydraulcs lab and misc. tool and other acessories | L.S. | | 15000 |

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## SURVEY LAB.

| | | | | |
|---|---|---|---|---|
| 1. | Vernier Theodolite | 2 | 10000 | 20000 |
| 2. | Dumpy Level | 4 | 1500 | 6000 |
| 3. | I.O.P. Level | 4 | 2000 | 8000 |
| 4. | , Surveyer's Compass | 2 | 600 | 1200 |
| 5. | Box Sextant | 1 | 1200 | 1200 |
| 6, | Abney's Level | 10 | 200 | 2000 |
| 7. | Clinometer | 2 | 600 | 1200 |
| 8. | Optical Square | 2 | 200 | 400 |
| 9. | Folding Staff | 2 | 900 | 1800 |
| 10. | Telescopic Staff | 10 | 1000 | 10000 |
| 11. | Plane Table with all accessories | 4 | 1200 | 4800 |
| 12, | Meteric Chain 20m & 30m | 10 | 240 | 2400 |
| 13. | Steel Tap 30m | 2 | 150 | 300 |
| 14 | Mettalic Tap 20m | 10 | 100 | 1000 |
| 15. | Steel Band | 1 | 500 | 500 |
| 16. | Cross Staff | 2 | 50 | 100 |
| 17. | Penta Graph | 2 | 1000 | 2000 |
| 18. | Planimeter | 1 | 750 | 750 |
| 19. | Telescopic Alidade | 1 | 1500 | 1500 |
| 20. | Ranging Rod steel conduit 2m | 50 | 60 | 3000 |
| 21 | line Ranger | 1 | 250 | 250 |
| 22. | Prismatic Compass | 5 | 500 | 2500 |
| 23 | Quick set Level | 1 | 2500 | 2500 |
| 24. | Cylone Ghat Tracer | 1 | 800 | 800 |
| 25. | Boning rod set | 1 set | 400 | 400 |
| 26. | Invar Tap | 1 | 750 | 750 |
| 27. | Engineers , Revenue and Gunter's Chain one each | 3 | 150 | 450 |
| 28. | Scientific Calculator | 2 | 750 | 1500 |
| 29. | Misc. | L.S. | | 10000 |

## SOIL MECHENICS AND SOIL SCIENCES LAB

| | | | | |
|---|---|---|---|---|
| 1. | Direct Shear Box Apparatus Complete with all accessories | 1 | 10000 | 10000 |
| 2. | Permometer (Constant and Variable head) | 1set | 8000 | 8000 |
| 3. | Standard Procter Compaction Test Apparatus with all accessories | 1set | 1000, | 1000 |
| 4. | Split Spoon Sampler | 1 | 800 | 800 |
| 5. | Thin Walled Sampler | 1 | 500 | 500 |
| 6. | Hydrometer with 1000ml. jar | 1 set | 100 | 100 |
| 7. | Liquid Limit Apparatus With revolution counter and other accessories complete | 2 set | 500 | 1000 |
| 8. | Set of BIS standard Sieve | 1 set | 4000 | 4000 |
| 9. | Sieve Shaker Electrically operated | 1 | 4000 | 4000 |
| 10. | Oven electrically operated medium | 1 | 5000 | 5000 |
| 11. | Sample Extracter | 1 | 500 | 500 |
| 12. | Core Cutter apparatus for determining field density of soil | 1 set | 2000 | 2000 |
| 13. | Sand Replacement Apparatus for determining field density of soil | 1 set | 2500 | 2500 |
| 14. | Triple Beam Balance 3 Kg. Cap.& .1 Kg Accuracy | 1 | 800, | 800 |
| | 1 Kg, Cap, & 0.1 Kg Accuracy | 2 | 500 | 1000 |
| 15. | Single Pan Balance 5Kg Cap. | 1 | 750 | 750 |
| | 1 Kg. Cap | 1 | 600 | 600 |
| 16. | Physical Balance with weight box. | 1 | 1000 | 1000 |
| 17. | Dial Gauge .01 least count | 1 | 1000 | 1000 |
| 18. | Plateform Weighing Machine 100 Kg. | 1 | 6000 | 6000 |
| 19. | Capillary Test Apparatus | 1 | 500 | 500 |
| 20. | pH meter | 1 | 5000 | 5000 |

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| | | | | |
|---|---|---|---|---|
| 21 | Tenso meter | 1 | 2000 | 2000 |
| 22. | Post hole and helical auger hand operated three sets of each | 6sets | 1000 | 6000 |
| 23 | Alluminum Sample Container with lid | 20 | 5 | 100 |
| 24, | Misc. for minor equipment , tools glass ware, heating and storing vessels etc. | L.S. | | 10000 |

ELECTRICAL ENGINEERING AND RURAL ELECTRIFICATION LAB

| | | | | |
|---|---|---|---|---|
| 1. | Three point starter | 8 | 3000 | 24000 |
| 2. | Ammeter A.C. and D.C. 4no each | 8 | 600 | 4800 |
| 3. | Voltmeter A.C. and D.C. 4 no. each | 8 | 600 | 4800 |
| 4. | Single phase transformer | 2 | 3000 | 6000 |
| 5. | Rheostat of different values | 10 | 200 | 2000 |
| 6. | Wattmeter | 5 | 500 | 2500 |
| 7. | Energy meter | 5 | 600 | 3000 |
| 8. | Earth Tester | 1 | 4000 | 4000 |
| 9. | Power Factor meter | 1 | 6000 | 6000 |
| 10. | Star Delta Starter | 4 | 2000 | 8000 |
| 11. | Speedometer | 1 | 4000 | 4000 |
| 12. | Moter A.C. 5 HP | 2 | 5000 | 10000 |
| 13. | Moter D.C. 5 HP | 2 | 5000 | 10000 |
| 14. | Alternator | 1 | 10000 | 10000 |
| 15. | Connecting wires and accessories | L.S. | | 5000 |
| 16. | Cables and cable fittings | L.S. | | 10000 |
| 17. | Wooden Board and switches etc. | L.S. | | 5000 |
| | Miscellaneous | L.S. | | 10000 |

RURAL AND ENTREPRENEURSHIP DEVELOPMENT LAB

| | | | | |
|---|---|---|---|---|
| 1. | Colour T.V. | 1 | 20000 | 20000 |
| 2. | C.D. Player | 1 | 5000 | 5000 |
| 3. | Portable Generater Set | 1 | 25000 | 25000 |
| 4. | Camp furniture | L.S. | | 20000 |
| 5. | Dari and bed sheets etc. | 10 set | L.S. | 5000 |
| 6. | Ring Toss Game Kit | 1set | 500 | 500 |
| 7. | Tower Building Game Kit | 1set | 400 | 400 |
| 8. | Boat making Papers | 10set | 300 | 300 |
| 9. | Broken Squqres | 1set | 250 | 250 |
| 10. | Trainer's Manual | 1set | 250 | 250 |
| 11. | Tent | | 8000 | 8000 |
| | Misc. Lum Sum | | | 5000 |

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## FARM POWER ENGINEERING WORKSHOP

| | | | |
|---|---|---|---|
| 1. | Tractor with full accessories 35 BHP | 1 | 3,50,000 |
| 2. | Solar Pump | 1 | 10,000 |
| 3. | Motercycle complete engine(second hand) | 1 | 8,000 |
| 4. | Various Types of Carburator | 1set | 8,000 |
| 5. | Diesel Pump Set complete (Slow speed) | 1 | 10,000 |
| | (High speed) | 1 | 10,000 |
| 6. | High Tention Battery | 1 | 5,500 |
| 7. | Spark Plug Tester | 1 | 4,500 |
| 8. | Old Diesel Vehicle Complete (need not in working order) | 1 | 40,000 |
| 9. | Power Tiller with full attachments | 1 | 2,00,000 |
| 10. | Tractor Trailer Cap. 3 Tonnes | 1 | 35,000 |
| 11. | Air Compresor with pipe hose & 3 HP Motor with Car washer jet & Tele hoist | 1. | 80,000 |
| 12. | High Pressure Water Pump for servicing of vehicle . | 1 | 8,000 |
| 13. | Gobar Gas Plant and Installation expences (Model) | 1 set | 4,000 |
| 14. | Solar Collector flat plate | 1 | 5,000 |
| 15. | Solar Cooker,Solar crop drier & solar water heater | L.S. | 75,000 |
| 16. | Cut section and working Models of form power equipments | L.S. | 20,000 |
| 17. | Misc. for meters, scales, storage and other common assorted materials | L.S. | 10,000 |

## POST HARVEST TECHNOLOGY AND AGRO BASED INDUSTY LAB

| | | | | |
|---|---|---|---|---|
| 1. | Air Screen Cleaner Farm Model two sieve with motor complete. | 1 | 10000 | 10000 |
| 2. | Elevator (Conveyer belt type) | 1 | 25000 | 25000 |
| 3. | Heated Air Drier | 1 | 50000 | 50000 |
| 4. | Screw conveyer with motor | 1 | 20000 | 20000 |
| 5. | Bucket elevator with motor | 1 | 20000 | 20000 |
| 6. | Slurry seed treator with motor | 1 | 15000 | 15000 |
| 7. | Dal Mill (mini unit) rubber role type for demonstration | 1 | 20000 | 20000 |
| 8. | Rice Mill (Mini unit) with 5 HP motor complete | 1 | 60000 | 60000 |
| 9. | Model of cold storage (Mini Plant) | 1 | 25000 | 25000 |
| 10. | Various types of grain bins | 1set | 8000 | 8000 |
| 11. | Oil expeller 1/2 Qnt/hour capacity | 1 | 30000 | 30000 |
| 12. | Ground nut decorticator | 1 | 3000 | 3000 |
| 13. | Potato grader power operated | 1 | 25000 | 25000 |
| 14. | Corn sheller hand operated | 1 | 800 | 800 |
| 15. | Winower | | | |
| | i. Hand operated | 1 | 1000 | 1000 |
| 16. | Juice Extractor | | | |
| | i. Hand operated | 2 | 500 | 1000 |
| | ii. Power operated | 1 | 5000 | 5000 |
| 18. | Gas Oven Complete | 2 Set | 2500 | 2500 |
| 19. | Misc. (Fruit preservation equipment and other minor tools etc.) | | L.S. | 20000 |

## IRRIGATION LAB (IRRIGATION,DRAINAGE AND TUBEWELL ENGG.)

| | | | | |
|---|---|---|---|---|
| 1. | Open drain, close conduit,collecting tank and stop watch | 1set | 6000 | 6000 |
| 2. | Infiltrometer | 2 | 3000 | 6000 |
| 3. | Hook gauge and scale | 2 | 2500 | 5000 |

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| | | | | | |
|---|---|---|---|---|---|
| 4. | Evaporation Tank | | 1 | 1000 | 1000 |
| 5. | Lysimeter | | 2 | 5000 | 10000 |
| 6. | Auger(Helical Type) | | 1 | 500 | 500 |
| 7. | Balances | | 2 | 600 | 1200 |
| 8. | Oven elecrically operated | | 1 | 5000 | 5000 |
| 9. | Sprinkler irrigation complete set with elect. pump,pipe, fittings etc. | | 1set | 30000 | 30000 |
| 10. | Model of surface drainage system | | 1 | 6000 | 6000 |
| 11. | Model of subsurface drainage systm. | | 1 | 10000 | 10000 |
| 12. | Turbine Pump | | 1 | 7000 | 7000 |
| 13. | Lift pump single acting | | 1 | 2000 | 2000 |
| 14. | Lift pump double acting | | 1 | 3000 | 3000 |
| 15. | Infra red moisture meter | | 1 | 10000 | 10000 |
| 16. | Pan Balance | | 2 | 1000 | 2000 |
| 17. | Soil sampler and samle container | | 4 | set 500 | 2000 |
| 18. | Sinle pan electronic balance | | 1 | 10000 | 10000 |
| | Misc. | | | L.S. | 5000 |

FARM AND LAND DEVELOPMENT MACHINARY LAB

| | | | | | |
|---|---|---|---|---|---|
| 1. | Mould board plough | | | | |
| | | Bullock driven | 4 | 1500 | 6000 |
| | | Power driven Two bottom | 1 | 10000 | 10000 |
| 2. | Disc Plough (2 disc) | | 1 | 10000 | 10000 |
| 3. | Disc horrow i.power driven(12disc) | | 1 | 12000 | 12000 |
| | | ii. Animal drawn | 1 | 2000 | 2000 |
| 4. | Cultivator | animal drawn | 1 | 1000 | 1000 |
| | | Power driven | 1 | 5000 | 5000 |
| 5. | Ridger( 2 ferrow ) | | 1 | 3000 | 3000 |
| 6. | Rotavator | | 1 | 70000 | 70000 |
| 7. | Puddlor | Animal drawn | 1 | 1500 | 1500 |
| | | Power driven | 1 | 7000 | 7000 |
| 8. | Planter | Animal drawn | 1 | 3000 | 3000 |
| | | Patoto Planter | 1 | 20000 | 20000 |
| 9. | Seed drill (Complete) | Animal drawn | 1 | 5000 | 5000 |
| 10. | Transplanter (manual operated) | | 1 | 3000 | 3000 |
| 11. | Suger cane planter (Tractir Drawn) | | 1 | 550000 | 550000 |
| 12. | Manure spreader | | 1 | 25000 | 25000 |
| 13. | Fertilizer Bread Caster (Mannual) | | 1 | 3000 | 3000 |
| 14. | Sprayer cum duster | Hand operated | 1 | 2500 | 2500 |
| 15. | L.P.G. Flame Weeder | | 1 | 8000 | 8000 |
| 15. | Reaper | Power driven | 1 | 30000 | 30000 |
| 17. | Power threasher 10.0 HP | | 1 | 20000 | 20000 |
| 18. | Paddy Threasher 5 HP Axil Flew Type | | 1 | 50000 | 50000 |
| 19. | Paddy Threasher 10 HP (hand driven) | | 1 | 2500 | 2500 |
| 20. | Ground Nut Digger Chourr | | 1 | 8000 | 8000 |
| 21. | Potato digger (power driven) | | 1 | 20000 | 20000 |
| 22. | Knap Sack Spryer Brass | | 1 | 1500 | 1500 |
| | | Plastic | 1 | 1000 | 1000 |
| 23. | Foot Sprayer | | 1 | 2000 | 2000 |
| 24. | Leveller 2m (Power Driven) | | 1 | 5000 | 5000 |
| 25. | Rotary Grass Cutter/Shrub masser | | 1 | 10000 | 10000 |
| | Misc. | | | Lum Sum | 50000 |

SOIL,WATER CONSERVATION AND LAND RECLAIMATION ENGG. LAB

| | | | | | |
|---|---|---|---|---|---|
| 1. | Rain Gauges | | | | |
| | i. Somens Rain Gauge | | 1 | 2500 | 2500 |
| | ii. Self recording rain gauges | | | | |
| | | (a) Float Type | 1 | 10000 | 10000 |
| 2. | Working Model of: | | | | |

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| | | | |
|---|---|---|---|
| (a) Drop Spill Way | 1 | 2000 | 2000 |
| (b) Drop Inlet Spill Way | 1 | 2500 | 2500 |
| (c) Chute Spill way | 1 | 3500 | 3500 |
| 3. Bund Farmer Disc Type | 1 | 3500 | 3500 |
| 4. Pentagraph | 1 | 2500 | 2500 |
| 5. Water Stage Recorder | 1 | 5000 | 5000 |
| Misc. | | Lum Sum | 30000 |

| | | | |
|---|---|---|---|
| 1. Zero Fill Ferts Seed Drill | 1 | 15000 | 15000 |
| 2. Till Plant Machine | 1 | 60000 | 60000 |
| 3. Raised bed Planter | 1 | 30000 | 30000 |
| 4. Cage Wheel (1 Set) | 1 | 3000 | 3000 |
| 5. Disc Type Band Former | 1 | 3500 | 3500 |

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INTRODUCTION TO COMPUTER (Common to all Trades)

COMPUTER CENTRE

| S.No. | DESCRIPTION | QTY. | APPROX. COST (in Rs.) |
|---|---|---|---|
| 1. | Core-2 Quad Processor, 4GB RAM<br>1 GB SATA HDD, 19" TFT Monitor/<br>Server of Latest Specification<br>OS-Windows 2007/2008/Latest Version | 02 Server | 1,20,000=00 |
| 2. | General Desktop Computer-Intel i5 or Higher(with latest Specification<br>Pre loaded latest Anti Virus<br>with Life time Subscription,<br>Licence Media and Manual with<br>UPS 660 VA with latest window OS<br>Including licence<br>OR<br>Computer of latest Specification<br>With latest window os including licence | 60 node | 36,00,000=00 |
| 3. | Software :((Latest Version) | | |
| | i. MS OFFICE 2010/Latest Version | LS | LS |
| | ii COMPILER 'C', C++, JAVA-7 | LS | LS |
| 4. | Hardware | 4,50,000.00 LS | |
| | i. Switch-32 Port | 02 | |
| | ii. Router | 02 | |
| | iii. Hub | 04(8 Port) | |
| | iv. Ext. Modem | 02 | |
| | v. Wireless N/W Adaptor | 02 | |
| | vi. Series Access Point | 02 | |
| | vii.LAN Cable Meter | 05 | |
| | viii. LAN Cable Analyzer | 05 | |
| | ix. Crimping Tool<br>and all other accessories related to<br>Networking | 15 | |
| 5. | Scanner- Flat Bed A4/Auto Lighter<br>(Bit depth 48) | 02 | 20,000 |
| 6. | 132 Column 600 CPS or faster<br>9 Pin dot matrix printer with<br>500 million character head life | 02 | 50,000 |
| 7. | Laser Jet-A4 All In one 20 page<br>per min (2 Each) | 04 | 50,000 |
| 8. | Desk Jet-A4 Photo Smart (2 Each) | 04 | 40,000 |
| 9. | 5 KVA on line UPS with minimum<br>30 minute battery backup along<br>with sealed maintenance free<br>batteries. Provision for connecting<br>external batteries with network<br>connectivity.(For 2 Labs) | 04 | 8,00000 |

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| | | | | |
|---|---|---|---|---|
| 10. | Split Air Conditioner 1.5 tones capacity with ISI mark along with electronic voltage stabilizer with over voltage and time delay circuit | 08 | 35,0000 |
| 11. | Room preparation and furniture | LS | |
| 12. | 19" rack, 24-port switch. connector RJ-45 Cat-6 cabling for network | LS | 10,0000 |
| 13. | 2 KVA Inverter Cum UPS | 02 | 6,0000 |
| 14. | Fire Extinguisher (2 Kg.) | 04 | 15000 |
| 15. | Fire Extinguisher (5 Kg.) | 04 | 25000 |
| 16. | Vacuum Cleaner | 02 | 25000 |
| 17. | LCD Projector 3000 Lumen with all Accessories | 02 | 350000 |
| 18. | Pen Drive 16 GB | 10 | 10000 |
| 19. | DVD Writer External | 02 | 10000 |
| 20. | HDD External 500 GB | 02 | 15000 |
| 21. | PAD (Latest Configuration) | 02 | 15000 |
| 22. | Broadband For Internet(Speed Min. 8mbps) | 04 | LS |
| 23. | USB Modem | 02 | 8000 |
| 24. | Generator 15 KVA Water Coolant | 01 | 450000 |

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LEARNING RESOURCE MATERIALS

| | | | | |
|---|---|---|---|---|
| 1. | LCD Projector with Screen | 1 | -- | 20000 |
| 2. | Handicam | 1 | -- | 30000 |
| 3. | Cutting, Binding & Stitching equipment. | 1 | -- | 30000 |
| 4. | Desk Top Computer with Internet Core i5/i7- 760, Processor, Genuine Windiw 7, Professional 18 inch HD, Flat Panel Monitor Optical Mouse, Key Board & all related media or latest version | 1 | -- | 40000 |
| 5. | Home Theater Support Disc type CD. CDR/CDRW DVDR/DVDRW, VCD Supported with USB Port Support-DIVX/JPEG/MP3 | 1 | -- | 25000 |
| 6. | Commerical P A System 16 W-220W output, AC & 24V DC Operated, 5 Mic. & 2 Auxilary input, Speaker output 4 Ohm, 8 Ohm, 17 V & 100 V | 1 | -- | 20000 |
| 7. | Interactive Board | 1 | -- | 50000 |

ote :

1. This center will be only one at the institute level irrespective of all branches.

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ANNEXURE - I

FIELD EXPOSURE - I

The second year students after their annual exam. will have undergo a four week Industrial Exposure in a medium/small scale unit (Agricultural Workshop, U.P. Agro Industrial corporation, Tractor Training and testing centre). It will be arranged and superwised by the institute staff. They will incorporate following points in their reports.

If inconvenient after annual exam, the industrial exposure can be arranged during second half of the session before the exam.

1. Name and Address of the unit

2. Date of

   i. joining.
   ii. Leaving

3. Nature of Industry

   i. Product.
   ii. Services
   iii. Working Hrs.

4. Sections of the unit visited and activities there in.

5. Details of machines/Tools & instruments used in working in the section of the unit visited.
6. Work procedure in the section visited.
7. Specification of the product of the section and materials used.
8. Control of work & Quality.
9. Inspection procedures packing storing and dispacting of products.
10. Use of computer - if any
11. Visit of units store, Manner of keeping store items, Their reciving and distribution.
12. Safety measures on work place & working condition s in general comfortable, convenient and hygeinic.
13. Pollution, professional deseases and hazards if any. Precautionary measures.

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ANNEXURE - II

FIELD EXPOSURE - II

The final year students will have a four week hands on Industrial Training engaged in units of soil and water conservation training center, minner irregation, Agro processing unit, construction units. It will be arranged and superwised the institute staff. The industrial exposure can be arranged during the second half of the session before the examination.

They will incorporate following points in their report.

1. Name and Address of the unit

2. Date of

   i. joining.
   ii. Leaving

3. Nature of Industry

   i. Product.
   ii. Services
   iii. Working Hrs.

4. Sections of the unit visited and activities there in.

5. Details of machines/Tools & instruments used in working in the section of the unit visited.

6. Work procedure in the section visited.

7. Specification of the product of the section and materials used.

8. Control of work & Quality.
9. Inspection procedures packing storing and dispacting of products.
10. Use of computer - if any
11. Visit of units store, Manner of keeping store items, Their reciving and distribution.
12. Safety measures on work place & working condition s in general comfortable, convenient and hygeinic.
13. Pollution, professional deseases and hazards if any. Precautionary measures.

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RECOMMENDED BOOKS

List of standard Text Books recommended for diploma level institutions of Uttar Pradesh

| Sl.No. | TEXT BOOK | AUTHOR | MEDIUM | EDITION YR | COST | FULL ADDRESS OF PUBLICATION |
|---|---|---|---|---|---|---|
| 1. | POST HARVEST TECHNOLOGY OF CEREALS PULSES AND OIL SEEDS | DR. A. CHAKRAV-ORTY | | THIRD | 120.00 | OXFORD & IBH PUBLISHING CO. PVT. LTD., CALCUTTA |
| 2. | UNIT OPERATIONS OF AGRICULTURAL ENGINEERING | K.M. SAHAI & K.K.SINGH | | SECOND REVISED | 210.00 | VIKAS PUBLISHING HOUSE PVT. LTD., NEW DELHI |
| 3. | PROCESSING AND CONVEYING EQUIP-MENT DESIGN | P.S. PHIRKE | | FIRST-2003 | 295.00 | JAIN BROTHERS, NEW DELHI |
| 4. | PRESERVATION OF FRUITS AND VEGITABLES | GIRDHARI LAL & G.S. SIDDAPPAA G.L. TANDON | | | 125.00 | I.C.A.R., NEW DELHI |
| 5. | POST HARVEST TECHNOLOGY OF FRUIT AND VEGETABLES VOL1-GENERAL CONCEPT & PRINCIPLES VOL2- TECHNOLOGY | L. R. VERMA & V. K. JOSHI | | | SET OF TWO VOL. Rs. 2000 | INDUS PUBLISHING COMPANY, NEW DELHI |
| 6. | PRINCIPLES OF AGRICULTURAL PROCESSING A TEXT BOOK | P. H. PANDEY | | 1994 | 45.00 | KALYANI PUBLISHER |
| 7. | POST HARVEST TECHNOLOGY OF FRUITS & VEGETABLES (PRINCIPLES & PRACTICE | P. H. PANDEY | | 1997 | 75.00 | SAROJ PRAKASHAN, ALLAHABAD |
| 8. | DRYING AND STORAGE OF GRAINS AND OILSEEDS | D. B. BROOKER FRED W. BAKKER-ARKENA CARL W. HALL | | 1997 | 150.00 | C.B.S. PUBLISHERS AND DISTRIBUTORS |
| 9. | FRUITS & VEGETABLE PRESERVATION PRINCIPLES AND PRACTICE SECOND REVISED & ENLARGED EDITI-ON | R.P. SRIVASTAVA SANJAY KUMAR | | LATEST | 190.00 | INTERNATIONAL BOOK DISTRIBU-TING COMPANY,LUCKNOW |
| 10. | AGRICULTURAL ENGINEERING THROUGH WORK EXAMPLE | Dr. RADHEY LAL | | LATEST | 125.00 | SAROJ PRAKASHAN, ALLAHABAD |
| 11. | SEED PROCESSING | BILLY R. GREGG ALVIN G. LAW SHER S. VIVDI & JOHRI S. BALIS | | 1970 | | N. S. C., NEW DELHI |
| 12. | SPEED STORAGE AND PACKAGING APP-LICATIONS FOR INDIA | JAMES F. HARRI-NGTON AND JOHEMON E. DOU-ALAS | | 1970 | | N. S. C. & ROCKEFELLER FOUNDATION, NEW DELHI |
| 13. | POST HARVEST TECHNOLOGY OF FRUITS AND VEGETABLES | A.K. THOMPSON | | | | BLACK WELL SCIENCE LTD. OXFORD |
| 14. | CIGR HANDBOOK ON AGRICULTURAL ENGINEERING VOL-IV AGRO PROCESS- | F.W.BAKKER - ARKEMA | | | | AMERICAL SOCIETY OF AGRICUL-TURAL ENGINEERS |
| 15. | PRINCIPLES OF AGRICULTURAL ENGG. VOL-I & II | MICHAEL & OJHA | | | 250.00 | M/S JAIN BROTHERS, NEW DELHI |
| 16. | TRACTORS AND THEIR POWER UNITS | J.B LILIJEDHL, P.K. TRUNQUIST, DAVID W. SMITH, MAKOTA HOKE | | | 210.00 | C.B.S. PUBLISHER & DISTRIBU-TORS, NEW DELHI |
| 17. | FARM MACHINERY & EQUIPMENTS | C.P. NAKRA | | | 60.00 | DAMPAT RAI & SONS |
| 18. | PRINCIPLES OF FARM MACHINERY | R.A. KEPNER, ROY BAINER & E.L. BERGER | | | 150.00 | C.B.S. PUB. & DISTRIBUTORS, NEW DELHI |
| 19. | TECHNOLOGY AND APPLICATION OF BIO GAS | SRIVASTAVA & OJHA | | | 100.00 | JAIN BROTHERS, NEW DELHI |
| 20. | AIR POLLUTION AND CONTROL | MURLI KRISHNA | | | 160.00 | JAIN BROTHERS, NEW DELHI |
| 21. | FRAM POWER MACHINERY & SURVEYING | IRSHAD ALI | | | 50.00 | KITAB MAHAL |
| 22. | NON CONVENTIONAL ENERGY | O.P. SINGHAL | | | 75.00 | SAROJ PRAKASHAN |
| 23. | SOLAR ENERGY | O.P. SINGHAL | | | 75.00 | SAROJ PRAKASHAN |
| 24. | SOIL & WATER CONSERVATION ENGG. | R. SURESH | | 2000 | 185.00 | STANDARD PUBLISHER DISTRIBU-TORS |
| 25. | GROUND WATER AND TUBEWELL | S.P. GARG | | | 129.00 | OXFORD & IBH PUB. CO. PVT. |
| 26. | GROUND WATER AND WELLS | JOHSON | | | 170.00 | JAIN BROTHERS, NEW DELHI |
| 27. | GROUND WATER | H.M. RAGHUNATH | | 1983 | 40.00 | WILEY EASTERN LTD. |
| 28. | HYDROLOGY | H.M. RAGHUNATH | | 1988 | 55.00 | WILEY EASTERN LTD. |
| 29. | WATERSHED HYDROLOGY | R. SURESH | | 1997 | 100.00 | STANDARD PUB. DISTRIBUTORS |
| 30. | IRRIGATION PRACTICE & DESIGN | K.B. KHUSHLANI M. KHUSHLANI | | 1971 | 33.00 | OXFORD & IBH PUB. CO. PVT. |

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