

TUTOR MARKED ASSIGNMENT

ET 502 (Part A)

STRENGTH OF MATERIALS

Maximum Marks : 100
Weightage : 30%

Course Code : ET-502A
Last Date of Submission : Sept. 30, 2017

Note : All questions are compulsory and carry equal marks. This assignment is based on all Blocks of Strength of Materials.

- Q.1 (a) A point in a given material is subjected to a system of stresses as shown in the Figure 1. Calculate the following :
- Principal stresses, and the identification of the plane on which these act.
 - Maximum shear stress, and the identification of the plane along which these act.

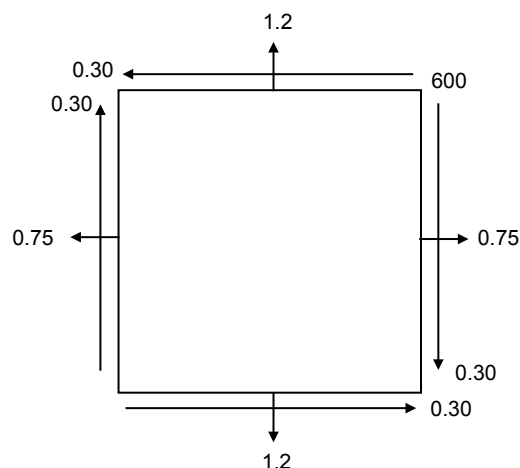


Figure 1

- (b) A beam of I-section, 60 cm deep and 25 cm wide has equal flanges 3 cm thick and a web of 2 cm thickness. It carries a shear force of 25 tonnes at a particular section. Determine the shear stress distribution in the beam section, also find the ratio of maximum to mean shear stress there.
- Q.2 (a) Prove, from fundamental principles, that the relation between the Elastic constants, E , G , and K , can be expressed as :

$$E = 3K(1 - 2\nu) = 2G(1 + \nu)$$

where, the symbols carry their usual meaning.

- Discuss the significance of the relationship between Young's modulus and modulus of rigidity.
- For a given material Young's modulus and modulus of rigidity are given as 130 Gpa and 55 Gpa, respectively. Calculate the Poisson's ration and bulk modulus of the material.

- Q.3 (a) Figure 2 depicts a truss girder. Determine the magnitude and nature of forces (stresses) induced in all its members for the given loading by: (i) method joints, (ii) method of sections, and (iii) graphical construction.

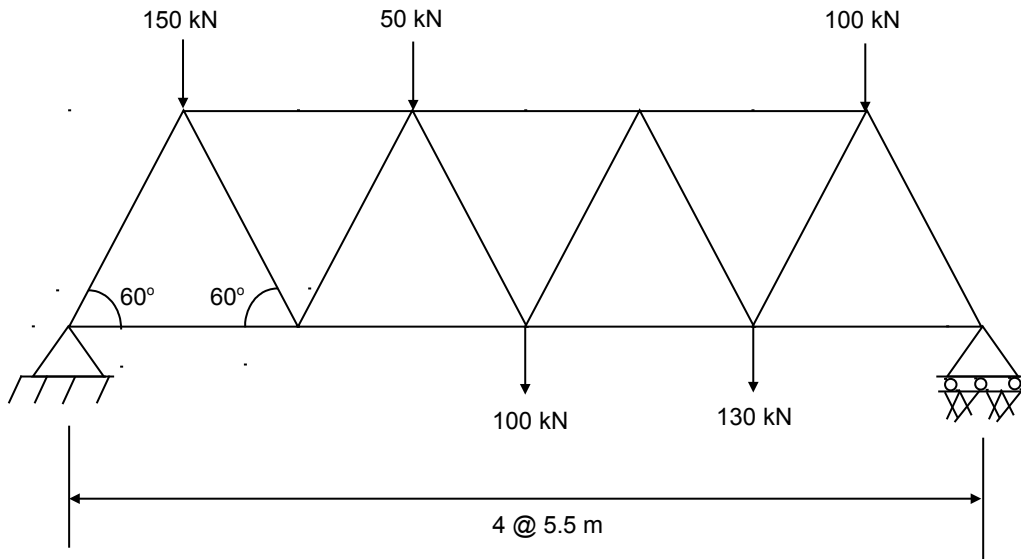


Figure 2

- (b) For the framed structure given in Figure 3 find the magnitude and nature of forces developed in at the members of this truss by: (i) method of joints, (ii) method of sections, and (iii) graphical construction.

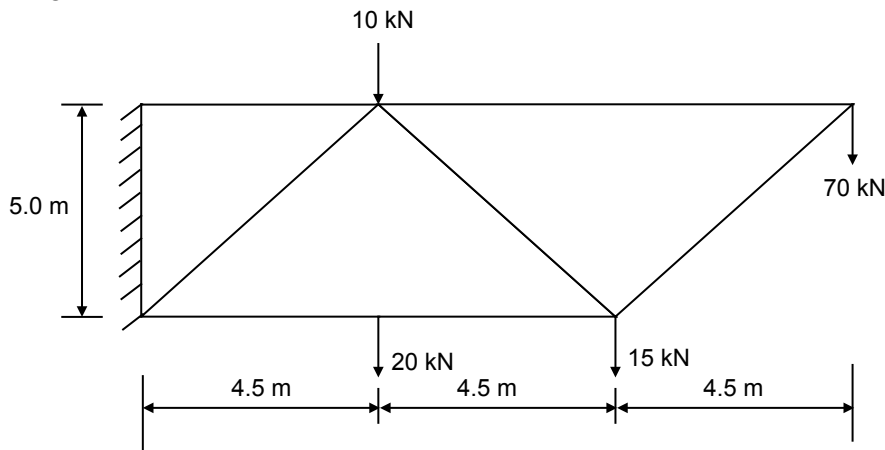


Figure 3

- Q.4 (a) Figure 4 indicates the loading pattern on a simple, supported beam. Draw SF and BM diagrams of the beam.

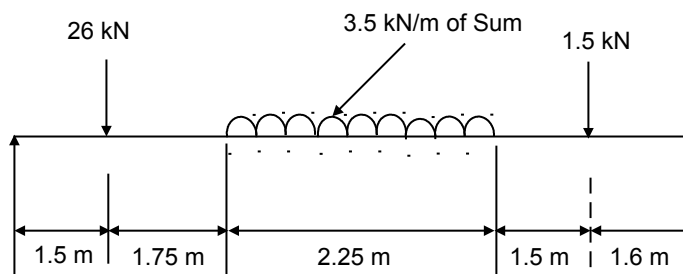


Figure 4

- (b) A timber beam of rectangular section is simple, supported and carries a load of 2.5 kN at mid-span (span = 4.20 m). If the depth of the section is to be twice its breadth, and the bending stress is not to exceed 9 N/mm², determine the cross-section dimensions of the beam.

- Q.5 (a) Two steel shafts *A* and *B* of the same length are subjected to equal torques. Shaft *A* is of uniform diameter *D*; and shaft *B* is of diameter *D* over its half length, and of diameter $D/3$ over the other half of its length. Find the ratio of the strain energies stored in the two shafts.
- (b) The internal diameter of a hollow shaft is $2/3$ of its external diameter. Compare its resistance to torsion with that of a solid shaft of the same weight and material.
- Q.6 (a) Figure 5 is the SF diagram for a loaded beam that rests on two supports (at *A* and *C*). Deduce directly the BM diagram from the beam giving values at 1.5 m intervals along the length of the beam.

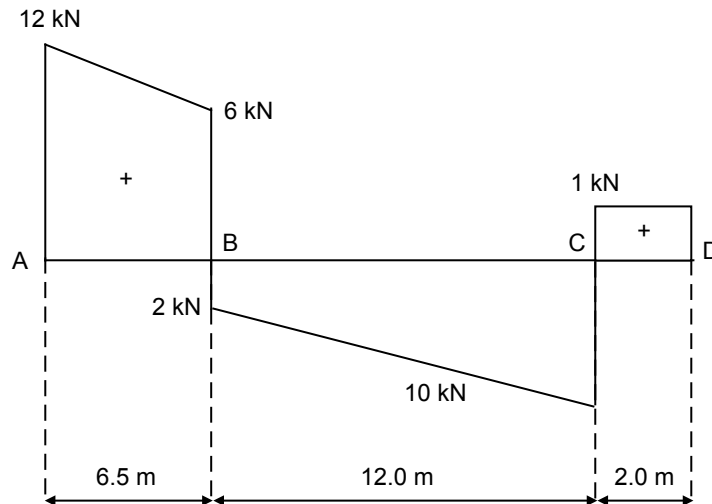


Figure 5

- (b) A beam 4.5 m in length is simply supported at the ends and carries a uniformly distributed load of 5.5 kN/m run. Determine the strain energy stored in the beam. Take $E = 200 \text{ kN/mm}^2$ and $I = 1200 \times 10^4 \text{ mm}^4$.
- Q.7 (a) Find out the elongation in the given compound, circular bar (Figure 6), assuming Young's modulus, $E = 120 \text{ kN/mm}^2$.

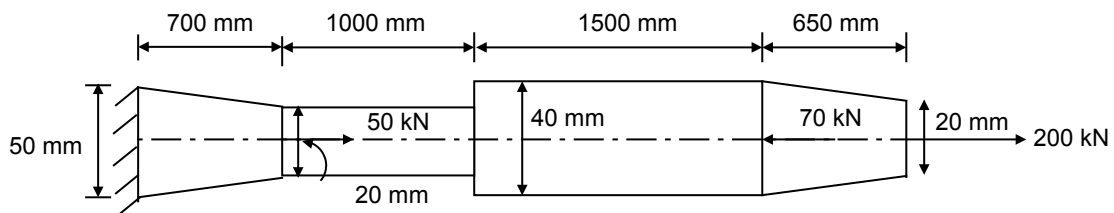


Figure 6

- (b) Given a solid bell shaped bar (Figure 7) find I_{xx} , I_{yy} and I_{xy} of this section.

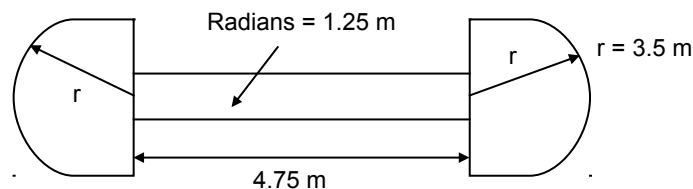


Figure 7

- Q.8 (a) A steel bolt 30 mm diameter and 300 mm long passes through a copper tube, having internal and external diameters of 35 mm and 40 mm, respectively. The bolt has four threads per cm, and the nut is initially just tight. Calculate : (i) the angle through which the nut is turned to cause a tensile stress of 800 N/mm^2 in the bolt; (ii) stress in the tube thereof. Take $E_s = 2 \times 10^5 \text{ N/mm}^2$ and $E_c = 10^5 \text{ N/mm}^2$.

- (b) A solid Aluminium shaft 1000 mm long, and of 50 mm diameter is to be replaced by a tabular steel shaft of the same length and the same outside diameter, so that either shaft could carry the same torque and hence the same angle of twist over the total length. What must be the inner diameter of the tabular steel shaft? Take the modulus of rigidity of steel = $0.85 \times 10^5 \text{ N/mm}^2$, and that of Aluminium = $0.28 \times 10^5 \text{ N/mm}^2$.

- Q.9 (a) A beam of I-section is simply supported over a span of 5.5 m. If the bending stress is limited to 120 N/mm^2 , calculate the uniformly distributed load that the beam can carry.

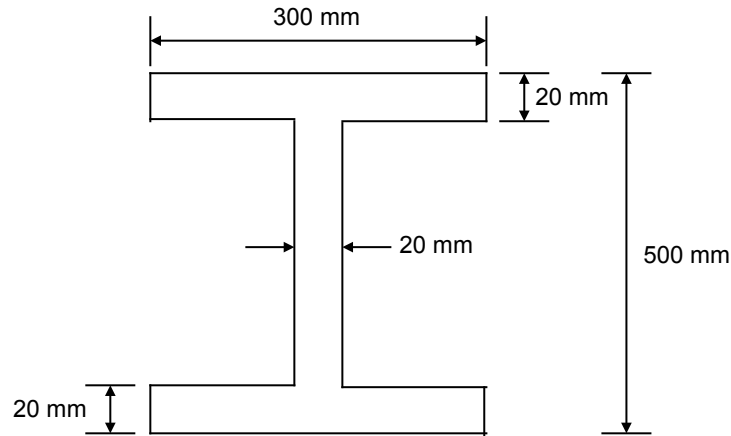


Figure 8

- (b) A rectangular beam 450 mm deep is simply supported over a span of 9.0 m. Calculate the maximum load it can take at its mid-span if the bending stress is limited to 120 N/mm^2 . Take Moment of inertia of the section = $5 \times 10^8 \text{ mm}^4$.
- Q.10 (a) A laminated spring having a length of 900 mm is required to carry a central load of 12 kN. Calculate the thickness, width and number of plates of the spring, if the bending stress and the central deflection are not to exceed 200 N/mm^2 and 15.0 mm, respectively. Also calculate the radius to which the plates should be curved. Take $E = 200 \text{ Gpa}$, and width of the plate to be 10 times its thickness.
- (b) A thin steel tube 50 mm in diameter is 2 mm thick. Find the safe twisting moment that can be applied to the tube if the allowable shear stress is 95 N/mm^2 . Also, find the twist in a length of 400 and 500 mm. Take $C = 8 \times 10^4 \text{ N/mm}^2$.

TUTOR MARKED ASSIGNMENT

ET 502 (Part B) STRUCTURAL ANALYSIS

Maximum Marks : 100
Weightage : 30%

Course Code : ET-502B
Last Date of Submission : Sept. 30, 2017

Note : All questions are compulsory and carry equal marks. This assignment is based on all Blocks of Structural Analysis.

Q.1 Draw influence line diagrams for moment at E , reaction at D and shear at C in the Figure 1.

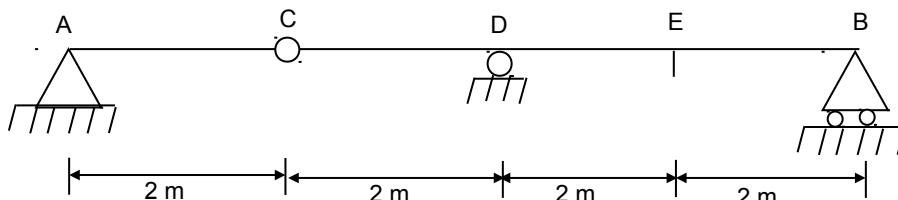


Figure 1

Q.2 (a) Figure 2 shows a frame hinged at base. Calculate the end reactions and draw the BM diagram. EI is constant.

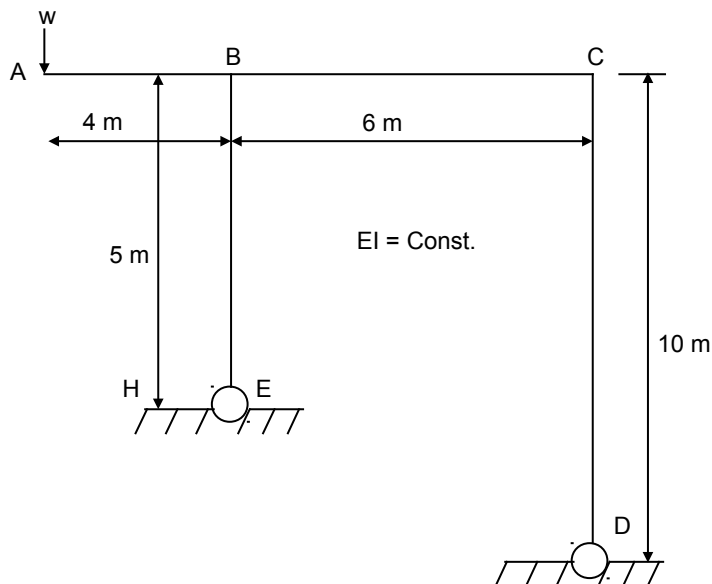


Figure 2

Q.3 Figure 3 shows a fixed beam with a point load. Calculate the support reactions with the help of Castigliano's theorem.

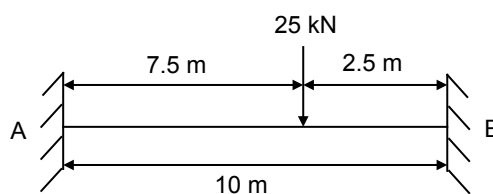


Figure 3

Q.4 Figure 4 shows a portal frame. Find the reactions at the supports A and B.

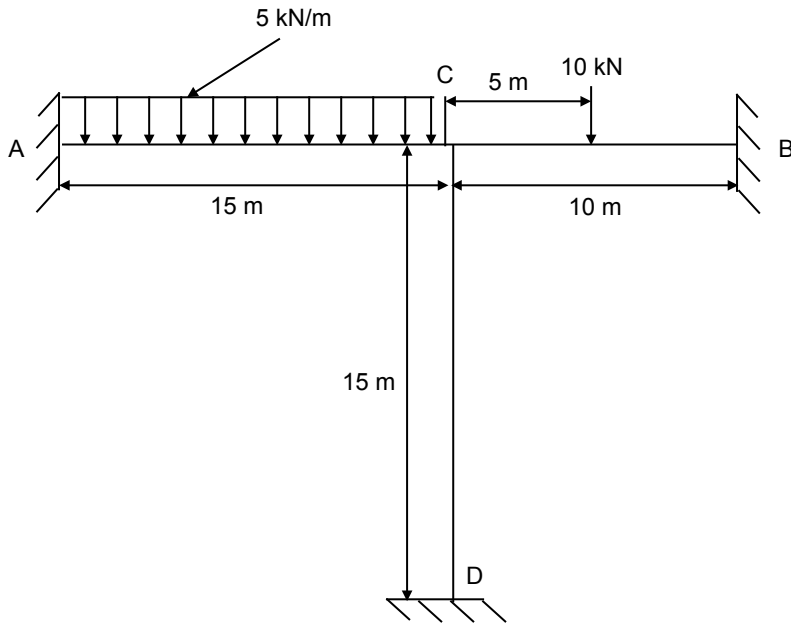


Figure 4

Q.5 A rigid frame is shown in Figure 5. The moment of inertia of all the members is the same. Calculate the support moments and draw the BM and SF diagrams and sketch the deflected structure for the given loads in the Figure.

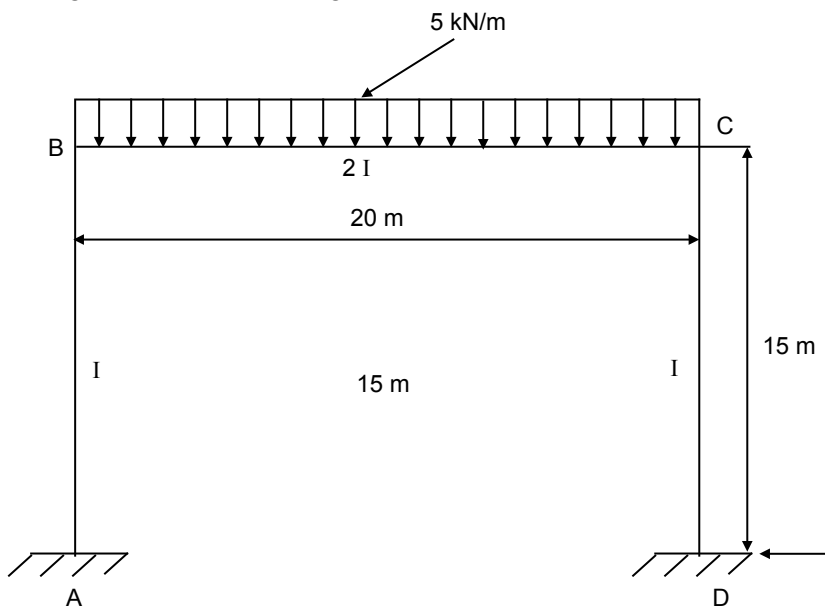


Figure 5

Q.6 Analyse the prismatic beam shown in Figure 6 using three-moment theorem and draw the bending moment diagram. The support B sinks by 5 mm. Take $EI = 36 \times 10^3 \text{ kN/m}^2$ as constant for the beam.

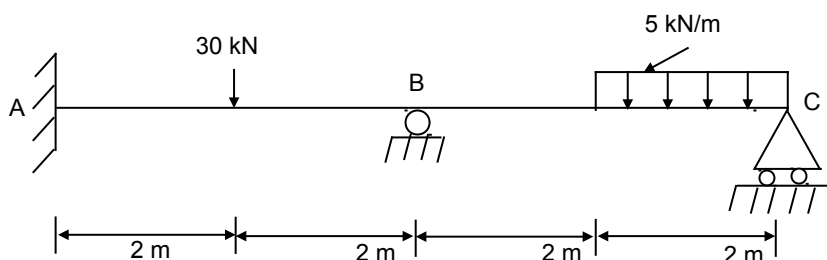


Figure 6

Q.7 Analyse the portal frame $ABCD$ loaded as shown in Figure 7. The member are made with same material, length and moment of inertia of each member are mentioned in Figure 7.

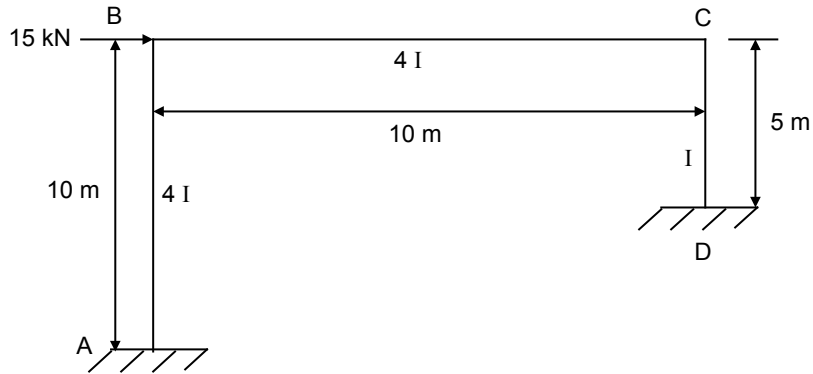


Figure 7

Q.8 Analyse the plane frame shown in Figure 8 using symmetry concept.

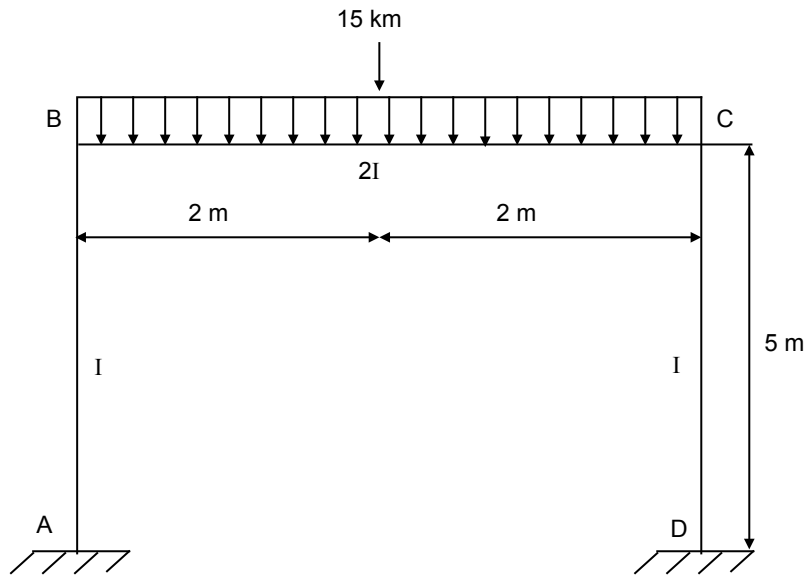


Figure 8

Q.9 (a) Determine the ultimate load W for the frame shown in the Figure 9. The ultimate moment capacities for AB , BC and CD are 2 MPa, 4 MPa and 3 MPa, respectively.

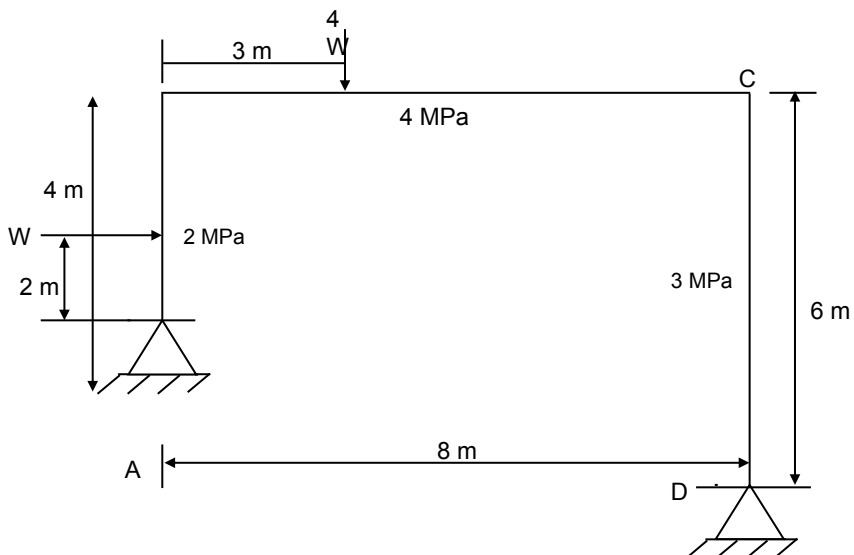


Figure 9

(b) Find the collapse load factor in terms of M_p for the frame shown in Figure 10.

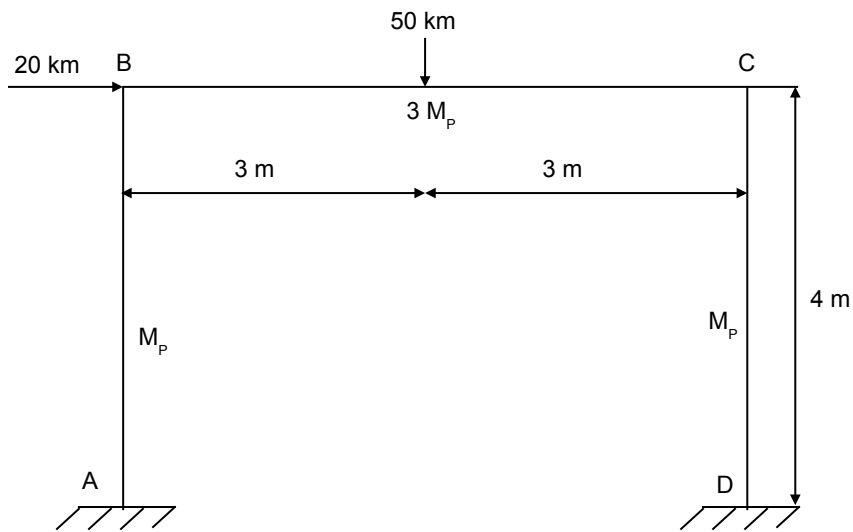


Figure 10

Q.10 A three-hinged symmetrical parabolic arch has a span of 90 m and a central rise of 15 m. It carries two 120 kN loads at 15 m and 30 m from left hand support and a udl of 3 kN/m over the right half of the span. Draw the bending moment diagram and calculate the bending moment, normal thrust and radial shear at a point 30 m from the right hand support.

TUTOR MARKED ASSIGNMENT**ET 521 (Part A)****PLANNING AND CONSTRUCTION OF BUILDINGS****Maximum Marks : 100****Course Code : ET-521A****Weightage : 30%****Last Date of Submission : July 31, 2017**

Note : All questions are compulsory and carry equal marks. This assignment is based on all Blocks of Planning and Construction of Buildings.

- Q.1 A plot of land measures 25 m × 25 m. The front is facing east and is on the 12 m wide road and a 6 m wide service lane is on the rear of the plot. Prepare a suitable, proportionate and dimensioned plan and elevation of a primary school building with following requirements :
- (a) One head master room
 - (b) One staff room for the teachers
 - (c) Five class rooms
 - (d) One activity room
 - (e) One indoor games room
 - (f) Three toilets
 - (g) A stair case
- Q.2 (a) Describe the various data required to be collected at a site to assess the potential of flood hazards.
- (b) Explain the basic requirements for judging the suitability of a site for all types of buildings.
- Q.3 Determine the minimum area of a plot for three storied residential building having four flats of 140 m² area in each floor for the given data:
- (a) Area for staircase and access should not exceed 25% of the ground floor area of the building, and
 - (b) FAR is to be restricted to 1.50.
- Q.4 (a) Discuss the minimum standards for rural housing as prescribed by NBO.
- (b) Describe the materials used in the application of water proofing layers on thatched roofs.
- Q.5 (a) List out broad functional elements of a shop, selling a variety of goods.
- (b) Describe the general requirements of "Hazardous Buildings". Also explain the important points to be considered in the planning of these buildings.
- Q.6 (a) Briefly discuss the various types of foundations.
- (b) Discuss the various factors on which depth of foundation of a multistoried building depends.
- Q.7 (a) What do you mean by super structure? Discuss the various functions served by walls in building.
- (b) Describe the common types of building stones and in what situations are they used?

- Q.8 (a) Briefly discuss the various types of window movement.
(b) Explain the modern types of doors in brief.
- Q.9 (a) Describe the components of oil based paints. How are these paints used as decorative materials?
(b) Explain the different materials used to clad the internal walls of any building.
- Q.10 (a) What do you mean by thermal insulation? Explain its significance.
(b) What is importance of accoustic insulation? Explain different types of accoustic materials.

TUTOR MARKED ASSIGNMENT**ET 521 (Part B)****BUILDING ARCHITECTURE****Maximum Marks : 100****Weightage : 30%****Course Code : ET-521B****Last Date of Submission : Sept. 30, 2017**

Note : All questions are compulsory and carry equal marks. This assignment is based on all Blocks of Building Architecture.

- Q.1 (a) How does an Architecture's role differ from an Engineer in any building project? What is his approach towards designing a building? What kind of problems does he solve by his architectural design?
- (b) Differentiate between architect, engineer and sculptor.
- (c) What is the role of science and technology in architecture?
- (d) List the elements that constitute our visual language. How do they affect your design?
- Q.2 (a) What are the principles of a good design? Give an example of a building in which some of these principles have been employed.
- (b) What are the visual properties and the types of form and space in architecture and how they are organised?
- (c) Describe the characteristics of Egyptian Architecture. What are the systems of construction in Egyptian architecture? Name the major building types of Egyptian Architecture.
- Q.3 (a) What are the factors that affected Greek Architecture? Describe the following :
- (i) Greek Temples,
- (ii) Greek Dwellings,
- (iii) Function of Roman forum, and
- (iv) System of water supply in Roman Architecture.
- Q.4 (a) Write in short about the structural system of Gothic Building. How the "quality of light" in the interiors of Gothic Cathedral was made possible?
- (b) What are the building types in Renaissance Architecture? Write in brief on the design and constructional aspects of St. Peter in Rome.
- (c) Name the countries where Baroque expression flourished. Write about the system of construction of the Baroque Age. Name the major building types.
- (d) Discuss in details the system of construction in both Buddhist and Hindu Architecture.
- Q.5 (a) Name the scripture of Vastu-Shastra. What are the style of Indian Architecture?
- (b) What is the departure in the system of construction after the arrival of Islamic rule in India?
- (c) Which was the earliest mosque on Indian Soil? Discuss in about the construction of "Taj Mahal".
- (d) Write in details about Colonial and Modern Architecture.

- Q.6 (a) What is Anthropometry? What are the types of human dimensions? How are aesthetic visual proportions evolved out of human dimensions?
- (b) What are the main types of activity related spaces in a building? Write the components of an activity-space.
- (c) What is the psychological dimension of space? What is a bubble diagram?
- (d) What are the environmental factors and how does a building modulate it? What are the various climatic zones of India? Discuss the main determining factors considered for the classification of the climatic zones in India.
- Q. 7 (a) What are the various fittings used in a building water supply system?
- (b) What are the important points to consider in-house drainage design?
- (c) Write notes on following :
- (i) Gully Trap
 - (ii) Sanitary fittings
 - (iii) Septic tank
 - (iv) Surface and concealed wiring
- Q.8 (a) What conditions make an inside of a building comfortable? How does an Architect ensure comfort inside a building?
- (b) What are shell and pneumatic structures? Where would you use such a structure? Where will you put a space frame?
- (c) Differentiate “ Arch” and “Vault”.
- (d) Explain briefly the followings :
- (i) Truss and types of truss
 - (ii) Geodesic dome
 - (iii) Simple Rigid Frame
- Q.9 (a) What are the different types of foundation?
- (b) Differentiate between shallow and deep foundations.
- (c) Differentiate between painting, varnishing and distempering.
- (d) What are the different types of bricks and stone masonry?
- (e) What are different types of stairs?
- Q.10 (a) Explain the role of an Architect in building project. What are the different types of Tender?
- (b) What is a professional Code of Conduct? Explain the duties and liabilities of an Architect.
- (c) How does computer help in architects work?
- (d) Differentiate between ‘hardware’ and software.

TUTOR MARKED ASSIGNMENT**ET 521 (Part C)****DESIGN DETAILING****Maximum Marks : 100****Weightage : 30%****Course Code : ET-521C****Last Date of Submission : Sept. 30, 2017**

Note : All questions are compulsory. Marks assigned to the questions have been shown in the brackets. This assignment is based on all Blocks of Design Detailing.

- Q. 1 (a) Determine the self weight of a brick wall per meter, considering its height to be 4 m when brick wall thickness is 230 mm and plaster of 12 mm on inner face while 25 mm on the outer face.
- (b) Why do we need concrete cover reinforcement? Mention the requirement for different member types.
- (6 + 4 = 10)
- Q.2 (a) Draw neat sketch of a square foundation of 3.5×3.5 m for a rectangular column of size 900×300 mm considering sloping footing.
- (b) State the advantages of limit-state approach method.
- (8 + 2 = 10)
- Q.3 Draw to a suitable scale a layout plan of a continuous beam of size 300×800 mm over three spans. The two-end spans being 8 m while central one is 4 m construction is monolithic with RCC slab 150 mm thick which is one way continuous in direction perpendicular to the beam. The slab 20×9 m is spanning over 4 beam equi-spaced at 3 m c/c and overhanging by 0.75 m on either side. The slab is subjected to load of 5 kN/m^2 . Assuming slab to be 150 mm thick, draw neat detail of continuous slab. Write a suitable schedule of reinforcement detail of the slab.
- (10)
- Q.4 (a) Explain in brief notes :
- (i) Form lining materials
- (ii) Telescopic beam.
- (b) Design the sheeting and beam for RCC flat slab 200 mm thick on $5 \text{ m} \times 5 \text{ m}$ module, height 4 m. Assume 25 mm planks are available.
- (5 + 5 = 10)
- Q.5 (a) Determine the working moment of resistance (MR) in kNm units of ISMB 400 and ISMB 400. Refer standard tables, in the IS handbook for structural engineer.
- (b) How does built-up section achieve economy?
- (6 + 4 = 10)

Q.6 Design the member and gusset plate connection for a tension member for a truss to carry an axial tension of 120 kN. Draw a neat sketch showing the connection. (10)

- Q.7 (a) In how many different ways can one weld two structural member. Draw appropriate sketches to explain them.
 (b) You are in a fillet weld shop. You need to connect < 2 angles ($65 \times 65 \times 6$) to carry 200 kN as shown in Figure 1.

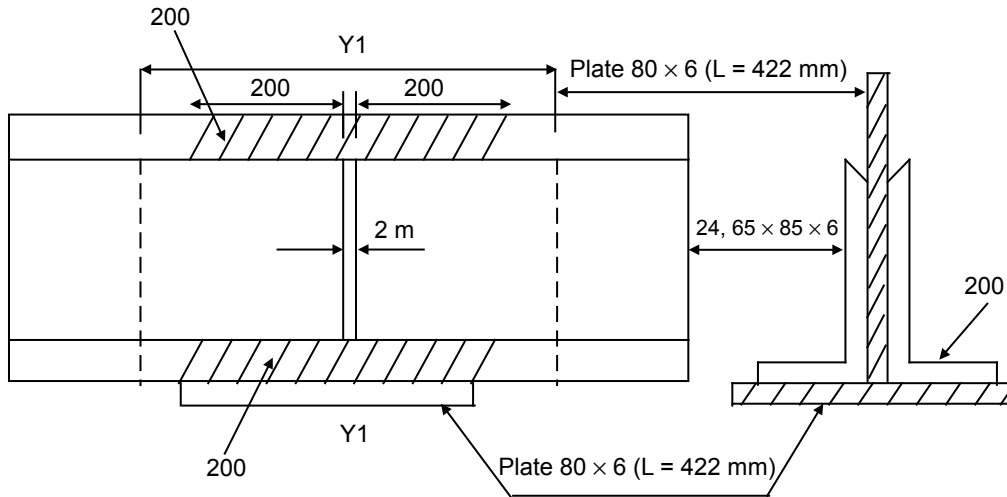


Figure 1

(5 + 5 = 10)

- Q.8 (a) Draw a typical detail of a Purlin supported on truss.
 (b) Draw a detail of an open web girder at its end supported on steel column of I-section for a hinged connection.

(4 + 6 = 10)

Q.9 (a) Calculate the number of twin mirror optic fluorescent fixtures with 40 w Tube lights for an office area of $20 \text{ m} \times 20 \text{ m}$ with a floor to false ceiling height of 2.5 m. The required illumination is 300 lux. Use the following data.

C = Coefficient of utilization for the room with spacing to height ratio of 1.3 is 0.7.

D = lamp derating factor is 0.90.

I = lumens per watt is 55.

M = mutual induction for two lamps in the same fittings is 0.92.

- (b) Sketch and explain physical requirements for lifts in a building.

(5 + 5 = 10)

Q.10 (a) Write short notes on :

(i) Principle of air conditioning

(ii) Water chillers

- (b) Calculate solar and trans gain at 4.00 pm for the month of June in New Delhi. Inside design condition is 24°C DB and 50% RH. The wall under consideration is facing south-west and is 3 m high and 10 m long, with 200 mm thick brick exposed on the exterior but interior plastered.

(4 + 6 = 10)

TUTOR MARKED ASSIGNMENT
ET 521 (Part D)
QUANTITY SURVEYING & VALUATION

Maximum Marks : 100
 Weightage : 30%

Course Code : ET-521D
 Last Date of Submission : Sep. 30, 2017

Note : All questions are compulsory and carry equal marks. This assignment is based on all Blocks of Quantity Surveying and Valuation.

- Q.1 (a) Discuss the various factors influencing the accuracy of estimate in building construction.
 (b) Define cost index and explain its importance.
- Q.2 Draw (to scale) the plans (of all floors) and sections of your polytechnic from where you have received your diploma in Civil Engineering on a drawing sheet and prepare an estimate of quantities of all the items concerning the structure.
- Q.3 Calculate the carpet area of a building having a plinth area of 2100 m². It may be assumed that 30% of the built up area will be taken by the corridors, verandah, lavatories, staircases, etc. and 10% of the built up area will be occupied by walls. Also prepare a preliminary estimate of this building. It is given that:
- | | |
|---|----------------------------|
| (i) Plinth area rate | Rs. 700 per m ² |
| (ii) Extra for special Architectural treatment | 2% of building cost |
| (iii) Extra for water supply and sanitary Installations | 5% of building cost |
| (iv) Extra of internal electric installations | 20% of building cost |
| (v) Extra for other services | 5% of building cost |
| (vi) Contingencies | 4% of overall cost |
| (vii) Supervision charges | 8% of overall cost |
- Q.4 (a) State the features of the software relating to analysis of rates in a building project that you have come across.
 (b) Explain the uses of computer in tender document preparation.
- Q.5 (a) Critically examine the role of specification in quality control .
 (b) Discuss the detailed specification of reinforced brick work.
- Q.6 Calculate the cost of 1 m³ of 1 : 1½ : 3 RCC (1 cement : 1½ courses sand : 3 stone aggregate) works in beams.
- Q.7 (a) Explain various factors affecting valuation of land .
 (b) Discuss briefly the significance of "Case Laws" in valuation of a property.

Q.8 A building fetches a gross rent of Rs. 3500/- per month. Assuming: 30% outgoings for taxes, 15% for repair and maintenance and 5% to set aside to accumulate the cost of buildings, determine its capitalized value at 7% per annum. Also calculate its depreciated value after 40 years assuming a depreciation of 1% per annum on its value at beginning of every year.

Q.9 Write a short notes on the following :

- (a) Abstracting of quantities.
- (b) Years purchase.
- (c) CPU.
- (d) Sinking fund method of depreciation.

Q.10 Differentiate between the following :

- (a) Depreciation and replacement cost of buildings.
- (b) Value and cost.
- (c) Secured and unsecured rent.
- (d) Unit method and cube method of estimation.

TUTOR MARKED ASSIGNMENT**ET 522****CONCRETE TECHNOLOGY AND CONSTRUCTION TECHNIQUES****Maximum Marks : 100**
Weightage : 30%**Course Code : ET-522**
Last Date of Submission : Sept. 30, 2017**Note :** All questions are compulsory and carry equal marks. This assignment is based on all Blocks of Concrete Technology and Construction Techniques.

- Q.1 (a) Briefly discuss the process of manufacture of Portland Cement.
(b) Explain the basic raw materials used in the manufacture of cement. Also write down the approximate oxide composition limits of Ordinary Portland Cement.
- Q.2 (a) Classify Aggregates on the basis of weight, source, size and shape.
(b) What do you mean by the Fineness Modulus? Explain the method of determining the fineness modulus of aggregate with the help of an example.
- Q.3 (a) Discuss the effect of oil contamination of water on concrete.
(b) Explain the important properties of fresh and hardened concrete, which can be altered by use of admixtures.
- Q.4 (a) What do you mean by workability? Explain the various factors affecting workability of concrete.
(b) Describe the various methods adopted for compacting the concrete.
- Q.5 (a) Define 'Water/Cement' ratio. Explain its significance.
(b) Describe the effect of permeability on durability of concrete. Also describe the various ways by which impermeability of concrete can be improved.
- Q.6 (a) What are the basic differences between Destructive testing and Non-destructive testing? Under what circumstances each of them is used?
(b) What do you mean by Segregation? Explain the conditions, which could encourage segregation?
- Q.7 (a) Explain the important parameters to be considered for concrete mix design. Discuss how these parameters affect concrete mix design.
(b) Discuss the different types of polymer concrete. Explain their applications.
- Q.8 (a) What do you mean by shotcreting? Explain the various processes used in shotcreting. Which process of shotcreting would you prefer and why?
(b) Discuss the effects of cold weather on concreting.
- Q.9 (a) Describe in brief various equipment used for compaction of soils.
(c) Discuss different types of formwork and scaffolding.
- Q.10 (a) Discuss in brief various methods of dewatering. Explain their advantages and disadvantages.
(b) What is diaphragm wall? Explain its uses.

TUTOR MARKED ASSIGNMENT**ET 523 (Part A)****CONSTRUCTION WORKS SUPERVISION**

Maximum Marks : 100
Weightage : 30%

Course Code : ET-523A
Last Date of Submission : July 31, 2017

Note : All questions are compulsory. Marks assigned to the questions have been shown in the brackets. This assignment is based on all Blocks of Construction Works Supervision.

- Q1. Elaborate on the statement: “ The main responsibility of a construction supervisor is to create a structure or services through his leadership role.”
Give specific field examples, with name of the work (s).
(10)
- Q.2 List the important documents, to be maintained at the site of a given work, by the contractor’s supervisor. Give specimen drafts of these documents preferably with reference to actual field work (give name).
(10)
- Q.3 Draw on a full size drawing sheet (to scale) the front deviation and side elevation of typical 4-stroyed residential apartments housing several units for families. Draw its plinth-level plan also.
(10)
- Q.4 Consider an RCC culvert, a two-way reinforced roof slab, an RCC staircase and an RCC column of a building. Give the designed plans and sections; and prepare their bar bending schedules separately.
(10)
- Q.5 Explain the purpose of the following :
- (i) Muster roll for directly employed workmen
 - (ii) Attendance records for other than workmen
 - (iii) Measurement book
 - (iv) Register of material receipts and issues
 - (v) Log books for construction equipment
 - (vi) Record for indirect costs
- Give specimens of their respective formats.
- Q.6 Discuss the procedure of construction and maintenance of :
- (i) A multistoreyed building,
 - (ii) Deep bore well
 - (iii) Installation and testing for a suitable pump for a bore well
 - (iv) An RCC culvert (deck type)
- (10)

Q.7 Write (giving two practical examples) 500 word notes on bar charts, and network (CPM) and critical path. Take data from a field example (give name). (10)

Q.8 Draw an isometric view (on a full drawing sheet) of a bamboo scaffolding work for constructing a 6-storeyed building. Name the parts. (10)

Q.9 From the available literature collect your data, and discuss :

- (i) Anti-termite treatment
- (ii) Preparations of cement and lime mortar
- (iii) Dressing of stones
- (iv) Curing of RCC work.

(10)

Q.10 Draw (on a full size drawing sheet) an isometric view of :

- (i) Form work for an RCC column
- (ii) Form work for an RCC beam
- (iii) Form work for an RCC slab, and
- (iv) An RCC wall for a ground-level water reservoir.

(10)

TUTOR MARKED ASSIGNMENT

ET 523 (Part B)

OPERATION AND MAINTENANCE OF CONSTRUCTION EQUIPMENT

Maximum Marks : 100

Weightage : 30%

Course Code : ET-523B

Last Date of Submission : July. 31, 2017

Note : All questions are compulsory and carry equal marks. This assignment is based on all Blocks of Operation and Maintenance of Construction Equipment.

- Q.1 (a) What factors are considered while selecting equipment for constructing a project?
 (b) A jetting pump is to be designed to deliver 0.45 cumec under a head of water of 8 m. The co-efficient of discharge may be taken as 0.08. Determine the dimensions of the base and the tip of the nozzle assuming that the ratio of diameter of base to nozzle is 8.
- Q.2 (a) What do you understand by “downtime” of a machine? How will you analyse downtime?
 (b) A centrifugal pump operating at 1800 rpm requires 60 kw power to discharge 80 litres/sec against a head of 90 m. Find its capacity, head and power required at 2100 rpm.
- Q.3 (a) How will you select equipment based on its productivity?
 (b) How will you standardize procurement system for acquiring construction equipment?
- Q.4 (a) What do you understand by licence and permit on a construction job? Explain with suitable examples.
 (b) A single-stage reciprocating compressor takes 1m³ of air per minute at 1.0 bar and 15°C and delivers it at 7 bar. Assuming that the law of compression is $PV^{1.35} = \text{constant}$, and the clearance is negligible, calculate the indicated power.
- Q.5 (a) Name the two general classes of combustion engines and state how do they basically differ in principle?
 (b) Given that $W_H = 4$ t, $W_p = 8$ t, height of drop = 4 m and number of blows is 15 per minute, determine the efficiency of the blow and the energy waste per blow if the materials are inelastic.
- Q.6 (a) How will you carry out the inspection of the following machines?
 (i) Tractor dozer
 (ii) Excavator
 (iii) Dump truck
 (iv) Belt conveyor.
 (b) What are the various types of lubricants? Explain their uses.
- Q.7 (a) Define preventive maintenance. What are the different systems for maintenance applicable on large mechanized construction projects?
 (b) Compare the use of compressed air with that of steam as the motive fluid in pile driving.

- Q.8 (a) How are internal combustion engines rated? Describe how you will specify an engine to suit a specific application. What important features would you recommend for an engine in construction equipment application?
- (b) Classify water pumps and distinguish between different types of water pumps. What considerations affect pump selection on a construction job? Compare the three principle types of pumps.
- Q.9 (a) Explain why clean air is necessary for extended, trouble free operation of an internal combustion engine, and how this is ensured in a modern design?
- (b) What do you understand by pump characteristics and how do these characteristics help in pump selection?
- Q.10 (a) What is super charging and what part it plays in engines for construction equipment? Described how it is achieved.
- (b) Describe the various piling rigs available for construction of pile foundations. What are the distinguishing characteristics of each?

TUTOR MARKED ASSIGNMENT**ET 523 (Part C)****REPAIR AND MAINTENANCE OF BUILDINGS**

Maximum Marks : 100
Weightage : 30%

Course Code : ET-523C
Last Date of Submission : July 31, 2007

Note : All questions are compulsory. Marks assigned to the questions have been shown in the brackets. This assignment is based on all Blocks of Repair and Maintenance of Buildings.

- Q1. Select a structure (say, a school, dispensary, a residential house, etc.), giving its name and location. Bring out a report about its needed repairs using photographs/sketches. The report should consist of 300 to 500 words, and incorporate a detailed repair. Estimate in terms of quantities of materials required. (10)
- Q.2 Discuss in, at least 300 words each, the following, giving necessary sketches and prescribed specifications.
- (i) Manufacture and use of bricks
 - (ii) Manufacture and use of carbon steel
 - (iii) Various types of stone work used in construction of structures
 - (iv) Methods of curing of RCC works, i.e. various structural elements of a building. (10)
- Q.3 write a detailed essay on the corrosion of steel in general, with a separate reference to corrosion in coastal areas. (10)
- Q.4 Discuss the manufacture, application, and specifications of various types of paints and varnishes that are available for use. Also indicate how to address the up keep of a painted and varnished surface. (10)
- Q.5 Draw dimensioned sketches on a full size-drawing sheet 3D view, plan and cross sections of the following :
- (i) All modern bathrooms fittings, and
 - (ii) All kitchen fittings for rendering it fully functional. (10)
- Q.6 With reference to the relevant IS codes of practice, summarize the specifications for :
- (i) Wall and floor tiles and tiling,
 - (ii) All types of ball- valves, including floats,
 - (iii) Flushing cisterns,
 - (iv) Synthetic roof water-tanks appropriately fitted, and
 - (v) Water supply pipes and accessories for domestic use. (10)

Q.7 Taking an actual field situation (mention name and location) give the full procedure to carry out its complete face-lift. (10)

Q.8 (a) Explain how to prevent the role of ramp in dampening the outer walls of a building; and stop the entry of rain through its open windows.

(b) Outline the measures (giving sketches) to minimize/ avoid the entry of direct sunrays into the room of a given building. (10)

Q.9 Give the procedure for :

(i) Erecting a partition wall (brick) in a big hall of a building,

(ii) Tackling leakage in water supply lines, and

(iii) Repairing sinking of ground floor surface of a building. (10)

Q.10 Give a detailed outline of a procedure to tackle :

(i) Leakage in toilets,

(ii) Leakage in RCC roof slab, and

(iii) Leakage in masonry water tanks. (10)

TUTOR MARKED ASSIGNMENT

ET 524 (Part A)/ET 534 (Part A)

PRINCIPLES OF ENGINEERING MANAGEMENT AND ECONOMICS

Maximum Marks : 100
Weightage : 30%

Course Code : ET-524A/534A
Last Date of Submission : July 31, 2017

Note : All questions are compulsory and carry equal marks. This assignment is based on all Blocks of Principles of Engineering Management and Economics.

- Q.1 (a) Discuss the assumptions made under Theory 'x' and Theory 'y'.
(b) Explain Maslow's Need Theory of Motivation.
- Q.2 Discuss various methods of training, giving examples. How does training differ from development?
- Q.3 Discuss various causes of project time and cost over-runs during different phases of a project life cycle. How can you mitigate these?
- Q.4 What are the various types of project organizations? Discuss the advantages and disadvantages of each. What form of project organization would you recommend in an organization where a number of medium sized projects are in progress?
- Q.5 What is value analysis? Discuss various phases of VE. Illustrate your answer with examples.
- Q.6 (a) Differentiate between democratic, authoritarian and charismatic leadership.
(b) Discuss various types of "power". Is power necessary to control people? Justify?
- Q.7 Differentiate between :
- (i) Quality assurance and Quality control.
 - (ii) Variable charts and Attribute charts.
 - (iii) Individual Vs Group decision-making.
- Q.8 Enumerate the classical principles, which need to be understood to ensure vertical coordination. Explain in detail the principle of span of control.
- Q.9 Organizations are social systems. What role as manager can you play to make your organization more dynamic?
- Q.10 Write short notes on:
- (i) Price elasticity of demand.
 - (ii) Joharic windows.
 - (iii) Drivers for quality.
 - (iv) Time value of money.

TUTOR MARKED ASSIGNMENT

ET 524 (Part B)

CONSTRUCTION MANAGEMENT-I

Maximum Marks : 100
Weightage : 30%

Course Code : ET-524B
Last Date of Submission : Sep. 30, 2017

Note : All questions are compulsory. Marks assigned to the questions have been shown in the brackets. This assignment is based on all Blocks of Construction Management-I.

- Q.1 Explain various activities involved in tendering procedure. (10)
- Q.2 Explain the following in context of site organization.
- (a) Site Access Roads.
 - (b) Surface Drainage.
 - (c) Site Electrification.
 - (d) Water Supply for construction. (10)
- Q.3 (a) What is Network? Explain the rules for Drawing a CPM Network.
- (b) What is Depreciation? What are the methods of charging depreciation? Explain any four methods. (15)
- Q.4 Why disputes are unavoidable in implementation of construction contracts? What are the mode of resolving disputes? Discuss the advantages and disadvantages of each method. (10)
- Q.5 Consider the following set of activities for conducting a 10 working days computer training class.

Activity	Predecessor(s)	Duration (Days)		Cost (Rupees)	
		Normal	Crash	Normal	Crash
A	-	7	4	5000	8000
B	A	3	2	2000	3500
C	-	6	4	5000	9000
D	C	3	1	2000	5000
E	B, D	2	1	3000	5500

- (a) Draw the normal time showing the earliest/latest start times and earliest/latest finish time of all activities.
- (b) Determine earliest and latest event times.
- (c) Determine critical path and normal time duration and normal cost of the project.
- (d) What activities should be crashed to meet the project deadline of 10 days with a minimum cost? Determine this new cost.

(15)

Q.6 Discuss the following.

- (a) Advantages of CA system over manual methods.
- (b) Earned value concept of schedule and cost control.
- (c) Difference between CPRM and PERJ.
- (d) Difference between a “balance sheet” and “profit and loss account”.

(10)

Q.7 Explain the NPV method of appraising a capital project. The net inflows and outflows of the project over its 8-year life are as follows.

Sl. No.	Year	Inflows (lakhs)	Outflows (lakhs)
1.	At the beginning of the project	10	–
2.	1 st year	5	4
3.	2 nd year	–	4
	3 rd year	–	4
	4 th year	–	3
	5 th year	–	3
	6 th year	–	3
	7 th year	–	3
	8 th year	–	3
4.	Depreciation at the end of 8 th year	–	1

The discount rate is 10%. Is the investment welcome?

(5)

- Q.8 (a) What is work break down structure? Explain its importance in project planning.
 (b) What do you understand by “Overheads”? Briefly explain different types of overhead. Give illustrations also.

(5)

Q.9 Give usage of the following, giving reasons for your preference.

- (a) Tracked dozers
- (b) Wheel dozers
- (c) Motor grader
- (d) Scraper
- (e) Loaders.

(10)

Q.10 Write a short note on:

- (a) BOT contracts
- (b) Cost-plus-fee contracts
- (c) Functioning of a construction manager
- (d) Closing of a project.

(10)

TUTOR MARKED ASSIGNMENT**ET 532 (Part A)****HYDROLOGY**

Maximum Marks : 100
Weightage : 30%

Course Code : ET-532A
Last Date of Submission : Sep. 30, 2017

Note : All questions are compulsory and carry equal marks. This assignment is based on all Blocks of Hydrology.

- Q.1 (a) Explain in detail the profile of temperature and pressure variations with height, in our atmosphere.
- (b) Classify different types of clouds (give sketches also); and, describe their relation to instability of air in troposphere.
- (c) Draw on a full-size drawing sheet, the major pressure and wind belts of our globe. (Consult standard sources of information, and quote the same).
- Q.2 (a) Explain (giving your own numerical examples) how you will estimate the missing precipitation data with reference to a given rain-gauge station.
- (b) Drawing on standard reference material, explain what you understand by : probable maximum precipitation; design storm; and probable maximum flood.
- (c) Giving sketches, explain the response to storms by various catchments having different geometric shapes, i.e, bring out their flood-producing characteristics. (study the related text books).
- Q.3 Take a full-sized drawing sheet, and draw :
- (i) Section and plan of US Class A Evaporation,
- (ii) ISI Evaporation Pan (Section and Plan)
- (iii) Section and plan of Colorado Sunken Evaporation Pan
- (iv) US Geological Survey Floating Pan.
- Q.4 (a) A reservoir with a surface area of 325 hectares is described with relation to its evaporation characteristics, by the following parameters :
- (i) mean weekly water temperature = 25°C
- (ii) relative humidity during this week = 45%
- (iii) wind velocity, during this week, at 1.0 m above the ground = 17.20 km/hour
- Estimate the average daily evaporation from the reservoir; and also the total volume of water evaporated during this week.
- (b) Draw the sketch, and explain different routes that is followed by runoff generated in a basin.
- (c) Explain how human interference with a catchments can cause reduction in infiltration capacities and also decrease in the efficiency of drainage network.
- Q.5 Write a 600-word discussion about the various methods of analysis of a given hydrograph. Also discuss the components of a typical hydrograph.
- Q.6 (a) In a rectangular channel (20 m wide) following measurements were made :

	Section I	Section II
Depth of flow (m)	4.0	3.9
Flow Area (m ²)	61.2	60.9

Distance between these two sections = 300 m. The drop in the water surface elevation between these locations was seen to be 0.14 m. If $n = 0.017$, estimate the discharge flowing.

- (b) Following observations were made on a channel at a given location :

Stage (m), i.e. Elevation	103.6	104.7	105.7	107.6	108.3	109.3	111.8
Discharge (cumec)	702.0	704.2	819.3	949.5	1039.3	1059.1	1329.3

Establish the stage-discharge curve (plot to scale) assuming the stage at zero flow to be 99.98 m. Using this relationship, estimate the discharge at stage = 110.0 m.

- Q.7 (a) Prepare the frequency table and plot the histogram, and cumulative frequency diagrams for the data relating to a given rain-gauge station :

Daily Rainfall (mm)	90-101	101-110	110-120	120-130	130-140	140-150	150-160	160-170
Absolute Frequency (Days)	5	12	15	8	8	11	20	20

- (b) Following grouped data is given :

Rainfall (mm)	25	26	26	24	20	18	15	25	25
No. of Days	4	3	8	6	6	4	7	2	2

(Evaluate the mean, variance, standard deviation, coefficient of variation, skewness, coefficient of skewness, kurtosis, and coefficient of kurtosis of this data; and comment on these values.

- (c) Observations, over a long period show with respect to a certain region that during a certain month the probability of rainfall is 0.2 on any one day. Some renovation work is to begin for 15 days during this month. Find the probability of no rainfall occurring during these 15 days and if 3 rainfalls are to be tolerated in 17 days of working, what is the probability of completing the job?

- Q.8 (a) The mean, standard deviation and coefficient of skewness of original and log-transformed annual maximum peak flood series of a typical gauging site are :

	Original Series	Log Transformed Series
Mean (m ³ /s)	602.856	7.896
Standard Deviation (m ³ /s)	241.090	0.432
Coefficient of Skewness	1.663	0.656

Estimate 1000 years flood if the peak discharge data follow : (i) Gumbel EV I, (ii) Pearson Type III; (iii) Log-Pearson Type III; (iv) Log-normal distributions.

- (b) Compute the confidence limits at 5% significance for 1000 years design flood estimated from 30 years of annual peak flood data with respect to a certain gauging station having a mean annual peak flood (X) of 260 cumec and a standard deviation of 20 cumec. Assume that the data follow Gumbel distribution and the parameters, u and α can be computed using the method of moments.

- Q.9 (a) Draw on a full-size drawing sheet the section of : (i) confined aquifer, (ii) unconfirmed aquifer; (iii) perched aquifer.
- (b) In an area of 150 ha, water table drops by 4.6 m. If the porosity of the aquifer is 0.25, and the specific retentions is 0.16, find the specific yield and change in storage in hectare-meter.
- (c) A 40 m thick aquifer's pumped at a constant rate of 185 m³/h till steady-state conditions prevail. Find the coefficient of transmissivity of the aquifer from the following data :

r (m)	2.5	50.00	100.00
s (m)	1.9	0.42	0.12

- Q.10 (a) For the period 1960 to 1986, recorded max floods of a stream are given as under :

Year	1960	61	62	63	64	65	66
Max Flood (m ³ /s)	3005	3621	2526	4223	3600	3012	5202
Year	67	68	69	70	71	72	73
Max Flood (m ³ /s)	4890	3802	4899	4198	4592	5200	7010
Year	74	75	76	77	78	79	80
Max Flood (m ³ /s)	4425	3560	8010	3208	6610	3810	4209
Year	81	82	83	84	85	86	
Max Flood (m ³ /s)	3010	2699	3970	4673	6800	2012	

By graphical extrapolation find the flood discharge with recurrence interval of (i) 25 years; (ii) 50 years; (iii) 100 years, and (iv) 150 years. Which extreme-value distribution fits these recorded values?

- (b) Using log-Pearson Type III distribution, estimate the flood discharge for a return period of : (i) 100 years, and (ii) 150 years for the annual series data given in (a) above.

TUTOR MARKED ASSIGNMENT

ET 532 (Part B)

GROUND WATER DEVELOPMENT

Maximum Marks : 100
Weightage : 30%

Course Code : ET-532B
Last Date of Submission : Sept. 30, 2017

Note : All questions are compulsory and carry equal marks. This assignment is based on all Blocks of Ground Water Development.

- Q.1 Describe storativity and transmissivity, of an aquifer. Derive this equation for unsteady state flow conditions, stating all assumptions. Find transmissivity and storage constant by this method using time-draw down data (given below) for an observation well 46 m from the well pumped at 1590 litre/minute.

Time (hr.)	1.8	2.8	5.4	9.0	18.0	54.0
Drawdown (m)	0.55	0.73	1.10	1.31	1.77	2.47

- Q.2 Explain the factors which control the hydrological properties of unconsolidated sediments. Derive expression for the determination of porosity. Determine the porosity of the rock sample which has oven-dry weight of 652.47 g. After saturation with kerosene its weight is 731.51 g. It is then immersed in kerosene and displaces 300.66 g.
- Q.3 Discuss :
- Remote sensing and its utility in the investigation of ground water.
 - Land subsidence due to the over exploitation of this ground water.
- Q.4 (a) What do you mean by cone of depression and radius of influence?
(b) Draw a profile of the cone of depression after 1 year of pumping at $0.03 \text{ m}^3/\text{s}$ with the following data :
- well dia = 60 cm
- Transmissivity = 149150 litres/day per metre width storage coefficient = 0.05.
- Q.5 (a) How Geological features, Topography of the area and climate conditions influence the ground water regime.
(b) Show drainage densities and patterns on the topographic map of the area of your choice.
- Q.6 (a) Define precipitation and surface-run-off. Collecting the rainfall data of the area of your choice. Calculate the mean annual precipitation.
(b) Describe rain-harvesting and its impact on environment.
- Q.7 What is a well screen? Describe various conditions determining length, position, size and material of a well screen.
- Q.8 Write an essay on "Hydrogeological and Mineralogical factors governing the composition of the Ground Water".

Q.9 Write short notes on the following:

- (i) Kavst topography
- (ii) Lycopodium spores
- (iii) Critical depth of Ground Water
- (iv) Seismic refraction method
- (v) Water Balance
- (vi) Sodium hazard
- (vii) Salination of soils

Q.10 Distinguish between the following:

- (i) Alluvium and colluviums
- (ii) Phreatic and Vadose Zone
- (iii) Evaporation and Transpiration
- (iv) Allochthonic and autochthonic micro-organisms
- (v) Plutonic igneous rocks and volcanic rocks
- (vi) Effective stress and pore pressure
- (vii) Electrical conductivity of water and hydraulic conductivity
- (viii) Inflow zones and infiltration
- (ix) Static water level and potentiometric surface
- (x) Turbulent and laminar flows.

TUTOR MARKED ASSIGNMENT**ET 533 (Part A)****IRRIGATION ENGINEERING**

Maximum Marks : 100
Weightage : 30%

Course Code : ET-533A
Last Date of Submission : July 31, 2017

Note : All questions are compulsory and carry equal marks. This assignment is based on all Blocks of Irrigation Engineering.

- Q.1 (a) Explain the various components needed for the development and management of irrigation projects with the help of a schematic diagram.
 (b) Discuss the advantages and disadvantages of irrigation.
- Q.2 (a) What do you mean by cropping pattern? Explain the various factors influencing the choice of cropping pattern.
 (b) Explain the conditions under which Drip Irrigation is best suited.
- Q.3 (a) For a three-phase soil system, prove that:

$$\gamma_{dry} = \frac{G_s \gamma_w}{1 + \left(\frac{\theta_w}{\theta V_s} \right) G}$$

where all the terms have their usual meaning.

- (b) An imaginary soil mass is contained in a container measuring 10 cm × 10 cm × 10 cm. The soil consists of spherical grains of size 1 cm in diameter. Determine the maximum possible voids ratio, porosity and percent solids.
- Q.4 (a) Explain the “Pan Evaporation Method” of estimation of evapotranspiration.
 (b) Describe the Philip infiltration model in detail.
- Q.5 (a) Explain the components of Sprinkler Irrigation System.
 (b) Discuss the check basin method of irrigation in detail.
- Q.6 (a) Explain the water distribution practices in Western Region of India.
 (b) Discuss various types of drainage system with the help of a neat sketch.
- Q.7 (a) Explain the possible modes of disposal of drainage water from a collection and conducting drain system.
 (b) Describe the various types of Land forming.
- Q.8 (a) Explain the various considerations in Land Grading Design.
 (b) Discuss the method of least squares for designing the grade.
- Q.9 (a) Explain the important differences in operating characteristics of centrifugal and reciprocating pumps.
 (b) Derive the formula of pressure rise in impeller of a centrifugal pump.

Q.10 Differentiate between the following :

- (a) Well and Canal Irrigation
- (b) Surface and Sub-Surface Drainage System.
- (c) W-Index and ϕ -index.
- (d) Salinity and Alkalinity of irrigation water.

TUTOR MARKED ASSIGNMENT

ET 533 (Part B)

OPEN CHANNEL FLOW

Maximum Marks : 100
Weightage : 30%

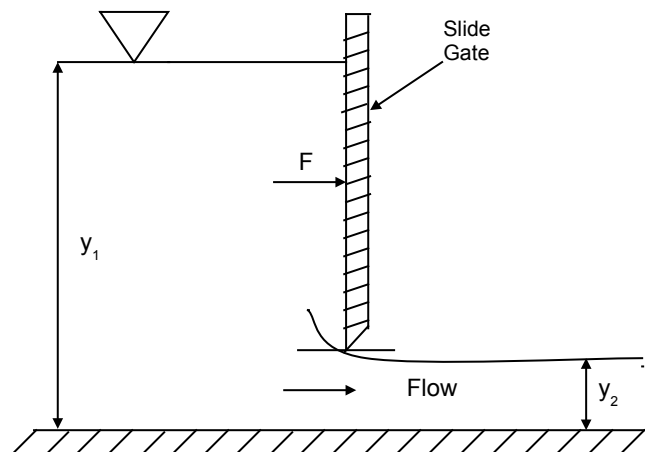
Course Code : ET-533B
Last Date of Submission : Sept. 30, 2017

Note : All questions are compulsory. Marks assigned to the questions have been shown in the brackets. This assignment is based on all Blocks of Open Channel Flow.

- Q.1 (a) What are isovels? Give typical sketches as these exist in variously-shaped open channels (rectangular, trapezoidal, and triangular).
- (a) A straight trapezoidal channel ($b = 1.2$ m, and $z = 1.2$) is laid to a slope of 0.0012. If the depth of flow (for a $Q = 0.98$ cumec) is 0.6 m, construct the hydraulic grade line and energy grade line for the channel. Changing the channel lining (i.e. adjusting the value of n) if the depth of flow is obtained as 0.65 m for the same discharge, trace these grade lines for that case too.
- (c) A flow of 1.2 m³/s flows through a pipe (running full) that is laid at an angle of 30° to the horizontal. The flow takes place from 30 cm diameter end (higher end) to 50 cm diameter end (lower end) over a distance of 500 m (horizontal). Draw the energy grade line and also the hydraulic grade line, if $f = 0.1$.

(2 + 5 + 3 = 10)

- Q.2 (a) For the system of flow shown in the figure, prove $F = \frac{1}{2} \gamma \frac{(y_1 - y_2)^3}{(y_1 + y_2)}$, where, γ = specific weight of water.



Figure

- (b) A high velocity flow from a hydraulic structure has a velocity of 6.0m/s, and a depth of 0.4 m. It is deflected upwards at the end of a horizontal apron, through an angle of 45° , into the atmosphere as a jet by an end sill. Calculate the force on the sill per unit of its width.
- (c) Calculate the force, in part (b) above, if the angle of lift of the jet is 60° .

(3 + 5 + 2 = 10)

- Q.3 (a) A trapezoidal channel ($b = 4.75$ m, and $z = 1.5$) has a Manning's coefficient of 0.019. If its $y_n = 1.1$ m for a flow of 9.0 m³/s, find its normal slope.
- (b) A trapezoidal channel ($b = 3.8$ m, and $z = 1$) has a bed slope of 0.0015, and $n = 0.0016$. Determine the normal discharge for $y_n = 3.0$ m.
- (c) Prove for a critical flow, in any channel section, $z = A\sqrt{D}$.

(4 + 4 + 2 = 10)

- Q.4 A non-erodible canal is to be constructed at $S_o = 1.05 \times 10^{-3}$ bed slope in a material of median grain size equal to 8.43 mm, and $\phi = 26^\circ$. Design the most economical cross section of the canal for following discharges :

- (a) 3.25 m³/s
 (b) 1.75 m³/s
 (c) 1.5 m³/s.

(5 + 3 + 2 = 10)

- Q.5 (a) A rectangular channel, 5.75 m wide, carries a flow of 35.25 m³/s with a bed slope of 0.0015 and $n = 0.015$. Compute the water surface slope at sections where $y = 2.64$ m and 1.75 m, respectively due to practical reasons.
- (b) Take $y_n = 1.78$ m, $y_c = 1.46$ m, $v_n = 2.98$ m/s, and $\cos \theta = 1$, and solve the (a) above.
- (c) If in (a) above the channel meets an abrupt drop in its bed, trace the draw down curve at the drop.

(6 + 1 + 3 = 10)

- Q.6 (a) A rectangular channel ($b = 2.3$ m) carries a discharge of 4.78 cumec at $y = 1.70$ m. At a certain section of the channel a small smooth hump, with a flat top and a height of :
- (i) 0.8 m
 (ii) 0.9 m
 (iii) 1.0 m
 (iv) 1.2 m

is proposed to be set up. What is the likely change in the water surface in each case if any loss of energy is neglected?

- (b) What changes in channel width are needed to nullify the effect of the hump in each case?

(6 + 4 = 10)

- Q.7 (a) A Venturi Flume is 1.5 m wide at the entrance, and 0.5 m at the throat. Neglecting hydraulic losses in the flume, compute the flow if the depths of flow at the entrance and throat are 0.70 m and 0.66 m, respectively.
- (b) A hump of 15 cm is to be installed at the throat of the flume so that a standing wave is formed beyond the throat. What will be the increase in the upstream depth if the same flow passes through the device?
- (c) Solve (a) and (b) above if entrance width is 1.75 m, and at the throat the width is 0.8 m, the rest of the data remaining same.

(4 + 3 + 3 = 10)

- Q.8 Design a slotted roller bucket type energy dissipator downstream of a spillway, for the following given two cases :

- (a) (i) $Q = 1200$ m³/s
 (ii) Width of bucket = 67.0 m

- (iii) Maximum reservoir pool level = 250 m
 - (iv) Crest level of spillway = 243 m
 - (v) Maximum tail water level = 230 m
- (b) (i) $Q = 1200 \text{ m}^3/\text{s}$
- (ii) Width of bucket = 68.0 m
 - (iii) Maximum reservoir pool level = 240 m
 - (iv) Crest level of spillway = 238 m
 - (v) Maximum tail water level = 232 m.

(5 + 5 = 10)

- Q.9 (a) A rectangular channel carries a flow at a depth of 3.2 m with a velocity of 2.25 m/s. The flow is suddenly trebled due to an urgent request on the downstream side, by an abrupt opening of the head gate. Determine the final depth of flow, height of the surface (and the type of the surface), celerity, wave speed and overrun.
- (b) Solve (a) above if the depth of flow is 1.7 m, velocity of flow = 1.75 m/s, and the flow is doubled.

(6 + 4 = 10)

- Q.10 (a) A train of waves, of period :

- (i) 8 sec
- (ii) 11 sec

is approaching the coast from deep waters. Calculate the wave length in this deep water; as well as in 11 m, 7 m, and 4 m deep water of this water body in each case [(i) and (ii)]. What are the corresponding phase velocities?

- (b) Oscillatory surface waves were observed in a deep-water body, having $T = 7.2$ sec. Find their wavelengths, phase and velocity.
- (c) Write a 300 word technical note on Tsunami waves for the benefit of a layman. Why are these more devastating than the every day common sea waves, explain in detail?

(4 + 3 + 3 = 10)

TUTOR MARKED ASSIGNMENT**ET 534 (Part B)
SYSTEMS METHODS****Maximum Marks : 100
Weightage : 30%****Course Code : ET-534B
Last Date of Submission : Sept. 30, 2017****Note :** All questions are compulsory and carry equal marks. This assignment is based on all Blocks of Systems Methods.

- Q.1 What do you understand by terms 'system and components'? With block diagram explain input/output by taking any two systems as examples.
- Q.2 How are system models classified? Explain in details.
- Q.3 Define the following by giving their applications :
- Kirchoff's laws
 - D'alembert's principle
 - First order systems
 - Second order system
- Q.4 What do you understand by the closed loop control system? How will you distinguish between open loop and closed loop control system? Give examples for both systems.
- Q.5 (a) Cite at least one example of hydraulic, mechanical, thermal and electro-mechanical control system. Also give block diagram of each system.
- (b) What is system modelling? Describe the two methods of system simulation.
- Q.6 (a) What are the limitations of linear programming?
- (b) A company produces two types of hats. Every hat *A* requires twice as much labour time as the second hat *B*. If the company produces only hat *B*, then it can produce a total of 500 hats a day. The market limits daily sales of hat *A* and hat *B* to 150 and 250 hats. The profit on hat *A* and *B* are Rs. 8 and Rs. 5, respectively. Solve graphically to get the optimal solution.
- Q.7 (a) Describe the assignment problem giving a suitable example.
- (b) Explain the difference between a transportation problem and an assignment problem.
- Q.8 (a) What are the various methods for solving transportation problem?
- (b) Solve the following transportation problem for minimization?

		Destinations			Capacity
		1	2	3	
Sources	1	2	2	3	10
	2	4	1	2	15
	3	1	3	1	40
	Demand	20	15	30	

Q.9 The following table shows the jobs of a network along with their time estimate. The time estimates are in days :

Job	1-2	1-6	2-3	2-4	3-5	4-5	5-8	6-7	7-8
a	3	2	6	2	5	3	1	3	4
m	6	5	12	5	11	6	4	9	19
b	15	14	30	8	17	15	7	27	28

- (i) Draw the project network and find the critical path.
- (ii) Find the probability that the project is completed in 31 days.

Q.10 (a) A T.V repairman finds that the time spent on his jobs has an exponential distribution with mean 30 minutes. He repairs sets in the order in which they come in. If the arrival of sets is approximately Poisson with an average rate of 10 per 8-hours day, what is the repairman's expected idle time each day? How many jobs are ahead of the average set just bought in?

- (b) The annual demand of an item is 3200. The unit cost is Rs. 6/- and inventory carrying charges 25% per annum. If the cost of one procurement is Rs. 150, determine :
 - (i) EOQ
 - (ii) No. of orders per year
 - (iii) Time between two consecutive order
 - (iv) The optimal cost

TUTOR MARKED ASSIGNMENT**ET 534 (Part C)****WATER RESOURCES PLANNING**

Maximum Marks : 100
Weightage : 30%

Course Code : ET-534C
Last Date of Submission : July 31, 2017

Note : All questions are compulsory. Marks assigned to the questions have been shown in the brackets. This assignment is based on all Blocks of Water Resource Planning.

- Q.1 (a) Taking a full-size drawing sheet/sheets, draw the geographical outline of the Indian sub-continent; and demarcate the width, length and actual spread of the following features :
- (i) Lesser Himalayas, with prominent peaks well identified and elevations indicated;
 - (ii) Godavari delta;
 - (iii) Shivalik ranges with important peaks well marked (elevations to be shown);
- (b) Describe in 300-words, each of the following :
- (i) Gujarat plains,
 - (ii) Konkan coast, and
 - (iii) Gir mountains
- (**Note :** Consult Relevant Literature).
- (5 + 5 = 10)
- Q.2 Draw on a full-size drawing sheet, a complete hydrologic cycle. Discuss its each and every element and their inter-relationship.
- (10)
- Q.3 Explain the undesirable effects of seawater intrusion; and list out the measures to control this intrusion. Give two examples of each such measure from true-lip situations (name the source of your information).
- (5 + 5 = 10)
- Q.4 (a) Define *duty* and *delta*, and obtain the relationship between them.
- (b) A crop requires a total depth of 10.10 cm of water for a base period of 122 days. What is the duty of water in this case?
- (c) What do you understand by: **intensity of irrigation**, **Khor period**, and **command area**, **contour bunding**.
- (10)
- Q.5 Taking a actual field example (give the name, and location), and on its basis prepare a 700- word note on environmental impact a water resources project has on the surrounding area. Use relevant indices to stress your points.
- (5 + 5 = 10)

- Q.6 (a) Determine pan evaporation coefficient and the consumptive use for the month of May for a crop, making suitable assumptions wherever necessary, with reference to the following data :
- (i) Consumptive use coefficient = 0.80
 - (ii) Latitude = 25°N; Elevation = 500 m; Mean temperature = 32.9° C
 - (iii) Mean wind velocity at 0.5 m above the G.L. = 215 km/hr
 - (iv) Mean relative humidity = 52%; Mean sunshine = 90%
- (b) Explain how to determine evapotranspiration rate and consumptive irrigation requirement of a given crop, and field irrigation requirement.

(5 + 5 = 10)

- Q.7. (a) Write a 300 word note on the multicrop system and land use management.
- (b) Compute the 70%, 85%, 95% and 98% dependable flows from the following runoff data (of a catchment).

Year	1	2	3	4	5	6	7	8	9	10
Runoff in million m ³	700	700	680	470	470	620	602	351	852	650
Year	11	12	13	14	15	16	17	18	19	20
Runoff in million m ³	650	582	491	380	379	487	488	472	550	561
Year	21	22	23	24	25	26	27	28	29	30
Runoff in million m ³	500	522	521	551	602	304	388	560	560	442
Year	31	32	33	34	35	36	37	38	39	40
Runoff in million m ³	695	384	659	753	328	410	241	329	301	229

(10)

- Q.8 (a) What is the role of an aquifer in our water resources system? Take a full-size drawing sheet and draw the section of the following:
- (i) Unconfined aquifer
 - (ii) Confined aquifer
 - (iii) Leaking aquifer
 - (iv) Perched aquifer
- (b) Explain how to estimate the specific yield of a given aquifer.

(5 + 5 = 10)

- Q.9 Give the design procedure (with explanatory sketches) for all the zones of a *high* concrete dam. Include seepage as gallery, spillway, and power tunnel in the design. Also discuss how to account for wave action in the design.

(10)

- Q.10 Explain, with examples, what is understood by Systems Approach to Water Resources Management. Study the relevant books listed in section 10.8 of your course material.

(7 + 3 = 10)

TUTOR MARKED ASSIGNMENT**ET 581 (Part A)****TESTING FOR QUALITY CONTROL**

Maximum Marks : 100
Weightage : 30%

Course Code : ET-581A
Last Date of Submission : Sep 30, 2017

Note : All questions are compulsory. Marks assigned to the questions have been shown in the brackets. This assignment is based on all Blocks of Testing for Quality Control.

- Q.1 (a) List various laboratory tests on Portland cement.
(b) Explain the purpose of conducting Le-Chatelier test. (10)
- Q.2 (a) What do you mean by heat of hydration of cement? Is it necessary to test all types of cements for this purpose.
(b) "Use of sea water is not recommended for mixing and curing of concrete ". Elaborate this statement. (10)
- Q.3 (a) What do you mean by Flakiness Index? Describe a test for determining Flakiness Index.
(b) What do you mean by bulking of fine aggregate? Explain its significance. (10)
- Q.4 (a) What is aggregate crushing value and how is it determined?
(b) What do you understand by the term "Alkali Aggregate Reactivity" and how is it determined by chemical method. (10)
- Q.5 (a) Explain the significance of measurement of workability of concrete.
(b) Describe the compacting factor test for determining workability of concrete. (10)
- Q.6 (a) Describe how you would test for performance of admixtures in concrete.
(b) Discuss the general pattern of influence of the Height/Diameter ratio on the apparent strength of a cylinder in a compression test. (10)
- Q.7 (a) Discuss the use of electrical method for determining corrosion of Reinforcement Bar.
(b) Explain the Resonant Frequency method for Non-destructive testing of concrete and discuss its limitations. (10)
- Q.8 (a) Discuss the suggestive criteria for acceptance and rejection of concrete.
(b) Describe the test for determining Efflorescence of bricks. (10)

- Q.9 (a) Explain the various tests to be conducted for judging the performance of glazed. Earthenware tiles.
- (b) Discuss the uses of Glue Adhesion test.

(10)

Q.10 Differentiate between the following :

- (a) Segregation and Bleeding
- (b) Indentation and Rebound principles
- (c) Destructive and Non-destructive testing of concrete
- (d) Field and laboratory testing of cement

(10)

TUTOR MARKED ASSIGNMENT**ET 581 (Part F)****MECHANICAL EQUIPMENT IN CONSTRUCTION (ELECTIVE-I)**

Maximum Marks : 100
Weightage : 30%

Course Code : ET-581F
Last Date of Submission : July. 31, 2017

Note : All questions are compulsory and carry equal marks. This assignment is based on all Blocks of Mechanical Equipment in Construction.

- Q.1 (a) Describe the role of construction equipment in speedy and economical completion of large construction projects.
- (a) A construction machine costs Rs. 96000 and has an expected life of 6 years and slavage value of Rs. 6000. It is expected to work 2500 hours in a year. Compute the yearly depreciation for the machine using :
- (i) Straight line and
(ii) Sum of the year's digit method
- Q.2 (a) Compare the mechanism and operation of the power shovel and the dragline. Under what conditions is each machine best suited?
- (b) A 2.4 m³ re-handling type bucket is used to transfer sand from stockpile into a hopper 12 m above the ground. The angle of swing is 90°. The average speed of hoist line is 4.0 km/hr. Determine the probable output per hour.
- Assume : Time per cycle (approx)
- Loading bucket = 10.0 sec.
 Dumping bucket = 10.0 sec.
 Swinging bucket to stockpile = 8.0 sec.
 Loss time, accelerating, etc. = 8.0 sec.
 Unit operates : 50 minutes per hour.
- Q.3 (a) Describe the mechanism of a scraper and its operation. Under what soil and valley conditions is the use of a scraper justified? Compare the towed scraper with the motorized model.
- (b) Determine the lifting capacity of a crawler crane, given that :
- Total weight of crane without boom (W) = 80 t
Total weight of boom and supporting tackle (B) = 8 t
Weight of load falls (P) = 4 t
Radius of lifting (R) = 12 m
Fulcrum distance (F) = 2.4 m
Distance of centre of gravity of machine from center line of rotation (g) = 1.8 m
Distance of boom hinge from centre line of rotation (a) = 1.2 m.

- Q.4 (a) Describe the basic construction of a truck. In particular deal with the power transmission, propeller, steering, and suspension systems.
- (b) What are the factors on which the selection of type and size of a power shovel depend?
- Q.5 (a) Classify cranes on the basis of broad construction features. Explain the application of each type and its method of operation.
- (b) Determine the quantity of material compacted, if the sheep's foot roller travels at 8 km/hr, time of rolling is 50 minutes, length of drum 5.0 m, number of drums 2, fraction of overlap 1/5, layer thickness 0.5 m, and the number of passes given are 10.
- Q.6 (a) Describe the requirements of safe operation of cranes. How is this achieved?
- (b) What effects do depth of cut and angle of swing have on the output of dragline? How do the size of bucket and the length of boom effect the output of a dragline?
- Q.7 (a) Describe the construction and operation of bucket elevator for handling gravel. How will you determine the capacity of such an elevator?
- (b) What is the purpose of providing gates on spillways?
- Q.8 (a) How will you extend the life of a belt conveyor in operation? Describe the safety devices you would recommend for the installation.
- (b) Describe about concrete mixtures. What are the various types of concrete mixtures? Explain briefly about the drum type concrete mixtures.
- Q.9 (a) Distinguish between cableways and rope ways. Describe the role of these two systems of conveying in handling
- (i) Raw material for an aggregate crushing plant
- (ii) Concrete for placement in a dam.
- (b) A batch of concrete mix for mass concrete includes the following ingredients :

Ingredients	Batch Weight (kg)	Specific	Initial Temperature (°C)
Cement	95	0.28	44.00
Sand	355	0.25	26.00
Gravel	1673	0.23	4.00
Water	38	1.00	2.00
Free moisture in sand	10.60	1.00	26.00
Free moisture in gravel	17	1.00	4.00
Ice	?	0.50	-4.00

If the desired temperature for placement is 10°C, what should be the quantity of ice to be added to the batch? Assume 3°C rise due to mixing operations.

- Q.10 (a) What are the principal types of compressors which are generally used for compressed air supply on construction projects? Give the layout for a typical compressor installation and explain its operation.
- (b) Describe the different types of drill bits used in rock drilling including diamond bits. How will you select a particular shape of the bit?