ARKA JAIN University, Jharkhand

5th Semester Final Examination – 2019-20

Subject : Design of Steel structure

Time : 3 Hours

Course: Poly civil
Full Marks : 70
Pass Marks: 28

- Candidates are required to give their answers in their own words as far as practicable.
- Question Paper is divided into **Three Parts –A, B & C**
- **Part-A** is compulsory.
- **Part- B** contains **SIX** questions out of which **FOUR** questions are to be answered.
- **Part- C** contains **SIX** questions out of which **THREE** questions are to be answered.
- **Part-D** is compulsory

PART A

Q1.) All questions are compulsory:-

A] Objective Answer Type **(10x1=10)**

i) Efficiency of a riveted joint, having the minimum pitch as per IS : 800, is

a) 40%

b) 50%

c) 60%

d) 70%

ii) Bolts are most suitable to carry

a) shear

b) bending

c) axial tension

d) shear and bending

iii) Diameter of a bolt hole is usually taken as

a) gross diameter of bolt

b) nominal diameter + 1.5 mm

c) nominal diameter + 2.0 mm

d) nominal diameter of bolt

iv)In the cross-section of a weld, throat is the

a) minimum dimension

b) average dimension

c) maximum dimension

d) none of the above

v)The effective length of a fillet weld should not be less than

a) two times the weld size

b) four times the weld size

c) six times the weld size

d) weld size

vi) For a standard 45° fillet, the ratio of size of fillet to throat thickness is

a) 1:1

b) 1 : V2

c) V2 : 1

d) 2: 1

vii)A butt weld is specified by

a) effective throat thickness

b) plate thickness

c) size of weld

d) Penetration thickness

viii)The actual thickness of butt weld as compared to the thickness of plate is usually

a) more

b) less

c) equal

d) none of the above

ix)According to IS Specifications, the maximum pitch of rivets in compression is

a) lesser of 200 mm and 12 t

b) lesser of 200 mm and 161

c) lesser of 300 mm and 32 t

d) lesser of 3 00 mm and 24 t

x) The maximum slenderness ratio of a compression member carrying both dead and superimposed load is

a) 180

b) 200

c) 250

d) 350

B] Short Answer Type **(5x2=10)**

(a) Define the following terms :

a. Size of filletweld

b. Throat thickness of fillet weld

(b) What loads are to be considered in the design of steel roof truss?

(c) List the mechanical properties of structural steel.

(d) Sketch the cross-section of fillet weld and butt weld?

(e) Define the following terms :

(a) Least radius of gyration and

(b) Slenderness ratio

PART B

Q2.) Answer any four: **(4x5=20)**

a. What do you mean by structural steel? Explain its properties..

b. What are the different cases by which we can find the net area of the tension members?

c. What are the type of failures occur in riveted joint?

d. What are the factors governing the selection for the type of roof truss?

e. Explain the advantages and disadvantages of welding.

f. Explain the strength of riveted joint.

PART C

Answer any Three: **(3x10=30)**

Q3) A double riveted cover butt joint is used for connecting two plates of 12 mm thickness. The diameter of the rivets is 22 mm. Calculate the necessary pitch and efficiency of the joint. Use PDSR. (τvf=100 N/mm2 , σpf=300N/mm2 .)

Q4.) SA 75 X 50 X 10 mm is to be connected to a gusset plate by 6 mm fillet weld. The load to be transmitted is 160 kN. Design the weld, Take τvf=102.5 N/mm2..

Q5.) Draw a neat sketch showing the following terms: i) Row of rivets ii) Staggered pitch iii) Edge distance iv) Gauge distance v) Row of rivets

Q6.) Find the suitable pitch for triple riveted lap joint for plates 12mm thick. Use PDSR rivets. Take permissible tensile stress in plate = 150MPa. Determine the efficiency of the joint also.

Q7) Design a suitable section of steel beam having an effective span of 8m and which carries the superimposed load of 40kN/m Take E = 2x105N/mm2 Apply the checks for shear and deflection.

Q8) What do you understand by failure of riveted joint? Enlist various manners through which riveted joint can fail.

AKKA JAIN University, Jharkhand

5th Semester Final Examination – 2019-20

Subject: Estimation & Costing

Time : 3 Hours

Course: Polytechnic (Civil)
Full Marks: 70
Pass Marks: 28

- Candidates are required to give their answers in their own words as far as practicable.
- Question Paper is divided into **Three Parts –A,B& C**
- **Part-A** is compulsory.
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PART A

Q.1) All questions are compulsory

A] Multiple Choice Questions: **(10x1=10)**

i) The brick work is not measured in m^3 in case of:
a) One or more than one brick wall
b) Brick work in arches
c) Reinforced brick work
d) Half brick wal

ii) The main factor to be considered while preparing a detailed estimate, is
a) Quantity of the materials
b) Availability of materials
c) Transportation of materials
d) All the above

iii) To make out an estimate for a work the following data are necessary-Drawing, Specification and:
a) Materials
b) rates
c) Labour
d) transportation

iv) _____ is prepared on the basis of plinth area of building, the rate being deducted from the cost of similar building having similar specification, heights and construction, in the locality.
a) Cube Rate Estimate
b) Supplementary Estimate
c) Maintenance Estimate
d) Plinth Area Estimate

v) In this method approx. total length of walls is found in running meter and this total length Multiplied by the rate per running meter of wall gives a fairly accurate cost.
a) Annual repair
b) Item rate estimate
c) Approximate quantity method estimate
d) Cubical content estimate

vi) Nominal size of a traditional brick is:
a)22.9*11.2*7.0 cm
b) 22.9*11.4*7.6 cm
d)*9*9cm
d) 20*10*10 cm

vii) Unit of measurement for cut stone work in lintel, beam, etc. is:
a) m
b) quintal
c) m^3
d) number

viii) The approximate value of Earnest Money in terms of %age of estimated cost is:
a) 5% b) 2%
c) 12% d) 3.5%

ix) Which of the following authority has the power of accepting the tender up to Rs.50, 000?
a) A.E b) SDO
c) Executive Engineer d) Chief Engineer

x) Which is not a carrying capacity of diesel truck?
a) 3tonn b) 5tonn
c) 8tonn d) 10tonn

B] Very Short question **5x2=10)**

a) Enlist the item of works for estimation of a project.
b) Enlist the types of estimation.
c) What is the value of additional length of cranked bar (bent up bar) when angle of bend is:
d) (i) 45° (ii) 30°
e) Write down the formula of deduction for the following openings:
(i) Doors & windows with small segmental arch (ii) Arch masonry work
f) Write down the formula for
(i) Mid sectional area method (ii) Mean sectional area method.

PART B

Q2. Answer any four: **(4x5=20)**

a) Calculate the quantity of arch work in a flat arch over a door of 1.20m width. The thickness of arch is 30cm and breadth of the wall is 30cm.
b) Write a short note on Septic Tank.
c) What is the unit of measurement for the following item of work?
i) Cutting of trees
ii) Lime concrete in roof terracing, thickness specified
iii) D.P.C
iv) Honey-Comb brickwork, thickness specified
v) Steel reinforcement bars
d) Briefly explain the types of sanction. Explain the power of technical sanction by different authorities.
e) Calculate the quantity of earthwork for 200m length for a portion of road in an uniform ground. The height of banks at the two ends being 1.00m and 1.60m. The formation width is 10m and side slopes is 2:1 (Horizontal: Vertical). Assume there is no transverse slope. Use Prismoidal Formula.
f) Define Estimate. What are the data required for estimate? Why there is a need of estimation & costing in a project?

PART C

(3x10=30)

Answer any three:

Q.3) Estimate the cost for a building having plinth area of 1800sq.ft. The rate of construction is Rs.3500/sq.ft Given:

(i) Electric installation charges = 7% of building cost

(ii) Cost of water supply = 4% of building cost

(iii) Other architectural installation = 3.5% of building cost

(iv) Cost of contingencies = 3.5%

(v) Cost of work establishment = 3%

Q.4) Prepare an estimate for a room of size 5m*4m as shown in fig. Show the details of measurement, calculation of quantities and abstract of estimated cost. Use long wall & short wall method. Schedule of rates for different item of works are as follows:

Item No.	Particulars of items	Unit	Rate (Rs.)
1	Earthwork in excavation	m^3	350
2	Lime concrete	m^3	220
3	1st class brick work	m^3	320
4	Cement concrete	m^3	55

Q.5) Explain in detail approximate cost of different components of a building.

Q.6)

a) Define Contract, Tender and Earnest Money.

b) Prepare a tender notice on behalf of executive engineer (civil) for the "Construction of Railway Over- Bridge at Gamharia". Estimated cost being Rs.5, 14, 55,347. The tender will open at 11am on 24th Dec, 2019. Tender form of contract will be available at Office of Executive Engineer (Civil) everyday (except Sunday & holiday) from 10am to 5pm at the charge of Rs.500.

Q.7). Workout the quantities of item of work for RCC Beam shown in fig. The beam is used over a clear span of 2m and has 200mm bearing on the wall on either side. Beam has 10mm four main bars(2.98kg/m)out of which 2bars have been bent up(2.47kg/m) at 45° at l/7 from the ends i.e. 320mm from ends. There are 2 anchor bars at the top side of 6mm dia (0.89kg/m). The beam has 6mm dia vertical stirrups (0.22kg/m) at 180mm spacing throughout the length. 40mm cover is provided on top & bottom of beam while 20mm cover is provided at sides. Prepare the BBS for the beam.

Q.8)

a) Differentiate between Centerline Method and Longwall-Shortwall Method.

b) Explain in detail the various types of item of works.

ARKA JAIN University, Jharkhand

21/11/19

5th Semester Final Examination – 2019-20

Subject: THEORY OF STRUCTURE
Branch –Civil Engineering
Time: 3 Hours

Course: Polytechnic
Full Marks: 70
Pass Marks: 28

- Candidates are required to give their answers in their own words as far as practicable.
- Question paper is divided in to **Three Parts-A, B & C.**
- **Part -A** is compulsory.
- **Part- B** contains **SIX** question out which **FOUR** are to be Answered.
- **Part- C** Contains **SIX** question out of which **THREE** is to be Answered.

PART A

Q.1) All questions are compulsory.

A) Multiple Choice Questions **(10x1=5)**

i) The moment distribution method in structure analysis falls in the categories of

a) Displacement method

b) force method

c) Flexibility method

d) First order approximate method

ii) The effective length of column when one end is fixed and other end pinned

a) L

b) L/2

c) 2L

d) $L/\sqrt{2}$

iii) The moment required to produce unit rotation is called as

a) flexibility

b) stiffness

c) relative stiffness

d) distribution factor

iv) stiffness of a member when far end is fixed

a) 3EI/L

b) 4EI/L

c) 2EI/L

d) 0

v) The no of independent equation to be satisfied for static equilibrium of a plane structure is?

a) 1

b) 2

c) 3
d) 6

vi) In moment distribution method the sum of distribution factor of all the members meeting at any joint is alway
a) zero
b) less than 1
c) 1
d) greater than 1

vii) The carry over factor in a prismatic member whose far end is hinged
a) 0
b) 1/2
c) 3/4
d) 1

viii) If slenderness ratio of a column is greater than 12 then column is
a) Short column
b) Long column
c) Both (a) and (b)
d) None of these

ix) Rankine's theory is applicable for?
a) short column
b) long column
c) both(a) and (b)
d) none of these

x) The limit of eccentricity of a circular column should be less than or equal to

a) d/4

b) d/6

c) d/8

d) d/3

B) Very short question **(5x2=10)**

1) Write the equation for fixed end moment subjected to central point load with diagram.
2) Write down limit of eccentricity for rectangular column with diagram.
3) Define slenderness ratio and stiffness
4) Advantages and disadvantages of fixed beam
5) Write the expression for maximum and minimum intensities of stress with eccentric loading about one axis.

PART B

Q.2) Answer any Four Question **(4x5=20)**

a) Derive the expression for symmetrical column with eccentric loading about one axis.
b) A steel rod 8m long and of 60 mm diameter is used as a column, with one end is fixed and other is free. Determine the crippling load by Euler's formula. Take E= 300Gpa.
c) Write the formula of Euler's crippling load for different end condition of column with suitable diagram.
d) Write down various steps involved in moment distribution method
e) Stiffness, relative stiffness, carry over moment and distribution factor

f) A fixed beam AB of 4m long is subjected to udl of 5KN/m over entire length. Determine the value of maximum negative and positive bending moments. Also calculate the maximum deflection of the beam. Take EI= 20MN-m^2?

PART C

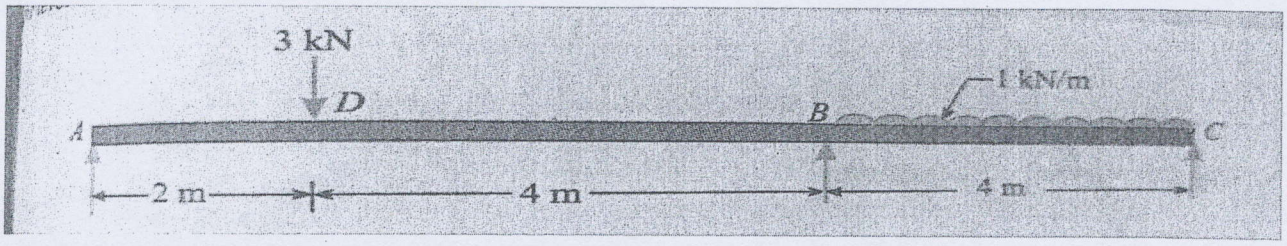
Answer any Three Question **(3x10=30)**

Q.3) Find out slope and deflection of simply supported beam carrying uniformly distributed load over entire span using double integration method.

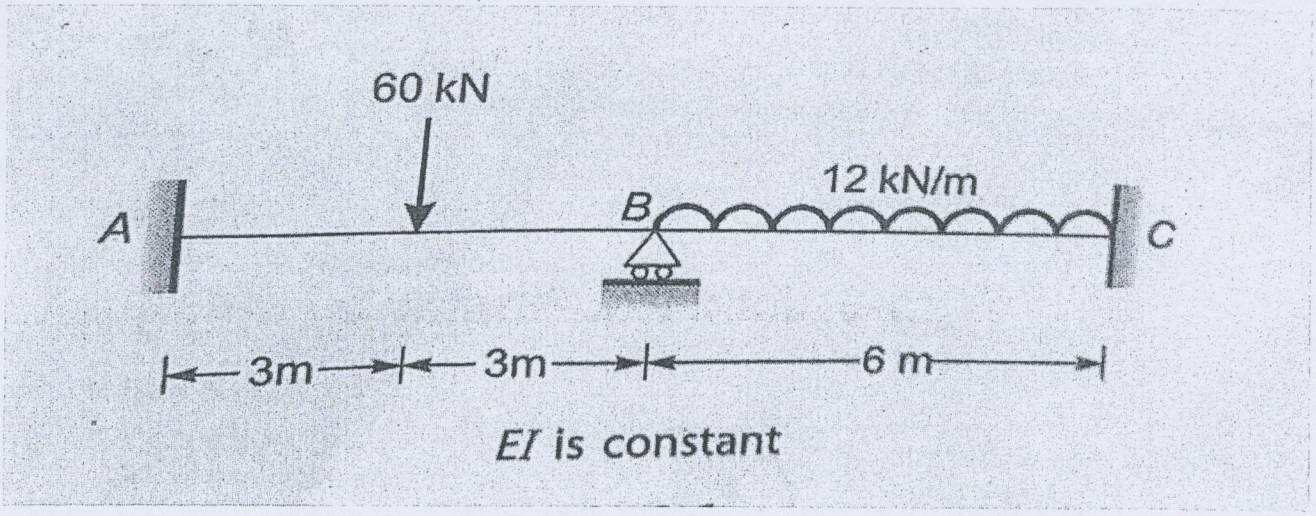
Q.4) Find the Euler's crippling load for a hollow cylindrical steel column of 38mm external diameter and 2.5mm thick. Take length of the column as 2.3m and hinged at its both ends. take E=205Gpa. also determine crippling load by Rankine's formula using constant as 335Mpa and 1/7500.

Q.5) A hollow rectangular masonry pier os 1.2mx0.8m wide and 150 mm thick. a vertical load of 2MN is transmitted in vertical plane bisecting 1.2m side and an eccentricity of 100mm from the geometric axis of the section. calculate the maximum and minimum stress intensities in the section.

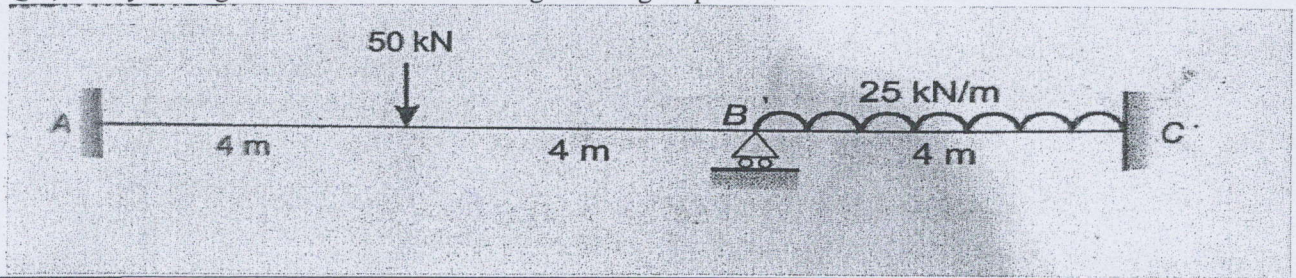
Q.6) A continuous beam ABC 10m lomg rests on three support A, B and C at the same level and is loaded as shown in figure. Determine the moments over the beam and draw the bending moment diagram. also calculate the reaction at the support and draw the shear force diagram.



Q.7) For the given beam shown in figure analyse and draw bending moment diagram using moment distribution method.



Q.8) Analyse the given beam shown in the figure using slope deflection method.



ARKA JAIN University, Jharkhand

5th Semester Internal Examination – 2019-20

Subject: TRANSPORTATION ENGG 2
Branch –Civil Egg.
Time:3 Hours

Course: Polytechnic
Full Marks:70
Pass Marks: 28

- **Candidates are required to give their answers in their own words as far as practicable.**
- **Question Paper is divided into Three parts- A, B & C.**
- **Part A is compulsory**
- **Part B contains SIX question out which FOUR are to be Answered**
- **Part C contains SIX question out of which THREE are to be Answered**

PART A

Q.1) Multiple Choice Questions **(10x1=10)**

i) The best wood for sleepers is

a. Sal
b. Teak
c. deodar
d. chir

ii) The size of the ballast used on Indian Railway for Wooden sleepers is:

a. 25 mm
b. 43 mm
c. 38 mm
d. 50 mm

iii) The railway station at which a track line meets a main line is called:

a. terminal station
b. flag station
c. way side station
d. junction station

iv) In broad gauge, the clear horizontal distance between the inner faces of two parallel rails forming the track is:

a. 1 m
b. 1.676 m
c. 0.6096 m
d. 0.792 m

v) The creep in rails is measured in:

a. cm/kg
b. cm
c. kg/cm
d. kg cm

vi)Fish bolts are made of:

a. Cast iron
b. low carbon steel
c. high carbon steel
d. stainless steel

vii) The rail chairs are generally made of

a. Cast iron
b. Low carbon steel
c. High carbon steel
d. Stainless steel

viii) Generally the shape of fish plate is:

a. elliptical
b. bone shaped
c. circular
d. rectangular

ix) Creeping of rails will be reduced by using:

a. Bearing plates
b. Spikes
c. Chairs
d. Anchors

x) Gauge is the distance measured in place of the between which faces of two parallel rails in a track.

a. inner faces
(b) centre line of one rail to inner face of other rail
(c) centre lines
(d) outer faces

B. Very Short Questions: **(5x2=10)**

a. Differentiate between Temporary and permanent bridge.
b. List some of the rail fixtures and fastenings used for fixing up the rails.
c. What is a rail gauge? What are its types.
d. Define **a.** Ballast **b.** Sleeper
e. What is a creep? Give two causes of creep.

PART B

Q.2) Answer any Four Question **(4x5=20)**

a. Draw the layout of airport showing all its components.
b. Classify different types of tunnels and also draw the tunnel cross sections for railways.
c. What is the function and requirements of ballast and sleepers?
d. Draw a neat sketch showing different component and function of points and crossing?
e. Compare the different modes of transportation system.
f. What are the factors affecting the selection of site of a bridge?

PART C

Q.3) Answer any three Questions **(10x3=30)**

a. Classify the bridge according to their function, size, alignment and position of HFL.
b. Draw the line sketches of following track junctions:
    1. Crossovers
    2. Scissor crossover
    3. Diamond crossing
c. What are the components of a bridge? Draw the plan and sectional elevation of bridge showing components of sub structure and superstructure.
d. What are the advantages and disadvantages of tunnels. How tunnels can be classified?
e. What is a sleeper density? Explain the types of sleepers with its suitability.
f. Explain the methods of tunneling in hard rock needle beam method.