

4017 - IRRIGATION ENGINEERING										
Teaching Schedule Per Week			Progressive Assessment	Examination Schedule (Marks)						
Lectures	Practical	Credits		Theory			Practical Ex.		Total	
3	0	3	25	3Hrs. 100			0		125	
Pre-requisite		Source	Semester	Theory	Test	Total	TW	PR	Gr Total	4
Nil		CVL		75	25	100	-	-	100	

RATIONALE: -This course is considered as most important for Diploma in Civil Engineering programme because, the Civil Engineer is primarily responsible for providing well planned and systematic facilities for the development of agriculture, water shed management and efficient water distribution. The student is expected to gain knowledge of major and minor irrigation schemes, dams and its related structures. Majority of the rural population of our country is dependent on agriculture for their livelihood and therefore, this course of Irrigation Engineering forms a core subject for civil engineers. The scope of the syllabus is restricted to the prescribed text-books only.

COURSE CONTENTS		Hrs	Mks
1. INTRODUCTION		3	4
Necessity and importance of irrigation. Advantages and disadvantages of irrigation. Types of Irrigation –flow and lift, perennial and inundation, direct and storage irrigation. Single and multi-purpose projects.			
2. HYDROLOGY		5	12
Definition of hydrology and hydrologic cycle. Rainfall-factors affecting rainfall, measurement of rainfall by symons rain gauge-float type automatic rain gauge. Rainfall cycles-Average annual rainfall methods of calculation of rainfall- Arithmetic average method, Theissens' polygon method and Isohyetel method. Catchment area –Definition, type of catchment, free catchment, intercepted catchment, etc. Run-off- Definition factors affecting run-off, run off co-efficient, computation of run off by Ingli's formula for ghat and non-ghat areas simple problems. Hydrographic and unit hydrograph, definition their use for finding run off and maximum flood discharge. Maximum flood discharge- Its computation from past records, river gauging, Inglis formula to find maximum flood discharge, simple problems.			
3. WATER REQUIREMENTS		6	15
Crop seasons such as kharif, rabi, hot weather, and perennial and their period types of crops grown in each season with their crop period. Definitions of terms-Duty, delta, crop period, base-period, time factor, capacity factor, intensity of irrigation, gross commanded area, culturalble commanded area, un-culturable commanded area. Relation between duty and delta with derivation- Importance of expressing duty with place of its measurements, factors effecting duty, method of improving duty. Rotation of crop, purpose, types of crop under rotation. Problems in calculation of discharge of canal from crop water requirement and finding the reservoir capacity or tank considering the losses and crop water requirements.			
4. STORAGE RESERVOIR		6	15
Function of storage-reservoir, factors to be considered for the selection of site for a reservoirs. Definition of terms- Bed level, lowest supply level, max water level, High Flood Level, flood lift, free board, top of bund-level, flood absorption capacity of reservoir, water shed area, dead storage, live storage, gross storage marking all the control levels over a cross section of a storage reservoir. Simple problems on fixing control levels from the crop water requirements, lift of reservoir, rate of silting, catchment area etc. from the R.L of contours and the corresponding storage			

capacity. Area capacity curve and its use in reservoir planning. Sedimentation in reservoirs-Preventive measures to control sedimentation. Losses in reservoir-Evaporation and absorption losses, factors affecting these losses.

6 15

5. GRAVITY DAMS

Dam-definition, classification of dams. Merits and demerits of gravity-dams situation under which gravity dam is suitable. Forces acting on masonry-dams, conditions of stability of gravity-dams. Elementary or theoretical profile and practical profile-low and high gravity dam. Construction of masonry dams- Drainage gallery, uplift control measures longitudinal and transverse joints. Failure of gravity dams and the remedial measures for strengthening gravity dam. Pickup weir-layout, location and function.

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6. SPILLWAYS

Spillway- Purpose and location of spillway. Types of spillways with and without gates, straight drop spillway, ogee spillway, through spillway, duck bill spillway. Energy dissipators- Function, location types of energy dissipaters. Spillway gates- Vertical and radial gates, function, location and principle of working.

5 9

7. EARTHEN DAMS

Earthen dam cross- section and its components. Types of earthen dam-Homogenous, cored and diaphragm type, their suitability for different foundation- Conditions, construction materials used. Construction of earthen dam, methods of construction, hydraulic fills and rolled fill methods machinery used in construction. Causes of failure of earthen dams, types of failures such as hydraulic failures, seepage failures and structural failures their effects and remedial resources. Seepage through earthen dam saturation gradient, phreatic lines, methods to reduce seepage through embankment and foundation, provision of core wall and cut-off trench, their effect on percolation. Drainage in earthen dams, rock-toe, vertical filter, horizontal filter or blanket. Outlets in earthen dams, functions and types.

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8. MINOR IRRIGATION SCHEMES

Bandhara-Layout and component parts. Advantages and disadvantages. Percolation tank, necessity, layout, component parts, selection of site and its construction. Lift irrigation, advantages and disadvantages. Open and tube wells, yield of wells, methods of determining yield by constant level pumping and recuperation test.

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9. DIVERSION WORKS

Weirs, functions, types, sloping-weir, vertical drop weir, dry stone weir, and situation favouring its construction. Barrages, components and their function, typical layout of barrage and location.

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10. DISTRIBUTION WORKS

Classification of canals, different method of alignment of canals ridge and contour-alignment, factors to be considered during alignment. Typical cross-sections of canal in cutting, embankment, partial-cutting and partial embankment and components. Canal lining, necessity, types of lining and joints, advantages and disadvantages of canal lining, maintenance of canals.

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11. CROSS-DRAINAGE WORKS

Definition of C.D works, function and necessity. Selection of site for cross drainage works. Types of CD works such as aqueduct- super-passage, head regulator, cross regulator outlets for canals.

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12. INVESTIGATION

Investigation for an Irrigation project- Preliminary and detailed engineering surveys. Geological and hydrological surveys. Survey of existing hydraulic structures under minor irrigation- Scheme, command-area. Preparation of layout plans and detailed drawings of the project. Final project report with cost of individual components.

cost benefit ratio, beneficiaries of the scheme, etc.		
Total	48	100

REFERENCE BOOKS

1. S.K Garg- Irrigation and Hydraulic Structure- khanna ,publication, Delhi-6
2. J.G Dahigaonkar- Textbook of Irrigation Engg
3. Birdi & Das - Irrigation Engineering
4. K.R Sharm: Irrigation Engg not I, II & III.
5. B.C. Punmia, Pande, & B.B.Lal, Irrigation and Water Power Engineers9th-Standard probe distributors Delhi-6
6. Bharat singh - Fundamentals of Irrigation Engg --Nanchand and Bros, Rorkee
7. Varshney S.C Gupta- Theory and Design of Irrigation Engineering and hydraulic structures- Oxford IBH Pub. Co. Delhi.
8. V.P Periyar- The foundation principle of Irrigation Engg

