# JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

(Established by Andhra Pradesh Act No.30 of 2008)
Kukatpally, Hyderabad - 500 085, Andhra Pradesh (India)

## B.TECH. CIVIL ENGINEERING

### II YEAR II SEMESTER

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
II Year B.Tech. CE-II Sem

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(A40008) PROBABILITY AND STATISTICS

Objectives: To learn

- Understand a random variable that describes randomness or an uncertainty in certain realistic situations. It can be of either discrete or continuous type.
- In the discrete case, study of the binomial and the Poisson random variables and the Normal random variable for the continuous case predominantly describe important probability distributions. Important statistical properties for these random variables provide very good insight and are essential for industrial applications.
- Most of the random situations are described as functions of many single random variables. In this unit, the objective is to learn functions of many random variables through joint distributions.
- The types of sampling. Sampling distribution of means, Sampling distribution of variance, Estimations of statistical parameters, Testing of hypothesis of few unknown statistical parameters.
- The mechanism of queueing system. The characteristics of queue, The mean arrival and service rates
- The expected queue length, The waiting line
- The random processes, The classification of random processes, Markov chain, Classification of states
- Stochastic matrix (transition probability matrix), Limiting probabilities, Applications of Markov chains

UNIT-I:

Single Random variables and probability distributions: Random variables – Discrete and continuous. Probability distributions, mass function/density function of a probability distribution, Mathematical Expectation, Moments about origin, Central moments, Moment generating function of probability distribution, Binomial, Poisson & normal distributions and their properties, Moment generating functions of the above three distributions, and hence finding the mean and variance.

UNIT-II

Multiple Random variables, Correlation & Regression: Joint probability distributions – Joint probability mass/density function, Marginal probability mass/density functions, Covariance of two random variables, Correlation Coefficient of correlation, The rank correlation. Regression – Regression

UNIT-III:

Sampling Distributions and Testing of Hypothesis: Sampling: Definitions of population, sampling, statistic, parameter. Types of sampling, Expected values of Sample mean and variance, sampling distribution, Standard error, Sampling distribution of means and sampling distribution of variance.

Parameter estimations – likelihood estimate, interval estimations

Testing of hypothesis: Null hypothesis, Alternate hypothesis, type I, & type II errors – critical region, confidence interval, Level of significance. One sided test, Two sided test,

Large sample tests:

(i) Test of Equality of means of two samples equality of sample mean and population mean (cases of known variance & unknown variance, equal and unequal variances)
(ii) Tests of significance of difference between sample S.D and population S.D.
(iii) Tests of significance difference between sample proportion and population proportion & difference between two sample proportions

Small sample tests: Student t-distribution, its properties; Test of significance difference between sample mean and population mean; difference between means of two small samples

Snedecor’s F- distribution and it’s properties. Test of equality of two population variances

Chi-square distribution, it’s properties, Chi-square test of goodness of fit

UNIT-IV

Queueing Theory: Structure of a queueing system, Operating Characteristics of queueing system, Transient and steady states, Terminology of Queueing systems, Arrival and service processes – Pure Birth-Death process

Deterministic queueing models – M/M/1 Model of infinite queue, M/M/1 model of finite queue.

UNIT-V


TEXT BOOKS:

Higher Engineering Mathematics by Dr. B.S. Grewal, Khanna
REFERENCE BOOKS:


Outcomes:

- Students would be able to identify distribution in certain realistic situations. It is mainly useful for circuit as well as non-circuit branches of engineering. Also able to differentiate among many random variables involved in the probability models. It is quite useful for all branches of engineering.

- The student would be able to calculate mean and proportions (small and large sample) and to make important decisions from few samples which are taken out of unmanageably huge populations. It is mainly useful for non-circuit branches of engineering.

- The student would be able to find the expected queue length, the ideal time, the traffic intensity and the waiting time. These are very useful tools in many engineering and data management problems in the industry. It is useful for all branches of engineering.

- The student would be able to understand about the random process, Markov process and Markov chains which are essentially models of many time dependent processes such as signals in communications, time series analysis, queuing systems. The student would be able to find the limiting probabilities and the probabilities in $n^{th}$ state. It is quite useful for all branches of engineering.

UNIT - I


Springs: Introduction – Types of springs – deflection of close and open coiled helical springs under axial pull and axial couple – springs in series and parallel – Carriage or leaf springs.

UNIT - II


Beams Curved in Plan: Introduction – circular beams loaded uniformly and supported on symmetrically placed Columns – Semi-circular beam simply-supported on three equally spaced supports.

UNIT - III

Beam Columns: Laterally loaded struts – subjected to uniformly distributed and concentrated loads – Maximum B.M. and stress due to transverse and lateral loading.

Direct and Bending Stresses: Stresses under the combined action of direct loading and bending moment, core of a section – determination of stresses in the case of chimneys, retaining walls and dams – conditions for stability – stresses due to direct loading and bending moment about both axis.

UNIT - IV

Unsymmetrical Bending: Introduction – Centroidal principal axes of section – Graphical method for locating principal axes – Moments of inertia referred to any set of rectangular axes – Stresses in beams subjected to unsymmetrical bending – Principal axes – Resolution of bending moment into two rectangular axes through the centroid – Location of neutral axis –
Deflection of beams under unsymmetrical bending.

**Shear Centre**: Introduction - Shear centre for symmetrical and unsymmetrical (channel, I, T and L) sections

**UNIT – V**

**Thin Cylinders**: Thin seamless cylindrical shells - Derivation of formula for longitudinal and circumferential stresses - hoop, longitudinal and Volumetric strains - changes in dia. and volume of thin cylinders - Thin spherical shells.

**Thick Cylinders**: Introduction Lame's theory for thick cylinders - Derivation of Lame's formulae - distribution of hoop and radial stresses across thickness - design of thick cylinders - compound cylinders - Necessary difference of radii for shrinkage - Thick spherical shells.

**TEXT BOOKS:**
2) Strength of Materials by R.K Rajput, S.Chand & Company Ltd.

**REFERENCES:**
2) Introduction to Strength of Materials by U.C.Jindal, Galgotia Publications Pvt. Ltd.
3) Strength of Materials by Bhattacharya, Cengage Learning

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II Year B.Tech. CE-II Sem

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**A40111 HYDRAULICS AND HYDRAULIC MACHINERY**

**UNIT – I**

**Open Channel Flow**: Types of flows - Type of channels - Velocity distribution - Energy and momentum correction factors - Chezy's, Manning's, and Bazin formulae for uniform flow - Most Economical sections. Critical flow: Specific energy-critical depth - computation of critical depth - critical sub-critical and super critical flows.

Non uniform flow-Dynamic equation for G.V.F., Mild, Critical, Steep, horizontal and adverse slopes-surface profiles-direct step method- Rapidly varied flow, headwater jump, energy dissipation.

**UNIT – II**

**Dimensional Analysis and Similitude**: Dimensional analysis-Rayleigh's method and Buckingham's pi theorem-study of Hydraulic models - Geometric, kinematic and dynamic similarities-dimensionless numbers - model and prototype relations.

**UNIT-III**

**Hydrodynamic Force on Jets**: Hydrodynamic force of jets on stationary and moving flat, inclined and curved vanes, jet striking centrally and at tip, velocity triangles at inlet and outlet, expressions for work done and efficiency-Angular momentum principle, Applications to radial flow turbines. Layout of a typical Hydropower installation - Heads and efficiencies.

**UNIT-IV**

**Hydraulic Turbines**: Classification of turbines-pelton wheel-Francis turbine-Kaplan turbine-working, working proportions, velocity diagram, work done and efficiency, hydraulic design, draft tube - theory and function efficiency. Governing of turbines-surge tanks-unit and specific turbines-unit speed-unit quantity-unit power-specific speed performance characteristics-geometric similarity-cavitation.

**UNIT – V**


Classification of Hydropower plants - Definition of terms - load factor, utilization factor, capacity factor, estimation of hydropower potential.
TEXT BOOKS:

REFERENCES:
1. Fluid Mechanics and Machinery, CSP OJHA, Oxford University Press
3. Fluid mechanics and fluid machines by Rajput, S.Chand &Co.

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II Year B.Tech. CE-II Sem

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(A40009) ENVIRONMENTAL STUDIES

Objectives:
1. Understanding the importance of ecological balance for sustainable development.
2. Understanding the impacts of developmental activities and mitigation measures.
3. Understanding the environmental policies and regulations

UNIT-I:
Ecosystems: Definition, Scope and Importance of ecosystem. Classification, structure and function of an ecosystem. Food chains, food webs and ecological pyramids. Flow of energy, Biogeochemical cycles, Bioaccumulation, Biomagnification, ecosystem value, services and carrying capacity. Field visits.

UNIT-II:
Natural Resources: Classification of Resources: Living and Non-Living resources, water resources: use and over utilization of surface and ground water, floods and droughts. Dams: benefits and problems. Mineral resources: use and exploitation, environmental effects of extracting and using mineral resources, Land resources: Forest resources, Energy resources: growing energy needs, renewable and non renewable energy sources, use of alternate energy source, case studies.

UNIT-III:
Biodiversity and Biotic Resources: Introduction, Definition, genetic, species and ecosystem diversity. Value of biodiversity; consumptive use, productive use, social, ethical, aesthetic and optional values. India as a mega diversity nation, Hot spots of biodiversity. Field visit. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts; conservation of biodiversity: In-Situ and Ex-situ conservation. National Biodiversity act.

UNIT-IV:
Environmental Pollution and Control Technologies: Environmental Pollution: Classification of pollution, Air Pollution: Primary and secondary pollutants, Automobile and Industrial pollution, Ambient air quality standards. Water pollution: Sources and types of pollution, drinking water quality standards. Soil Pollution: Sources and types, Impacts of modern agriculture, degradation of soil. Noise Pollution: Sources and Health hazards, standards, Solid waste: Municipal Solid Waste management, composition and
characteristics of e-Waste and its management. **Pollution control technologies**: Wastewater Treatment methods: Primary, secondary and tertiary.


**UNIT-V:**


**SUGGESTED TEXT BOOKS:**
1. Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission.
2. Environmental Studies by R. Rajagopalan, Oxford University Press.

**REFERENCE BOOKS:**

**Outcomes:**
Based on this course, the Engineering graduate will understand /evaluate / develop technologies on the basis of ecological principles and environmental regulations which inturn helps in sustainable development.
UNIT - V

Moving Loads and Influence Lines: Introduction maximum SF and BM at a given section and absolute maximum S.F. and B.M due to single concentrated load U.D load longer than the span, U.D load shorter than the span, two point loads with fixed distance between them and several point loads-Equivalent uniformly distributed load-Focal length. Definition of influence line for SF, influence line for BM- load position for maximum SF at a section-Load position for maximum BM at a section - Point loads, UDL longer than the span, UDL shorter than the span- Influence lines for forces in members of Pratt and Warren trusses.

TEXT BOOKS:
1) Structural Analysis Vol - I & II by Vazarni and Ratwani, Khanna Publishers.

REFERENCES:
2) Structural Analysis by Hibbeler, pearson Education Ltd
4) Fundamentals of structural Analysis by M.L.Gamhir, PHI.

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II Year B.Tech. CE-II Sem

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UNIT - I

(A40109) BUILDING MATERIALS, CONSTRUCTION AND PLANNING

UNIT - I

Stones and Bricks, Tiles: Building stones – classifications and quarrying properties – structural requirements – dressing Bricks – Composition of Brick earth – manufacture and structural requirements.


UNIT-II


UNIT-III


UNIT -IV

Masonry and Finishing's: Brick masonry – types – bonds ; Stone masonry – types ; Composite masonry – Brick-stone composite ; Concrete, Reinforced brick.

Finishers: Plastering, Pointing, Painting, Claddings – Types – Tiles - ACP

Form work: Requirements – Standards – Scaffolding – Design ; Shoring, Underpinning.

UNIT -V

Building Planning : Principles of Building Planning, Classification of buildings and Building by laws.

TEXT BOOKS:
REFERENCES:

2. Building Construction by PC Verghese PHI.
4. Basics of Civil Engg by Subhash Chander; Jain Brothers.

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II Year B.Tech. CE-I Sem

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(A40186) COMPUTER AIDED DRAFTING OF BUILDINGS

1. Introduction to computer aided drafting
2. Software for CAD – Introduction to different softwares
3. Practice exercises on CAD software
4. Drawing of plans of buildings using software
   a) single storeyed buildings  b) multi storyed buildings
5. Developing sections and elevations for
   a) single storeyed buildings  b) multi storyed buildings
6. Detailing of building components like Doors, Windows, Roof Trusses etc. using CAD softwares
7. Exercises on development of working of buildings

TEXT BOOKS:

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

II Year B.Tech. CE-I Sem

(A40190) SURVEYING LAB – II

LIST OF EXERCISES:
1. Study of theodolite in detail - practice for measurement of horizontal
   and vertical angles.
2. Measurement of horizontal angles by method of repetition and
   reiteration.
3. Trigonometric Leveling - Heights and distance problem (Two
   Exercises)
4. Heights and distance using Principles of tacheometric surveying (Two
   Exercises)
5. Curve setting - different methods. (Two Exercises)
6. Setting out works for buildings & pipe lines
7. Determine of area using total station
8. Traversing using total station
9. contouring using total station
10. Determination of remote height using total station
11. State-out using total station
12. Distance, gradient, Diff, height between tow inaccessible points using
   total stations

LIST OF EQUIPMENT:
1. Theodolites and leveling staffs.
2. Tachometers.
3. Total station.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

III Year B.Tech. CE-I Sem

(A50116) CONCRETE TECHNOLOGY

UNIT I
Cement: Portland cement - chemical composition - Hydration of cement -
Structure of hydrate cement - Test on physical properties - Different grades
of cement.
Admixtures: Types of admixtures - mineral and chemical admixtures -
properties - dosages - effects - usage.
Aggregates: Classification of aggregate - Particle shape & texture - Bond,
strength & other mechanical properties of aggregate - Specific gravity, Bulk
density, porosity, adsorption & moisture content of aggregate - Bulking of
sand - Deleterious substance in aggregate - Soundness of aggregate -
Alkali aggregate reaction - Thermal properties - Sieve analysis - Fineness
modulus - Grading curves - Grading of fine & coarse Aggregates - Gap
graded aggregate - Maximum aggregate size.

UNIT II
Fresh Concrete: Workability - Factors affecting workability - Measurement
of workability by different tests - Setting times of concrete - Effect of time
and temperature on workability - Segregation & bleeding - Mixing and
vibration of concrete - Steps in manufacture of concrete - Quality of mixing
water.

UNIT III
Hardened Concrete: Water / Cement ratio - Abram’s Law - Gel-space ratio
- Nature of strength of concrete - Maturity concept - Strength in tension &
compression - Factors affecting strength - Relation between compression &
tensile strength - Curing.

Testing of Hardened Concrete: Compression tests - Tension tests - Factors
affecting strength - Flexure tests - Splitting tests - Pull-out test, Non-
destructive testing methods - codal provisions for NDT.

ELASTICITY, CREEP & SHRINKAGE - Modulus of elasticity - Dynamic
modulus of elasticity - Poisson’s ratio - Creep of concrete - Factors
influencing creep - Relation between creep & time - Nature of creep - Effects
of creep - Shrinkage - types of shrinkage.

UNIT IV
Mix Design: Factors in the choice of mix proportions - Durability of concrete
- Quality Control of concrete - Statistical Quality Control - Acceptance criteria
-Proportioning of concrete mix by normal and pumpable concretes by -