

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

IV Year B.Tech. Ag. Engg.-II Sem

L	T/P/D	C
4	-/-	4

(A83024) DESIGN OF AGRICULTURAL MACHINERY

Objective: To enable the students to understand the general procedure for designing any machine parts. To know the design of cotter and knuckle joints, levers, springs, various types of shafts, couplings bearings and various IC engine parts.

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Unit-I:

Machine Design – Definition, Classification of machine design, General considerations in machine design, General procedure in machine design. Fundamental units, Mass and Weight, inertia, laws of motion, force, moment of force, couple mass density, torque, work, power and energy. Simple stress in machine parts – Introduction, load, stress, strain, tensile stress and strain, compressive stress and strain, Young's modulus, shear stress and strain, shear modulus, bearing stress. Stress strain diagram, working stress, Factor of safety and selection, stresses in composite bars, thermal stress, linear and lateral strain, Poisson's ratio, volumetric strain, bulk modulus and relations, impact stress, resilience. Principal stresses and principal planes – Theories of failure under static load, Rankine's theory, Guest's theory, maximum distortion theory, stress concentration, notch sensitivity.

Unit-II:

Important terms used in Limit System, fits, types of cotter joints, design of socket and spigot cotter joint. Knuckle joint, Dimensions of various parts of knuckles joint, methods of failure of knuckle joint, design procedure of knuckle joint. Levers – Introduction, application of levers in engineering practice, design of lever hand levers, foot lever, cranked lever. Springs – Introduction, types of springs, material for helical springs, spring wire, terminology, springs in series and parallel, flat spiral springs, leaf springs, construction of leaf springs.

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Unit-III:

Shafts – Material used for shafts, types and sizes of shafts, stresses in shafts, maximum working stresses. Design of shafts, for twisting moment, bending moments, fluctuating loads, axial load in addition to combined twisting and bending loads, design of shafts on the basis of rigidity. Keys and coupling – Introduction, types of keys, sunk keys, saddle keys, tangent keys, round keys, splines, forces acting on sunk keys, strength of sunk key. Effect of key ways, shaft couplings, types of shaft couplings, muff coupling, design of flange coupling.

Unit-IV:www.universityupdates.in

Fly wheel – Introduction, Coefficient of fluctuation of speed, fluctuation of energy, maximum fluctuation of energy, energy stored in a flywheel. Bearing – Introduction, classification of bearing, types of sliding contact bearings, rolling contact bearings – Introduction, advantages and disadvantages of rolling contact bearing over sliding contact bearings. Types of rolling contact bearings, types of radial ball bearings, Standard dimensions and designations of ball bearings, types of roller bearings, basic static load rating of rolling contact bearings, life of a bearing. Basic dynamic load rating of rolling contact bearings, dynamic load rating for rolling contact bearings under variable loads, reliability of bearing, lubrication of ball and roller bearings.

Unit-V:

Design of Machinery : Design of Tillage equipment – cultivator, Rotovator, sowing machinery – Tractor Operated seed com Fertilize drill. Design of harvesting & threshing equipment – reaper, power thresher, Design of spraying equipment – Tractor mounted Boom sprayer.

TEXT BOOK:

1. Machine Design – Khurmi R.S. and Gupta J.K. 1996, Eurasia Publishing House Pvt. Ltd., New Delhi.

REFERENCE:

1. Machine Design – Jain R.K. 1991. Khanna Publishers, New Delhi.

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(A83026) GIS AND REMOTE SENSING**(Elective-III)**

Objective: To equip the students with the knowledge on techniques of Remote Sensing and GIS applications for land and water resources management with projections on yield response to irrigation water, mapping of salt affected and waterlogged lands and techniques of image processing for various applications in efficient natural resources management.

Unit-I:

Introduction to Remote Sensing, stages I remote sensing, Sensors- Remote sensing types and applications, important features of Indian Remote Sensing Satellites, Data acquisition and analysis – from satellites-interpretation, Electromagnetic spectrum- different bands- Resolution, Spectral response Pattern-multi spectral data use, modern remote sensing technology versus conventional aerial photography.

Unit - II

Visual image interpretation, image interpretation, Basic principles of image interpretation, Factors governing the quality of an image, Factors governing interpretability, visibility of objects, Elements of image interpretation, Techniques of image interpretation, Digital image processing-Radiometric correction-DN (Digital Number value) – Noise removal and correction-image enhancement, Digital image processing-Contrast manipulation-gray level thresholding-level slicing-contrast stretching, Digital image processing-spatial Feature Manipulation-spatial filtering-convolution edge enhancement.

Unit – III:

Digital image processing-Fourier Analysis-Multi Spectral scanners-MSS operation and design considerations-Imaging spectrometry –Multi image manipulation, Digital image processing vegetation components image classification supervised image classification unsupervised classification output stage data merging, Remote sensing in agriculture progress and prospects Yield assessment, Remote sensing in water resources development, Remote sensing in soil conservation, Remote sensing in geology and soil mapping.

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Microwave radiometry for monitoring agriculture crops and hydrologic forecasting, Aerial photo interpretation for water resources development and soil conservation survey, definition- Geographical Information Systems GIS:

History of development of GIS definition, Basic components and standard GIS packages.

Unit – V

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Date entry, storage and maintenance, Data types spatial non spatial (attribute-date), Data structure, data format, point line vector-raster polygon, Object structural model, files, files organization, Data base management, systems (DBMS), Entering data in computer-digitizer-scanner data compression.

TEXT BOOKS:

1. Remote sensing and Geographical information system, BS publications, sultan Bazaar, Hyderabad – 3
2. Introduction to Remote sensing, James B and Compell, Published by Taylor & Francis Limited.

REFERENCES:

1. Basics of remote Sensing and GIS, University Science Persons.
2. Remote Sensing and GIS by Basudeb Bhatta, Oxford University Persons, New Delhi.

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(A83027) HUMAN ENGINEERING AND SAFETY

(Elective-III)

Objective: To enable the students to study of human relation with environmental factors, study of anthropometry study of safety gadgets for spraying, chaff cutting and tractor & trailer operator.

Unit-I:

Introduction to human engineering & safety different working systems-human factors, Machine factors-environmental factors – relationship between the three, study of human machine model, Human performance –effectors and senses, Importance of FMJ (Fitting Man Job) & FJM (Fitting Job man). Study of anthropometrics in designs, Workspace design for standing and seated workers, Tasks requirements –visual requirements and postural requirements.

Unit-II:

Functions of the skeletal and muscular systems, The conditions for the static equilibrium for the human body, The muscle function and types of muscle fatigue & discomfort, Factors influencing the work posture, Design of hard tools, Biometrics and energy for muscle contraction oxygen dependent & oxygen independent system & CO₂ consumption, Importance of cardio Vascular system and respiratory system in physical work handling, Difference between static and dynamic works.

Unit – III:

Physical work capacity- Factors effecting the work capacity – Introduction, Work capacity- Factors effecting the work capacity- Personal factors- Age, Sex, Environmental Factors- Light, climate, Indirect measures of energy expenditure, Calculation of rest periods in manual work.

Unit-IV:

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Safety using the difference machines and measures taken for the protection, Vision- Importance of vision- measures taken for the protection of the vision- Guidelines for using colour combinations. Sound- measurement of sound- the nature of sound and the damages due to noise and preventive measures taken, Displacer- types of displace-Visual displace, Audio signals, Communication, Noise communication, Audio warning cues.

Unit – V:

Advance affects of air pollution- safety regulation acts for the safety measures to be taken in forming operated, Rehabilitation and compensation to accident victims, Human information processing, skill and performance – General

model of human information processing, Memory storage- Short term and long term storages, Feedback information, Design of hand tools for Agricultural operation.

TEXT BOOK:

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1. Work study and Ergonomics, Dalela S and Saurabh 1995, Standard Publishers and Distributors, New Delhi

REFERENCES:

1. Introduction to Ergonomics, Bridger R S.
2. New Horizons I Human Factor Design, Huckingson 1992. McGraw-Hill Book Co., New Delhi.
3. Human Factors Engineering, McCormick E J 1992. McGraw-Hill Book Co., New Delhi.
4. Human Factors in Engineering and Design, Sanders M S and McCormick E J 1992. McGraw-Hill Book Co., New Delhi.

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(A83025) DESIGN OF TRACTORS

(Elective-III)

Objective: To enable the students to know the development of agricultural tractors and different operations performed by the tractors to know the different trouble shootings and remedies, design of different parts. To get knowledge on different tests performed on tractors.

Unit – I:

Introduction – Development of agricultural tractor- Classification and selection of tractors, different operations performed by the tractors, Tractor components, Procedure for design, Parameters to be considered for design of tractors, parameters for balanced design of tractor for stability. Weight distribution, weight transfer in tractors, Adding extra weights to front and rear wheels, Location of centre of gravity, different methods, Turning ability of a tractor.

Unit-II:

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Design of mechanical power transmission in agricultural tractors Drive trains – types of Transmissions, Gears – Gear design Bearings and seals, Rolling contact bearings, V-belt drivers, Applications- mechanics-tension ratios, Drive trains, Over load safety devices, clutches and brakes, universal joints, Power take off drives, load limits.

Unit – III:

Steering system-Qualities of steering system, Main parts, Types of Steering boxes, worm and roller type, sector type, worm and nut type, cam and lever type etc., Steering system-Qualities of steering system, Main parts, Types of Steering boxes, worm and roller type, sector type, worm and nut type, cam and lever type etc., Working of hydraulic or power steering – maintenance, steering and front end trouble shooting, Front axle- functions- types, axle beams, adjusting front wheel spacing, Repair of front axle.

Unit – IV:

Tractor Hydraulic systems- Principle of hydraulics, working of hydraulic system, Components of hydraulic circuits, different valves in hydraulic system. Hydraulic controls- Position control system, Draft control system, Maintenance and repair of hydraulic system, Tractor seat and controls of an agricultural tractor, operator exposure to vibration, operator seating.

Unit – V:

Traction mechanism, Tractive efficiency, Traction testing, Tractive

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performance, chasis mechanics- Static equilibrium analysis, stability, longitudinal stability, centre of gravity determination. Tests related to Tractor- Power Test, PTO test, draw bar test, Hydraulic power and lifting capacity test.

REFERENCES:

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1. Machine Design, Jain R K, 1991, Khanna Publishers, New Delhi.
2. Testing and Evaluation of Agricultural, Mehta M.L, Verma S R, Misra S K and Sharma, VK, 2005, daya Publishing House, Delhi. Machinery
3. Farm Machines and their Equipment, Nakra C P, 1986, Dhanpet Rai and Sons, 1682, Nai sarak, New delhi.
4. Text book on Off Road Vehicle, Carrol E Goering, Marvin L Stone, David W Smith, Paul K Turnquist, 2003, ASAE Publishers, Engineering Principles

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(A83023) AGRICULTURAL AND FARM STRUCTURES

(Elective-IV)

Objective: To enable the student to understand the principles and acquire the knowledge on various aspects in farmstead design and construction and also design and construction of farm structures like dairy barns, barn for poultry, compost pit, fodder silos, farm fencing, implement sheds, rural grain storage structures, silos, rural roads and septic tank.

Unit -I:

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Planning and layout of farmstead-location-definition and arrangement, location of various buildings, Farm service buildings: Site selection, planning farm service buildings, factors effecting planning of farmstead. Physiological reactions of livestock to solar radiation. (dairy cattle, poultry, beef cattle and sheep). Influence of climate and thermoregulation: temperature, relative humidity, direct effect of temperature, direct effect of solar radiation. Environmental factors effecting design of farm residence or animal shelter: temperature, Relative humidity, air purity, air movement, light, heat and moisture production.

Unit-II:

Livestock production facilities: water and electricity, sanitary requirements, etc. BIS. Standards for dairy, piggery, poultry and other farm structures. Design, construction and cost estimation of farm structures; Animal shelters: Dairy barn compost pit, fodder silo cost estimation of different farm buildings, method of building estimates, actual cost, detailed estimates of main items of work. Fencing: -design and construction of farm fences, planning of farm fences, type of farm fences: wooden, fencing, woven wire fencing, barbed wire fencing, plain wire fencing, and electrical fencing. Cost estimation.

Unit -III:

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Implement shed: requirements of farm machinery and implement shed, requirements of farm work shop, planning and construction of shed and pump houses. Problems and layout. Threshing and drying yards: design and construction of drying and threshing floors, type of floors: barbed floor, concrete floor, natural floor etc. Barn for cows, buffalo-planning and design of different barns, types of dairy barns based on construction-housing systems: stable barns, free stalls and milking parlor barn layout.

Unit-IV:

Barn for poultry: planning and requirements, environmental requirements, modern poultry houses: deep litter housing, building of poultry houses,

classification of poultry houses depending up on materials used: wired floor houses, deep litter, cage houses.

Unit-V:

Design and construction of rural grain storage structures such as Bhukari, Morai, Kothari: - requirements of good storage structures, types of grain storage structures. Construction of Bhukari, Morai, Kothari type storage structures. Silo: design and construction in respect of farm uses. Types of silos: pit silo, tower silo, trench silo, bunkers.

Unit -VI:

Development, rural roads: design and construction of farm road types of farm roads: characteristics of some important early roads, earth roads, gravel roads, kankar roads, etc. Construction cost of different roads, repair and maintenance. Road estimation and casting. Design of septic tank for small family-location-capacity of tank-cleaning-disposal field-soakage pit-water closet.

REFERENCES:

1. Principles and practices of Agricultural, Structures and Environmental Control, Pandey P H 2004, Kalyani Publishers, Ludhiana.
2. Principal of Agricultural Engineering Vol. 1, Michael A M and Ojha T P 2004 Jain Brothers, New Delhi.
3. Farm Buildings Design, Newbaver L W and Walker H B 2003 Prentice - Hall Inc., New Jersey.
4. Agricultural Buildings and Structures, Whitaker J 2002. Reston Publishing Home, Reston, Virginia.

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(A83028) HYDRAULIC DEVICES AND CONTROLS

(Elective-IV)

Objective The students will be trained to highlight the usage and operation of hydraulic and pneumatic controls required for operation of automated farm machinery with hydraulic and pneumatic systems.

Unit -I:

Hydraulic basics – Pascal's law applications, fluid flow, fluid energy, fluid work, Fluid power –advantages, draw backs, applications, components. Hydraulic system, color coding. Reservoirs – Hydraulic reservoirs, design and construction features, sizing of reservoirs. Strainers and filters – Hydraulic filters, positions, types, disfilters, water traps, air dryers, different air dryers. Filtering material and elements – introduction strainers, filters, filtering methods, location of filters in hydraulic circuits, beta ratio of filters.

Unit- II:

Accumulators – Definition, types, weight – loaded, spring loaded, gas – loaded (non-separator, separator), piston, diaphragm, bladder. Accumulators – As a auxiliary power source, leakage compensator, emergency power source, hydraulic shock absorber. Pressure gauges and volume meters – Bourdon gauge, Schrader gauge, rotameter, sight flow indicator, disc piston, turbine flow meter, electronic digital readout. Hydraulic circuits–control of single acting and double acting hydraulic cylinder, regenerative cylinder circuit, pump unloading circuit, double pump hydraulic system, Counter balance valve application; hydraulic cylinder sequencing circuits. Hydraulic circuits–Automatic cylinder reciprocating system, locked cylinder using pilot check valves, cylinder synchronizing circuits, fail-safe circuits, speed control of hydraulic cylinder, speed control of hydraulic motor. Hydraulic circuits–Hydraulic motor braking system, hydrostatic transmission system, air-over-oil circuit, analysis of hydraulic system with frictional losses considered mechanical hydraulic system. Hydraulic conductors and fittings –conductor sizing for flow rate requirements, pressure rating of conductors, steel pipes, steel tubing, plastic tubing, flexible houses, quick disconnect couplings, metric steel tubing.

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Unit-III:

Pumps, pump theory, pump classification, performance, displacement, designs, gear pumps, vane pumps, piston pumps, pump operation. Hydraulic actuators- Linear actuators, cylinders, construction, seals, rotary actuators. applications (speed control, actuator synchronization, regeneration, counter

balance and dynamic braking, pilot operated check valves, pre-fill and compression relief), maintenance. Hydraulic cylinders operating features, cylinder mountings and mechanical linkages, cylinder force, velocity and power, cylinder loadings through mechanical linkages, hydraulic cylinder cushions, hydraulic shock absorbers. Hydraulic motors limited rotation hydraulic motors, gear motors, vane motors, piston motors, hydraulic motor theoretical torque, power and flow rate, performance, hydraulic transmissions. Hydraulic valves- directional control valves, flow control valves, Servo valves, proportional control valves, cartridge valves, hydraulic fuses, valve installation, valve failures, remedies, valve assembly, trouble shooting of valves. Hydraulic circuit diagrams and trouble shooting, USASI graphical symbols –Symbols, description, Tractor hydraulics – Power steering (hydraulic power steering, surface and soil conditions, sizing of components, actuator, control valves, lines hoses and internal passages, orifices, power steering pumps, Tractor hydraulics-noise in hydraulic systems, hi-tech tractor kinetic energy, problems, integral hi-tech systems, three point hitches quick attaching coupler for three point hitches.

Unit-IV:

Pneumatics: Air services – Compressors (Introduction, piston compressors, compressor starting un loader controls, screw compressor, vane compressor, capacity rating sizing of air receiver, power. Fluid conditioners (air filters, air pressure regulators, air lubricators pneumatic pressure indicators), pneumatic silencers, after coolers, air dryers) analysis of moisture removal from air, air-flow rate control with orifices and sizing of valves). Air services-Air control valves (regulators, check valves, shuttle valves, directional control two-way valves, three way and four way control valves, flow control valves, sizing of valves) pneumatic actuators (pneumatic cylinders, pneumatic rotary actuator, rotary air motors, air requirement, problems), pneumatic circuits and applications-Introduction, pneumatic circuit design considerations, air pressure losses in pipe lines, economic cost of energy losses, basic pneumatic circuit analysis using metric systems, Basic electrical controls –Electrical components, control of a cylinder using a singly limit switch, reciprocation of a cylinder using pressure or limit switches, dual cylinder sequence circuits, box-sorting system, electrical control of regenerative circuit, counting timing, reciprocation of hydraulic cylinder.

Unit – V:

Logic units-Moving part logic (MPL) control systems, MPL control of fluid power circuits, Boolean algebra, illustrative examples using Boolean algebra, Fail, safe and safety systems, Safety, cleanliness, fault finding instruments, fault finding, preventive maintenance, Robotics, use of hydraulic and pneumatic drives in agricultural systems, Advanced electrical controls-Components of an electro hydraulic servo system, analysis, programmable

logic controllers.

REFERENCES:

1. Robotics Control, Sensing Vision, and Intelligence, Gonzalezr K S and Lee S G 1987 Mc Graw – Hill Book Company, New Delhi.
2. Tractors and their Power Units, Lijedahl J B, Carleton WM, Turnquist P K and Smith D W 1984. AVI Publishing Co. Inc., Westport, Connecticut.
3. Mechanical Measurements, Thomas GB and Buck N L 1969 Oxford and IBH Publishing Co. Ltd., 66 Janpath, New Delhi.
4. Robot Engineering – An Integrated approach, Klafter R D, Cmielewski T A and Negin M. Prentice – Hall of India, New Delhi.
5. Fluid Power with Applications, Esposito A. 2003. Pearson Education, Inc., Delhi.
6. Hydraulics and Pneumatics, Parr A. 2005. Jaico Publishing House, Mumbai.

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD**IV Year B.Tech. Ag. Engg.-II Sem****L T/P/D C****4 -/- 4****(A80129) PRINCIPLES OF ENTREPRENEURSHIP****(Elective-IV)**www.universityupdates.in**Unit I:**

Introduction to Entrepreneurship: Definition of Entrepreneur Entrepreneurial Traits. Entrepreneur vs. Manager, Creating and Starting the venture: Sources of new ideas, methods of generating ideas, creative problem solving - Writing Business Plan, Evaluating Business Plans. Launching formalities.

Unit II:

Financing and Managing the new venture: Sources of capital, Record keeping, recruitment, motivating and leading teams, financial controls. Marketing and sales controls. E-commerce and entrepreneurship, Internet advertising- New venture Expansion Strategies and Issues.

Unit III:

Institutional/financial support: Schemes and functions of Directorate of Industries, District Industries Centres (DICs), Industrial Development Corporation (IDC), State Financial Corporation (SFCs), Small Scale Industries Development Corporations (SSIDCs), Khadi and Village Industries Commission (KVIC), Technical Consultancy Organisation (TCO), Small Industries Service Institute (SISI), National Small Industries Corporation (NSIC), Small Industries Development Bank of India (SIDBI).

Unit IV:

Production and Marketing Management: Thrust areas of production management, Selection of production Techniques, Plant utilization and maintenance, Designing the work place, Inventory control, material handling and quality control. Marketing functions, market segmentation, market research and channels of distribution, Sales promotion and product pricing.

Unit V :

Labour legislation, Salient Provisions of Health, Safety, and Welfare under Indian Factories Act, Industrial Disputes Act, Employees State Insurance Act, Workmen's Compensation Act and Payment of Bonus Act.

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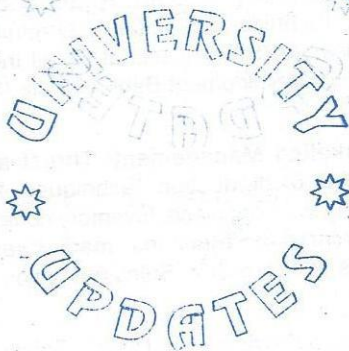
1. Robert Hisrich, & Michael Peters: Entrepreneurship, TMH, 2009.
2. Dollinger: Entrepreneurship, Pearson, 2009.

REFERENCE BOOKS:

1. Vasant Desai, Dynamics of Entrepreneurial Development and

1. Management, Himalaya Publishing House, 2009.
2. Harvard Business Review on Entrepreneurship, HBR Paper Back.
3. Robert J. Calvin: Entrepreneurial Management, TMH, 2009.
4. Gurmeet Naroola: The entrepreneurial Connection, TMH, 2009
5. Bolton & Thompson: Entrepreneurs—Talent, Temperament and Techniques, Butterworth Heinemann, 2009.
6. Agarwal: Indian Economy, Wishwa Prakashan 2009.
7. Dutt & Sundaram: Indian Economy, S. Chand, 2009
8. B D Singh, Industrial Relations & Labour Laws, Excel, 2009.
9. Aruna Kaulgud: Entrepreneurship Management by, Vikas publishing house, 2009.
10. Essential of entrepreneurship and small business management by Thomas W. Zimmerer & Norman M. Scarborough, PHI-2009
11. ND Kapoor: Industrial Law, Sultan Chand & Sons, 2009.

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(A80087) INDUSTRY ORIENTED MINI PROJECT

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(A80089) SEMINAR

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(A80088) PROJECT WORK

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(A80090) COMPREHENSIVE VIVA