Tribhuwan University

Institute of Engineering

Pulchowk Campus

Syllabus for the Position of Assistant Instructor

(*Civil Engineering***)**

S.N.	Paper	Question Format	Full Marks	Number of Questions	Exam Time
1.	**Paper I**	Core Course (Objective)	50	50	50 minutes
2.	**Paper II**	Core Course (Theory)	50	10	1 ½ hrs
Total Written Exam Full Marks:			**100**		

Paper I: Objective (Core Course) Marks: 1 × 50 = 50

Unit	Area of Questions	Marks	No of Question	No of question × marks
1	Construction Materials	5	50	50 questions × 1 marks
2	Engineering survey and drawings	8		
3	Highway Engineering	6		
4	Construction Management	5		
5	Mechanics of Structure and Structural Design	5		
6	Building Construction	5		
7	Estimating and costing	6		
8	Soil Mechanics	5		
9	TU Laws 2049, TU Teacher and Officers Service laws (2050) (Section 5,6,9, and 10), TU Economic Management and Procurement laws (2050) (Section 12, 13 and 14)	5		
	Total Marks =	50	50	

Paper II: **Core Course** **Marks: $5 \times 10 = 50$**

Subjective Knowledge

Unit	Area of Questions	Marks	No of Question	No of question × marks
1	Construction Materials	5	1	10 questions × 5 marks
2	Engineering survey and Drawings	10	2	
3	Highway Engineering	5	1	
4	Construction Management	5	1	
5	Mechanics of Structure and Structural Design	5	1	
6	Building Construction	5	1	
7	Estimating and costing	5	1	
8	Soil Mechanics	5	1	
9	TU Laws 2049, TU Teacher and Officers Service laws (2050) (Section 5,6,9, and 10), TU Economic Management and Procurement laws (2050) (Section 12, 13 and 14)	5	1	
	Total Marks =	50	10	

1. **Construction Materials:**
   Type of construction materials available in different part of Nepal; Properties of construction materials: physical, chemical, constituents, thermal etc.; Stone: Types, characteristics and requirements of stones as building materials. Required tests to confirm their strength and durability; Brick: Types, properties of good bricks and requirements of bricks as building materials. Required tests to confirm their strength and durability; Ceramic materials: Ceramic tiles, mosaic tiles, their uses and tests to confirm strength and durability; cementing materials: Types and properties of lime and cement. Constituents of lime and cement mortars, their uses and required tests to confirm their strength and durability; Metals: Steel; types and properties; alloys their uses and tests. Aluminum, its properties, uses and tests; Timber and wood: Different timber trees in Nepal, types and properties of wood, their uses and necessary tests; Miscellaneous materials: Asphaltic materials (Asphalt, Bitumen and Tar); paints and varnishes; polymers; composites, etc.
2. **Engineering Survey and Drawings**
   Introduction, importance and basic principles of surveying; Linear measurements: techniques; chain, tape, ranging rods and arrows; representation of measurement and common scales; sources of errors; effect of slope and slope correction; correction for chain and tape measurements; Abney level and clinometers; Compass and plane table surveying: bearings; types of compass; problems and sources of errors of compass survey; principles and methods of plane tabling; Leveling and contouring: Principle of leveling; temporary and permanent adjustment of level; bench marks; booking methods and their reductions; longitudinal and cross

sectioning; reciprocal leveling; trigonometric leveling; contour interval and characteristics of contours; methods of contouring; Theodolite traversing: Need of traverse and its significance; computation of coordinates; adjustment of closed traverse; closing errors; Uses of Total Station and Electronic Distance Measuring Instruments; Importance of GIS in surveying; total station and its uses.

Engineering drawing: concept, aims, used and importance of drawing; drawing tools and instruments and their uses; drafting techniques and methods in common practice; introduction to Computer Aided Drafting (CAD) software

3. **Highway Engineering**

Highway Alignment and Engineering Survey: Introduction; Requirements of ideal highway alignment; Factors controlling highway alignment; Engineering survey for highway alignment; Map study; Reconnaissance; Preliminary survey; Final location and detailed survey; Geometric Design of Highways: Cross sectional elements; Camber; Highway curves; Superelevation; Extra widening; Sight distance; Gradient; Vertical curves; Highway Drainage: Requirements of good drainage system; Classification of highway drainage system; Highway Materials: Classification of highway materials: Introduction, Classification based on purpose binding, mineral, other minerals; Subgrade soil; Stone aggregates; Binding materials (bituminous material): Road Pavement: Hill Roads: Road Machineries: Road Construction Technology: Highway Maintenance and Repair:

4. **Construction Management:**

Organization: need for organization, responsibilities of a junior engineer, relation between owner, contractor and engineer; Site management: preparation of site plan, organizing labor, measures to improve labor efficiency, accident prevention; Contract procedure: contracts, departmental works and day-work, types of contracts, tender and tender notice, earnest money and security deposit, preparation before inviting tender, agreement, conditions of contract and construction supervision; Accounts: administrative approval and technical sanction, familiarity with standard account keeping formats used in governmental organizations, measurement book, running bill, final bill, and project completion report; Planning and control: construction schedule, equipment and materials schedule, construction stages and operations, bar chart, CPM and PERT; Safety measures and programs in excavation, drilling, blasting, tower erection, cable stringing and underground works

5. **Mechanics of Structure and Structural Design**

Forces on a rigid body; Stress and strains, theory of tension and flexure, friction moment of inertia, centre of gravity; Analysis of plane truss; One-way, two-way slabs and their design criteria; Analysis of beams and frames: bending moment and shear force; Steel structures and joints; Roof truss; Timber structures; Shear and bonds for RCC; Axial load in column; Introduction to limit state method

6. **Building Construction**

Building and their type; Foundation adopted for buildings; Masonry wall, stone masonry; Partition and cavity walls; Concrete construction; Formwork and scaffolding; Floor and their types; Roof, staircase and differ parts of buildings; Door and windows; Finishing works

7. Estimating and costing

Introduction; Definition of Estimating ; Purpose of Estimating; Types of Estimates: Estimation of Building; Analysis of Rates; Estimate of Road construction: Analysis of Rates of Road, Sanitary and Water supply Works; Property Valuation: Specifications; Estimating of Water Supply and Sanitary Works; Estimating of Irrigation Works; Analysis of Rate for Irrigation and Suspension Bridges:

8. Soil Mechanics

Properties of soil; Factors influencing the choice of foundation; Soil compaction, effective stress and compressibility of soils; Shear strength of soils and slope stability; Lateral earth pressure in soils; Bearing capacity and settlement of foundations; Design of isolated footings, combined footings and raft foundations

9. TU Rules and Regulations

TU Laws 2049, TU Teacher and Officers Service laws (2050) (Section 5,6,9, and 10), TU Economic Management and Procurement laws (2050) (Section 12, 13 and 14)

द्रष्टव्य :

1. लिखित परीक्षाको लागि ५० पूर्णाङ्कको एक पत्र हुनेछ ।
2. वस्तुगत बहुवैकल्पिक (Multiple Choice) प्रश्नको विकल्प छनौट गर्दा गलत विकल्प छानेमा ऋणात्मक मूल्याङ्कन (Negative Marking) गरिने छ । अर्थात् यसरी मूल्याङ्कन गर्दा प्रत्येक गलत उत्तरको लागि २० प्रतिशत अङ्ककट्टा गरिनेछ । बहुवैकल्पिक प्रश्नको २० प्रतिशत अङ्क प्राप्ताङ्कबाट घटाइने छ । (उदाहरणका लागि परीक्षार्थीले २० अङ्कको बहुवैकल्पिक प्रश्नमा १५ प्रश्नको सही उत्तर र ५ प्रश्नको गलत उत्तर दिएमा निजको प्राप्ताङ्क (०.२० × ५=१.००) अर्थात् १५–१= १४ अङ्क हुनेछ । तर उत्तर नदिएमा त्यस बापत अङ्क दिइने छैन र अङ्क कट्टा पनि गरिने छैन ।
3. विषयगत प्रश्नको हकमा एउटै प्रश्नका दुई वा दुई भन्दा बढी भाग (Two or more parts of a single question) वा एउटा प्रश्न अन्तर्गत दुई वा बढी टिप्पणीहरू (Short notes) सोध्न सकिने छ ।
4. प्रत्येक पत्रको उत्तीर्णाङ्क पूर्णाङ्कको ४० प्रतिशत हुनेछ ।
5. भाषा विषयबाहेक अन्य विषयका लागि उत्तरको माध्यम अंग्रेजी वा नेपाली हुनेछ ।