Faculty of Engineering & Technology
P.K.University
Shivpuri (MP)

Evaluation Scheme & Syllabus for
Department Of Civil Engineering

M. Tech.-(Construction Planning & Management)
(I to IV Semester)

(Effective from session 2019-20)

EVALUATION SCHEME

M. Tech.-Construction Planning & Management

Semester-I

SUBJECT CODE	SUBJECT NAME	THEORY		PRACTICAL		TOTAL
		SESS.(30)	EXT.(70)	SESS.(25)	EXT.(25)	
MTCP-101	Advanced Mathematics	30	70	NA	NA	100
MTCP-102	Construction Material	30	70	NA	NA	100
MTCP-103	Ad. Geotechnical Engg.	30	70	NA	NA	100
MTCP-104	Construction Technology	30	70	NA	NA	100
MTCP-105	Low cost Build materials & cont. Technology	30	70	NA	NA	100
MTCP-106	Computer Workshop Lab-I	NA	NA	25	25	50
MTCP-107	Ad. Construction Lab-I	NA	NA	25	25	50

Semester-II

SUBJECT CODE	SUBJECT NAME	THEORY		PRACTICAL		TOTAL
		SESS.(30)	EXT.(70)	SESS.(25)	EXT.(25)	
MVCP 201	Construction Management	30	70	NA	NA	100
MVCP202	Prefabrication design & its construction technique	30	70	NA	NA	100
MVCP 203	Construction Equipment and Material Management	30	70	25	25	150
MVCP 204	Financial Management in Construction Industries	30	70	NA	NA	100
MVCP 205	Risk & Safety Management in Construction Industry	30	70	NA	NA	100
MVCP 206	Construction software Lab	NA	NA	25	25	50
MVCP 207	Adv. Construction Lab					

Semester-III

SUBJECT CODE	**SUBJECT NAME**	THEORY		PRACTICAL		TOTAL
		SESS.(30)	EXT.(70)	SESS.(25)	EXT.(25)	
MVCP 301	Dissertation phase-I	NA	NA	200	300	600
MVCP 302	Seminar-III	NA	NA	50	50	50

Semester-IV

SUBJECT CODE	**SUBJECT NAME**	THEORY		PRACTICAL		TOTAL
		SESS.(30)	EXT.(70)	SESS.(25)	EXT.(25)	
MVCP 401	Dissertation phase-I	NA	NA	300	300	600

Department Of Civil Engineering
(Faculty of Engineering & Technology)
P.K. University, Shivpuri (MP)
I Year I Semester

MTCP-101-Advanced Mathematics

(3-1-0)

Unit-1

Introduction of operation-research, Mathematical Programming Techniques Linear programming (formulation, Graphical solution).Simplex method, BIG-M method. Duality theory in linear programming, Transportation & Assignment Problem.

Unit-2

Network Methods: CPM, PERT, Dynamic Programming, Bellmon's Principle of optimality, Non linear Programming. Fibonacci method.

Unit-3

Game theory, Queuing system, Genetic algorithm, ANN methods, Evolutionary algorithms.

Unit-4

Probability concepts , Additive and Multiplicative laws of Probability , Boye's theorem, statistical frequency distribution, Binomial, Poisson, Normal Distribution, confidence intervels, Tests of Significance for small & large samples. Testing of Hypothesis, Linear and Non linear regression.

Unit-5

Reliability Engineering: Basic concepts of Reliability, Design for Reliability constraints and consideration Reliability and Mathematics, Components Reliability and Hazard models, System Reliability models.

Books :-

1. Operation Research by Phillips & Ravindran
2. Operation Research by TAHA
3. Probability, Statistics & Decision in Civil Engineering by Benjamin & Cornell
4. **Optimization by S.S. Rao**

Department Of Civil Engineering
(Faculty of Engineering & Technology)
P.K. University, Shivpuri (MP)
I Year I Semester

MVCP 102 - Construction Materials

1. Material Science :

Classification, Standardization , Codification and Variety. Details of Micro Structure of Different construction Materials, Different effects on materials of construction.

2. Properties of Materials :

Environmental Influences : Thermal effects : Effect of Chemicals, Fire resistance, Corrosion and Oxidation, Radiation. Properties of fresh & hardened concrete. Shrinkage & creep of concrete.

3. Concrete :

Design and production of concrete in gradients, Additives and admixtures. Special concretes e.g. light weight, Heavy weight, Ready mix concrete, Fiber Reinforced concrete etc.

4. New Construction Materials :

Polymer materials, Thermo - Plastic, Polymer Concrete, Composite materials, Ferro-cement, Ferroconcrete, Building materials from Agricultural & Industrial wastes.

5. Quality control in construction :

Various aspects, Principle of statistical quality control. Different techniques of materials and process Quality control, Destructive and non-destructive Testing of Materials, I.S. and international procedures of testing.

Books-

1. Ammer, D.A. Material Management Irwin Publishers Illionis, 1972.
2. White A.H. Engineering materials, MC Graw - Hill.
3. Deb. A., Engineerig materials, world press.
4. Billmeyer Jr. F.W. Text Book of Polymer Science, Interscience Publishers Inc.
5. Golding Brage Polymers and Resins Nortrand.
6. Schmidt A.X. & Marties CA "Principle of High Polymer Theory & Practice" MC Graw – Hill.
7. Stille, J.K. "Introduction to Polymer Chemistry" Johwiley.
8. Winding C.C. & Hiatt G.D. "Polymetric".

Department Of Civil Engineering
(Faculty of Engineering & Technology)
P.K. University, Shivpuri (MP)
I Year I Semester

MVCP 103 - Advanced Geotechnical Engineering

1. Site Investigations & Stress Distribution in soils :
Brief review of various methods of subsurface explorations, soil sampling, subsurface soundings, Geophysical explorations. Stress distribution beneath loaded areas by Boussinesq Westergaard's and Steinbrenner methods. Newmark's influence chart. Contact pressure distribution. Settlement analysis.

2. Well Foundations & Coffer Dams :
Types of caissons , Wells, and their design criteria. IS and IRC codes and their
provisions. Tilt and Shift in wells and their rectifications. Types, Design data for cellular dams, stability analysis. interlock Stresses, Methods of design of cellular coffer dams.

3. Machine Foundations :
Theory of Vibrations. Single and double degree of freedom system. Damped and Un-damped vibrations. Types of machine foundations, mass spring model of analysis. Apparent mass of soil. Design of block foundations for impact type of machinery. Indian standard on Design and Construction of Foundations for Reciprocating machines.

4. Foundations on Expansive Soils :
Characteristics and treatment of expansive soils. Construction techniques in expansive soils. Use of under-reamed piles and their design criteria, CNS Layer techniques. Construction on collapsible soil.

5. Rock Mechanics :
Problems in Rock mechanics, Classification of rocks, physical, geological and Mechanical properties of rocks, mechanics of rock, deformation and fracture under load. The range and scope of Rock mechanics in relation to civil engineering projects.

Department Of Civil Engineering
(Faculty of Engineering & Technology)
P.K. University, Shivpuri (MP)
I Year I Semester

MVCP 104 - Construction Technology

1. Advanced Pavement Construction Techniques :
Pavement Construction using Bitumen, Hot mix plant, Concrete Road Construction, Fibre Reinforced Pavement Construction, Low Cost Road Construction Techniques.

2. Form Work and Temporary Structures :
Design and construction features of different types of Temporary Structures. Stationary and slip form work Techniques, Special features of in situ construction. Stripping and Removal of form works, Form works for special structures e.g. shells, bridges, towers etc.

3. Steel Construction :
Shop and insitu construction techniques, different connections. High strength bolts, Clearances and Tolerances, Erection of steel structures like Bridges, Trusses Chimneys, Power Houses.

4. Pre-stressing :
Plants, Equipment for Pre-stressed Construction, Different Techniques of Pre-stressing. Pre-stressing of Bridge girders, water tanks and special structures.

5. Construction Techniques of Heavy and Special Structures :
Dams, Bridges, large span roofs, high rise Buildings, off shore Platforms, Pipelines, Tunnels and other under- ground structures, Safety measures in Construction.

Department Of Civil Engineering
(Faculty of Engineering & Technology)
P.K. University, Shivpuri (MP)
I Year I Semester

MVCP 105 - Low Cost Building Materials and Construction Techniques

1. Concepts of low cost materials
Soil, Fly ash, ferrocement, Lime, Fibers, Stone Dust, Boulders and oversize metal, Bitumen etc.

2. Low cost building material products:-
(a) Walls - Stabilized and sun dried, soil blocks & bricks, Hollow concrete blocks, stone masonry blocks, Ferro-cement partitions.
(b) Roofs - Precast R.C. Plank & Joists roof, Precast channel roof, Precast L-panel roof, Precast Funicular shells, Ferro-cement shells, Filler Slab, Seasal Fiber roof, Improved country tiles, Thatch roof.

3. Low cost construction Techniques and Equipment :-
(a) Techniques :- Rat trap bond construction, Precast R.C. and Ferro-cement technique, Mud Technology.
(b) Equipment's :- Brick mounding machine, Stablilised soil block making machine and plants for the manufacturing of concrete blocks.
(c) Low Cost Roads :-

4. Low cost sanitation :-
(a) Waste water disposal system
(b) Low cost sanitation for rural and urban areas
(c) Ferro-cement Drains

5. Cost analysis and comparison :-
(a) Low cost materials
(b) Low cost techniques

Department Of Civil Engineering
(Faculty of Engineering & Technology)
P.K. University, Shivpuri (MP)
I Year II Semester

MVCP 201 – Construction Management

1. Contract Management - I :

Types of Construction contract, Lump sum, Unit rate, cost plus-fee, Cost Plus percentage-fee, Incentive Contracts, Nature of Contract, Contract Documents and Contracting procedures, contract revisions, Negotiated contracts, contract claims.

2. Contract Management - II :

Technical Specifications, Drawings, Tender Bond, Labour and Material Payment Bonds, Scrutiny of Tenders, acceptance, letter of indent. Important Contract clauses, Terms of Payment, retention acceptance and final payment, maintenance period, Time for Completion, Extension of time, Variation in work and conditions, claims and disputes, liquidated damages, Termination rights and responsibility of client, Architect, Engineer, Contractor, Professional liability. Disputes in contracts, Sub-contracts.Purchase orders as contracts. Insurance Contract and Claims. Arbitration, Accounts.

3. Tender Management :

Advance Techniques of Estimating. Principles of Analysis of rates and Specification, writing for different types of construction industries, capital structure, Theories.

4. Legal Frame Work of Construction :

Constitutional provisions relating to Business and industry, Master Plans, Indian Contract Act. Arbitration act.

5. Labour Laws and Legislation :

Contract labour (RRA) ACT 1970, laws relating to wages, bonus & industrial disputes.

Department Of Civil Engineering
(Faculty of Engineering & Technology)
P.K. University, Shivpuri (MP)
I Year II Semester

MVCP202 – Prefabrication design & its construction technique

1. Prefabricated Construction :

Prefabricated construction, necessity, Advantages, disadvantages, Mass produced steel, reinforced concrete and masonry systems, Industrialized buildings.

2. Modular Construction :

Modular coordination, basic module, planning and design modules, Modular grid systems, National Building Code Specification, Standardization, Dimensioning of products, Preferred dimensions and sizes, tolerances and deviations layout and processes.

3. Prefabricates :

Classification, foundation, columns, beams, roof and floor panels, wall panels, clay units, box prefabricates, erection and assembly.

4. Design of prefabricated Elements :

Lift points, beams, slabs, columns, wall panels, footings, design of joints to transfer axial forces, moments and shear forces.

5. Construction Techniques :

Large panel construction, Lift slab system, Glover system, contains' jack-block system, Constain V-Plate system, Bis on system, Silber-Kuhi System, control of construction processes. equipment’s, horizontal and vertical transportation.

Department Of Civil Engineering
(Faculty of Engineering & Technology)
P.K. University, Shivpuri (MP)
I Year II Semester

MVCP 203 – Construction Equipment and Material Management

1. Planning and Selection of Construction Equipment :

Advantage of mechanization of Construction industry. Merits of Labour intensive construction. Planning for construction equipments. Analytical studies, equipment operation. Selection of construction machinery & equipments.

2. Production Estimates, Sizing and Matching :

Cycle time capacity ratings and output of Excavators, Power shovels, drag lines, scrapper, bulldozers, tractor shovels rippers, motor graders etc. Sizing and matching. Capacity ratings and output of compactors, aggregate processing plant concrete production plants etc.

3. Economics of Construction Equipment :

Equipment working rates, Investment cost, Depreciation cost, major repair cost. Cost of fuel and lubricants. Cost of labour, servicing and field repairs, overheads. Recommendations of statuatory bodies.

4. System Approach :

Problems of equipment management. Application of CPM in equipment management. Application of the assignement model, transportation model and waiting line models in equipment management.

5. Material Management :

Materials planning and budgeting. Role and functions at different levels of management and budgeting variations. Stages of materials management. A.B.C. analysis. Advantages, mechanics purpose cautions, limitations and tabular analysis. Purchasing parameters and inter relationships. Time source quantity, price, quality, grading systems. Special purchasing systems. Obsolesence. Scrap disposal.

Department Of Civil Engineering
(Faculty of Engineering & Technology)
P.K. University, Shivpuri (MP)
I Year II Semester

MVCP 204 – Financial Management in Construction Industries

1. Personnel Management :

Principle of personnel management. Qualities of a personnel manager. Objective of personnel management. Personnel policied procedures and programmers. Organizational structure of personnel department. Man power resources. Human resource planning. Job analysis. Performance standards, work rules. Recruitment and selection process. Tests and interview Induction orientation and in doctrination. Policies, promotion, demotion, transfers etc. Training of personnels. Need for training. Principles of training programmes. Types of training programmes on the job training policy and implementation. Task analysis identification and methodologies. Evaluation of training and post training follow up. Performance appraisal-rating scales, rankings etc. Management development programmes. Wage and salary management. Principles of wages and salary administration. Factors influencing wages. Types of wages and salary structure. Theory of wages. Minimum fair and living wages. Types of wages. Wage incentives. Types of incentive schemes. Profit sharing features-Fringe benefits general scope. Different types of fringe benefits and awards.

2. Labour Management :

Industrial relations in construction industry. Principles of industrial relationships. Functional requirements and programme, Industrial disputes, causes of disputes. Types Of disputes. Procedures of the settlement of industrial disputes. Implementation mechanism. Trade Unions - Principles of industrial trade unionism. Objectives and functions. Essentials of trade union. Objectives, forms levels and growth of worker's participation in management. Collective bargaining. Principles and main features of collective bargaining. Different industrial Regulations and labour laws and acts – Industrial Health and Safety. Occupational hazards. Provisions under factory act. Accident and safety at construction sites. nature and causes of accident. Safety Programmes and their principles. Factors effecting accidents etc.

3. Waste Management :

Introduction to waste and waste management, the concept of productivity and its inter relationship with productivity. Systems concept of waste. Complementarity of waste and resource management. Identification of construction waste material waste, man power waste, energy waste, space waste time waste, equipment waste, capital waste, utilities and services waste. Data and information waste. Design of waste reduction in construction. Reduction,

Collection, recycling treatment and disposal of waste in construction systems. Modelling of resources and waste flow in construction systems waste management and cost reduction. Roles of legislation and government.

4. Financial Management :

*Managerial Economics & Financial Statement,*Nature and scope of managerial economics. Economic theories. Demand analysis and fore casting . Elasticities of demand. Cost and production analysis. Pricing decisions, Policies and practices. Break even analysis. Time value of money, Economics. Comparisons using time value of money basic of comparisons. Decision making amongst alternatives. Cash flow, discounted cash flow. Cash flow forecasting, Project appraisal through financial statements. Statement analysis. Financial ratio analysis, Trend analysis yield. Taxation and inflation, Sinking fund provisions. Risks and uncertainties. Project risk and firm risk. Replacement analysis. Finances & working capital. Capital budgeting & Performance budgeting. Benefit-cost ratio. Project selection, Control and evaluation, Pre-project and post project evaluation.

5. Capital Generation & Financial Accounting

Banking : Financial Institutes like IFCI, IBI, International financing etc. Book keeping process in construction. The acciybtabcy cycle. Journals, ledgers etc. for labour cost, materials and purchases miscellaneous ledgers and accounting procedures, types of financial statements in Govt.

Department Of Civil Engineering
(Faculty of Engineering & Technology)
P.K. University, Shivpuri (MP)
I Year II Semester
MVCP 205 – Risk & Safety Management in Construction Industry

UNIT I

Introduction to Risk Management Definitions - The Development of Risk Management - Principles of Risk Management - The hazard and risk – knowledge of the contents the reasons for managing risk in the public and private sectors – Risk estimation – types of risk and classifications - benefits of having a risk management programme responsibilities of those involved in the risk management - Outline the elements of the various risk management standards,

UNIT II

Risk Assessment, Analysis and Evaluation 10 hr Risk Management Documentation – Risk Culture - Risk Identification - – life cycle risk management – multi dimensional analysis – risk ranking – event incident scenario – uncertainties and consequences – risk estimation – assessment – quantitative techniques – human factors – decision making under uncertainity

UNIT III

Risk Control and Treatment Risk Reduction - Transfer and Sharing of Risk - Elimination and Retention of Risk - Entrepreneurial risks - Pure risks - Internal risks Retaining insurable risks – Insurance - Self-insurance - Contractual Transfer of Risk – Captives - Responsibilities of Those Involved in Risk Transfer -- Factors Affecting Insurance as a Financing Tool . Risk Management and Internal How the Internal Audit Function Works - Control Systems - Auditing Risk Management - Setting

UNIT IV

Construction accidents -Accidents and their Causes – Human Factors in Construction Safety - Costs of Construction Injuries – Occupational and Safety Hazard Assessment – Legal Implications .I Contractual obligations- Safety in Construction Contracts – Substance Abuse – Safety Record Keeping

UNIT V

Designing for safety - Safety Culture – Safe Workers – Safety and First Line Supervisors –Safety and Middle Managers – Top Management Practices, Company Activities and Safety – Safety Personnel – Subcontractual Obligation – Project Coordination and Safety Procedures .