

**SUBJECT CODE NO:- P-15**  
**FACULTY OF ENGINEERING AND TECHNOLOGY**  
**S.E.(ALL-BRANCHES) Examination May/June 2017**  
**Engineering Mathematics - III**  
**(Revised)**

**[Time: Three Hours]****[Max.Marks:80]**

Please check whether you have got the right question paper.

N.B

- i) Q. No. 1 and Q. No.6 are compulsory
- ii) Solve any two questions from Q. Nos. 2, 3, 4 and 5.
- iii) Solve any two questions from Q. Nos. 7, 8, 9 and 10.
- iv) Use of non-programmable calculator is allowed.
- v) Figures to the right indicate full marks.

## Section A

Q.1 Solve any five from the following

10

- a) Solve  $(D^2 - 4D - 12)y = 0$
- b) Solve  $(D^2 + 2\pi D + \pi^2)y = 0$
- c) Find the P.I. of the equation  $(D^2 + D - 6)y = e^{2x}$
- d) Find the P.I. of the equation  $(D^3 + 4D)y = \sin 2x$
- e) Find the mean of the following data

Class	5-10	10-15	15-20	20-25	25-30	30-35	35-40
f:	6	5	15	10	5	4	3

- f) Find the area under the normal curve between  $Z = -1.24$  to  $1.24$
- g) For a binomial distribution the mean is 12 and the variance is 4, find all the constants of the distribution.
- h) A 2 lb weight – suspended from a spring stretches it 1.5 inches. If the weight is pulled 3 inches below the equilibrium position and released set up a differential equation of motion.

Q.2

- a) Solve  $(D^2 + 2)y = e^x \cos 2x$
- b) Calculate the mean deviation from the median for the following data

05

05

Class	50-100	100-150	150-200	200-250	250-300	300-350
f:	7	18	25	31	15	4

- c) An emf of 200V is in series with a 10 ohm resistor, a 1 henry inductor and 0.02 Farad capacitor At  $t=0$ , the charge Q and current I are zero. Find Q and I at any time t.

05

Q.3

- a) Calculate the mean and standard deviation for the data

05

Class	68-74	75-81	82-88	89-95	96-102	103-109
f:	5	31	40	20	3	1

- b) Solve without using method of variation of parameters  $(D^2 + 9)y = \sec 3x$
- c) The differential equation of a cantilever beam of length l and weighing w kgs/unit, subjected to a horizontal compressive force P applied at the free end is given by

05

05

$$EI \frac{d^2 y}{dx^2} + Py = \frac{-1}{2} Wx^2, \text{ if } y = \delta$$

$$\text{And } \frac{dy}{dx} = 0 \text{ at } x=l \text{ and}$$

$$\frac{d^2 y}{dx^2} = 0 \text{ at } x=0, \text{ find the maximum deflection of the beam}$$

Q.4 a) Solve by method of variation of parameters

05

$$(D^2 + 1)y = \frac{1}{1 + \sin x}$$

b) The income distribution of a group of 10000 persons was found to be normal with mean Rs.7500 and the standard deviation Rs.500. What is the number of persons of this group which have income

05

i) exceeding Rs.6680 ii) exceeding Rs.8320.

c) If a weight 6 lbs hangs from a spring with constant  $K = 12$  and no damping force exists, find the motion of weight when an external force  $3 \cos 8t$  acts, initially  $x=0$ ,  $\frac{dx}{dt} = 0$  Determine whether resonance occurs.

05

Q.5 a) Solve  $x^2 \frac{d^3 y}{dx^3} + 3x \frac{d^2 y}{dx^2} + \frac{dy}{dx} = x^2 \log x$

05

b) Fit the curve  $y = ae^{bx}$  for the data

05

X:	1	2	3	4	5	6
Y:	1.6	4.5	13.8	40.2	125	300

c) The first three moments of a distribution about the value 2 are 1, 16 and -40. Find mean, variance and

05

$\mu_3$

Also find the first three moments about  $x=0$

#### Section B

Q.6 Solve any five

10

a) Find the first approximate value of the root (i.e.  $X_1$ ) by Newton – Raphson method for  $x e^x - 2 = 0$ , correct to 3 decimal place.

b) find  $f(8)$  for the data

x	5	6	9
f(x)	12	13	14

c) Find the values of  $x, y, z$  in the first iteration by Gauss seidel method for

$$54x + y + z = 110$$

$$2x + 15y + 6z = 72$$

$$-x + 6y + 27z = 85$$

d) Find grad  $\phi$  at  $(1, -2, -1)$ , if

$$\phi = 3x^2 y - y^3 z^2$$

e) show that the vector

$$\vec{v} = e^x \sin y \mathbf{i} + e^x \cos y \mathbf{j}$$
 is irrotational

f) Evaluate  $\int_C \vec{F} \cdot d\vec{r}$  Where  $F = x^2 \mathbf{i} + xy \mathbf{j}$

c:  $y = 0$

between points  $(0,0)$  to  $(a,0)$

g) find  $\nabla^2 (r \log r)$

h) Write statement of Stoke's theorem.

Q.7 a) Solve by Gauss Seidel Method

05

$$10x + 2y + z = 9$$

$$2x + 20y - 2z = -44$$

2017

$$-2x + 3y + 10z = 22$$

b) Find the directional derivative of

$$f = x^2 - y^2 + 2z^2 \text{ at the point}$$

(1,2,3) in the direction towards the point (2,1,4)

c) Show that vector field

$$\vec{F} = 2x(y^2 + z^3)\mathbf{i} + 2x^2y\mathbf{j} + 3x^2z^2\mathbf{k}$$

is conservative. Find the work done in moving a particle from

(-1,2,1) to (2,3,4)

Q.8 a) Find a root of the equation correct to three decimal places

$$\log x - \cos x = 0$$

b) Show that  $f(r)\vec{r}$  is always irrotational

c) Evaluate by Green's theorem

$$\int_c \vec{F} \cdot d\vec{r}, \text{ where } \vec{F} = x^2\mathbf{i} + xy\mathbf{j}$$

And c is a triangle having

Vertices A (0,2), B(2,0) and C (4,2)

Q.9 a) Find  $\frac{dy}{dx}$  at  $x = 1.9$  for the data

x	1.1	1.3	1.5	1.7	1.9
y	0.21	0.69	1.25	1.89	2.61

b) Using stoke's theorem evaluate

$$\int_c [(x+y)dx + (2x-z)dy + (y+z)dz]$$

c

Where c is the boundary of the triangle with vertices (2,0,0), (0,3,0) and (0,0,6)

c) Show that  $\vec{F} = (6xy + z^3)\mathbf{i} + (3x^2 - z)\mathbf{j} + (3xz^2 - y)\mathbf{k}$  is irrotational. Find scalar  $\phi$  such that  $F = \nabla\phi$ .

Q.10 a) Use Runge Kutta method of order 4

to approximate y when  $x=1.1$ ,

given that  $y(1) = 1.2$  and

$$\frac{dy}{dx} = 3x + y^2, \text{ take } h=0.1$$

b) Solve by Euler's modified method

$$\frac{dy}{dx} = -xy^2, y(0) = 2$$

find y (0,2) by taking  $h = 0.2$

c) Evaluate

$$\iint_S \vec{F} \cdot \hat{n} ds \text{ where}$$

$\vec{F} = 4xzi - y^2j + yz\mathbf{k}$  and S is the surface of the cube

bounded by  $x=0, x=1, y=0, y=1, z=0, z=1$

# Subject Code : 41

FACULTY OF ENGINEERING & TECHNOLOGY

S.E. Civil (Revised) Examination

APRIL/MAY, 2017

## Strength of Material

Time : Three Hours

Max. Marks: 80

"Please check whether you have got the right the question paper"

- Note:
- i) Q.No. 1 & 6 are compulsory and solve any two from remaining questions of Section.
  - ii) Figures to the right indicate full marks.
  - iii) Assume suitable data if necessary.

### SECTION – A

Q.1 Write short notes on (Any Five) : 10

- (i) Define stress
- (ii) State Hooke's law
- (iii) Define temperature stress
- (iv) Define beam
- (v) Define shearforce and bending moment.
- (vi) Define bending stress
- (vii) Define bulk modulus
- (viii) Define moment of resistance.

Q.2 (a) Derive the relation between E, G & K i.e. ( $E = 9kg/3k + g$ ) 07

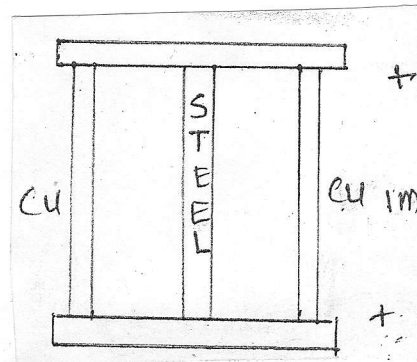
- (b) Three rods each of length 1m & c/s area  $200 \text{ mm}^2$  are connected to the rigid plate at the ends. If temperature of assembly is raised by  $25^\circ\text{C}$ , determine stress in each rod. 08

Take

$$E=200 \text{ GPa } X_s = 120 \times 10^{-6} / ^\circ\text{C}$$

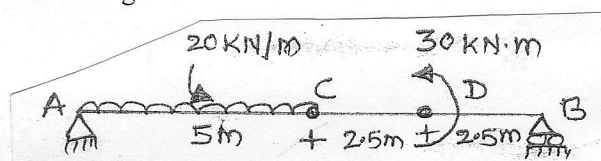
$$E_C = 120 \text{ GPa } \alpha = 18.5 \times 10^{-6} / ^\circ\text{C}$$

$$A_S = A_C = 200 \text{ mm}^2$$



Q.3 (a) Define point of contra flexure. 03

- (b) Draw S.F.D. & B.M.D. and locate maximum bending moment for a beam loaded as shown in Figure. 12



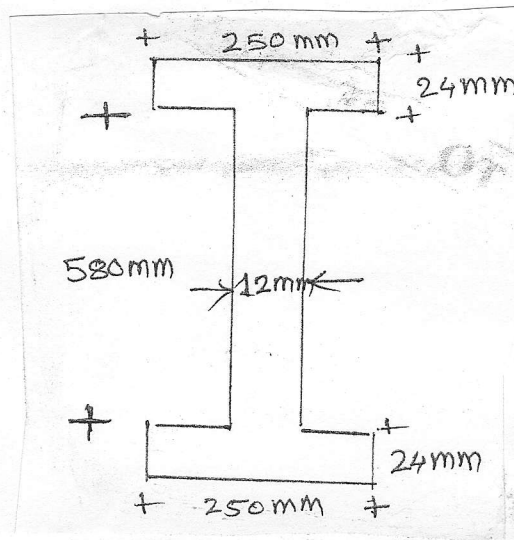
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# Subject Code : 41

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- Q.4 A rolled steel joist of I-Section has the following dimension as shown in Figure. If the beam carries u.d.l. of 40 kN/m on span of 6m. Calculate the maximum stress produced due to bending the beam is simply supported at both the ends. 15



- Q.5 (a) Write down the assumptions made in theory of simple bending. 07  
(b) A bar of length 10m elongates through 8mm under the action of an axial pull of 5 kN. If diameter of bar is 25mm. Find stress strain and modulus of elasticity. 08

## SECTION – B

- Q.6 Write short notes on (Any Five) : 10  
(i) What is angle of twist?  
(ii) Write down the torsional formula.  
(iii) Define longitudinal stress.  
(iv) Define principal plane and stress.  
(v) Define strut.  
(vi) Write down assumptions in theory of torsion.  
(vii) Define eccentric loading.  
(viii) Define polar modulus.
- Q.7 (a) A bar 1m in length is subjected to a pull such that maximum stress is equal to the 150 N/mm<sup>2</sup>. It's area of c/s is 200 mm<sup>2</sup> over a length of 950mm and for middle 50mm length the c/s area is 100mm<sup>2</sup>. If E= 200 GPa, calculate the strain energy stored in bar. 07  
(b) A solid circular shaft transmit 75kW at 200 rpm. Calculate the shaft diameter if the twist in the shaft is not to exceed 1° in 2m length of shaft. If the shearing stress is limited to 50 N/mm<sup>2</sup>. Take  $G = 1 \times 10^5$  N/mm<sup>2</sup> 08
- Q.8 (a) A cylindrical shell 3m long, 1 m in diameter and is subjected to an internal pressure of 1 N/mm<sup>2</sup>. If the thickness of the shell is 20mm. Find the circumferential and longitudinal stress. 07  
(b) A short masonry pillar is 600 mm x 600 mm in section pillar carries a point load of 1000 kN acting on the centroidal axis of the section shown in figure and at an eccentricity of 80mm from the longitudinal axis. Find the minimum and maximum stress in the section. 08

Contd...3.

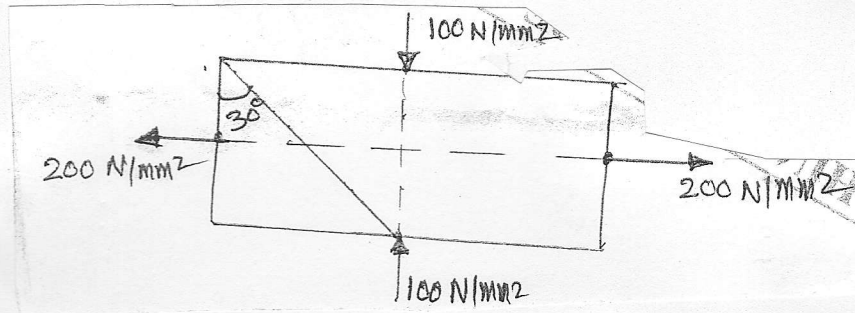
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# Subject Code : 41

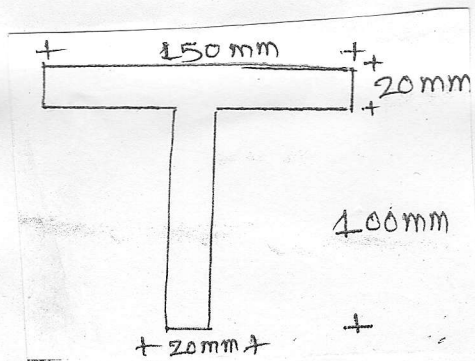
-3-

- Q.9 Determine the resultant stress in magnitude and direction on a plane inclined at  $30^\circ$  to the axis of major principal stress. Also determine the maximum intensity of shear stress in the material at the point 15



- Q.10 Calculate the buckling load for a strut of T-section as shown in figure having length 6m. One end of strut is hinged and other end is fixed. Calculate buckling load using Euler's formula. 15

Take  $E = 200 \text{ GPa}$ .



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**SUBJECT CODE NO:- P-72**  
**FACULTY OF ENGINEERING AND TECHNOLOGY**  
**S.E.(CIVIL) Examination May/June 2017**  
**Fluid Mechanics-I**  
**(Revised)**

**[Time: Three Hours]**

**[Max.Marks:80]**

Please check whether you have got the right question paper.

- N.B
- i) Q.No.1 and Q.No.6 are compulsory.
  - ii) Solve any two from remaining questions for section A and any two for section B.
  - iii) Assume suitable data, if necessary.

**Section A**

- |     |  |                               |
|-----|--|-------------------------------|
| Q.1 | Solve any five from following.   | 10                            |
|     | <ol style="list-style-type: none"> <li>1) Draw a net diagram showing different types of fluids.</li> <li>2) Define specific volume.</li> <li>3) What is meant by intensity of pressure?</li> <li>4) Define the term vapour pressure?</li> <li>5) Enlist the applications of flow net.</li> <li>6) Define radial flow.</li> <li>7) Define metacentric height.</li> <li>8) Draw neat diagram for inclined plane surface sub-merged in liquid.</li> <li>9) What are the properties of stream function( <math>\Psi</math> )</li> </ol> |                               |
| Q.2 | <ol style="list-style-type: none"> <li>a) If specific gravity of a liquid is 0.80. Make calculations for its mass density, specific volume and specific weight.</li> <li>b) What do you mean by single column manometers? How are they used for the measurement of Pressure?</li> <li>c) State the Archimedes Principle.</li> </ol>  | <p>06</p> <p>06</p> <p>03</p> |
| Q.3 | <ol style="list-style-type: none"> <li>a) Derive an expression for the force exerted on a submerged vertical plane surface by the static liquid and locate the position of centre of pressure.</li> <li>b) A vertical square 1.6 m on a side with two sides horizontal is immersed in a oil density <math>900 \text{ kg/m}^3</math>, such that the centre of pressure is 7.5 cm below the center of gravity .How far below the square be immersed in oil? What will be the total force on the square?</li> </ol>                   | <p>08</p> <p>07</p>           |
| Q.4 | <ol style="list-style-type: none"> <li>a) The velocity components in fluid flow are given by <math>u=2xy</math>, <math>v = a^2 + x^2 - y^2</math>.                             <ol style="list-style-type: none"> <li>i) Show that the flow is possible.</li> <li>ii) Derive the relative stream function.</li> </ol> </li> <li>b) Derive an expression for the velocity distribution for viscous flow through a circular pipe.</li> </ol>   | <p>07</p> <p>08</p>           |
| Q.5 | Write short notes on (any three) <ol style="list-style-type: none"> <li>1) Free and forced vortex</li> <li>2) Equilibrium of Floating bodies.</li> <li>3) Expression for the meta-centric</li> <li>4) Draw neat diagram of .                             <ol style="list-style-type: none"> <li>a) U-tube manometer</li> <li>b) Inverted U- tube Manometer</li> </ol> </li> </ol>  | <p>15</p>                     |

## Section-B

- |      |   |   |
|------|---|---|
| Q.6  | Solve any five from following.  | 10  |
|      | <ol style="list-style-type: none"> <li>1) Define potential energy and kinetic energy.</li> <li>2) Give classification of notches.</li> <li>3) Define Moment of momentum equation.</li> <li>4) Draw neat diagram of partially sub-merged orifice.</li> <li>5) What do you mean by a drowned weir?</li> <li>6) Define momentum thickness.</li> <li>7) Draw neat diagram of vertical venturimeter with U-tube manometer.</li> <li>8) Enlist the types of boundary layer.</li> <li>9) The reading of differential manometer connected to the inlet and throat is 20 cm of mercury; find the pressure head for water flowing through horizontal venturimeter.</li> <li>10) Draw the diagram for forces acting on a pipe bend.</li> </ol> |   |
| Q.7  | <ol style="list-style-type: none"> <li>a) Derive Bernoulli's equation for the flow of an incompressible frictionless fluid.</li> <li>b) A venturimeter with 200 mm diameter at convergent cone and 100 mm at throat is laid with its axis horizontal and is used for measuring the flow of oil of sp. Gr. 0.80. the oil mercury differential manometer shows a gauge difference of 250 mm. Calculate the discharge. Take <math>C_d = 0.97</math></li> </ol>   | <div>07</div> <div>08</div>               |
| Q.8  | <ol style="list-style-type: none"> <li>a) Obtain an expression for discharge through               <ol style="list-style-type: none"> <li>i) Mouthpiece running free</li> <li>ii) Mouthpiece running full.</li> </ol> </li> <li>b) The head of water over the centre of an orifice of diameter 25 cm is 2.8 m. The actual discharge through the orifice is 450 lit/sec. Find the co-efficient of discharge</li> </ol>   | <div>10</div> <div>05</div>               |
| Q.9  | <ol style="list-style-type: none"> <li>a) Explain in detail               <ol style="list-style-type: none"> <li>1) Laminar boundary layer</li> <li>2) Turbulent boundary layer.</li> </ol> </li> <li>b) Obtain an expression for drag and Lift.</li> </ol>   | <div>06</div> <div>09</div>               |
| Q.10 | <ol style="list-style-type: none"> <li>a) The head of water over a rectangular weir is 400 mm. The length of the crest of the weir with end contraction suppressed is 2.0m. find the discharge by using Francis's formula.</li> <li>b) Find the velocity of the flow of an oil through a pipe, when the difference of mercury level in a differential U-tube manometer connected to the two tappings on the piton-tube is 150 mm. Take <math>C_v = 0.98</math> and sp. gr. of oil = 0.8.</li> <li>c) Explain how to determine coefficient of velocity (<math>C_v</math>) experimentally.</li> </ol>   | <div>05</div> <div>06</div> <div>04</div> |



**SUBJECT CODE NO:- P-105**  
**FACULTY OF ENGINEERING AND TECHNOLOGY**  
**S.E.(Civil) Examination May/June 2017**

**Surveying-I**  
**(Revised)**

[Time: Three Hours]

[Max.Marks:80]

Please check whether you have got the right question paper.

N.B

- i) Q. No. 1 and Q. No. 6 are compulsory.
- ii) Solve any two questions from each section.
- iii) Assume suitable data if necessary.
- iv) Figures to the right indicate full marks.

Section A

Q.1

Answer any five of the following:-

10

1. What is the principle of chain surveying?
2. What are the offsets?
3. Define contour interval and horizontal equivalent.
4. Enlist the instruments used for setting out eight angles.
5. Give the classification of surveying.
6. Define leveling and state types of leveling.
7. Write the two disadvantages of plane table surveying.
8. What is the two point problem?
9. Give the expressions for curvature and refraction corrections.
10. Define check line and base line.

Q.2

07

- (a) Explain the construction procedure and function of optical square in details.
- (b) The following bearings are observed while traversing with compass. Check the bearing for local attraction and correct the bearing by the method of included angles.

08

Line	FB	BB
AB	$188^{\circ}45'$	$7^{\circ}45'$
BC	$118^{\circ}15'$	$298^{\circ}15'$
CD	$346^{\circ}35'$	$166^{\circ}30'$
DE	$337^{\circ}05'$	$158^{\circ}10'$
EA	$293^{\circ}30'$	$113^{\circ}00'$

Q.3

07

- (a) Explain the terms in details:-  
 Profile leveling and cross-sectional leveling.
- (b) The following consecutive readings were taken with a level on continuously sloping ground at common

08

2017

interval of 30 m. The RL of A=395.50 m. 0.905(A), 1.745, 2.345, 3.125, 3.725, 0.545, 1.390, 2.055, 2.955, 3.455, 0.595, 1.015, 1.850, 2.655, 2.945 (B).

Calculate the RL's of different points and apply the check.

- Q.4 (a) Explain the solution of three point problem for graphical method. 07  
 (b) Define ranging. Explain the types ranging in details. 08  
 Q.5 Write short notes on (Any three):- 15  
 (i) Orientation  
 (ii) Differential leveling  
 (iii) Temporary adjustment of dumpy level.  
 (iv) Chain and tape correction  
 (v) Prismatic compass.

#### Section B

- Q.6 Solve any five:- 10  
 1. What is the transit theodolite?  
 2. What is the direct angle?  
 3. What are the consecutive co-ordinate?  
 4. What are the functions of theodolite?  
 5. State the transit rule.  
 6. Define tacheometry.  
 7. State the trapezoidal rule.  
 8. State the different types of cross-sections.  
 9. What are the functions of clamp screw and tangent screw?  
 10. What is difference between a theodolite and a tacheometer?  
 Q.7 (a) Explain the procedure for measurement of magnetic bearing by using theodolite. 07  
 (b) The measured length and bearings of the sides of traverse ABCDEA in an anticlockwise direction are as follows. Calculate the length of CD and DE. 08

Line	Length	Bearing
AB	298.7	0°0'
BC	205.7	N25°12'W
CD	?	S75°6'W
DE	?	S56°24'E
EA	213.4	N35°36'E

- Q.8 (a) Explain the constructional detail of planimeter. 07  
 (b) An embankment of width 10 m and side slope 1.5:1 required to be made on a ground which is level in a direction transverse to the center line. The central height at 40 m interval as follows. 08  
 0.90, 1.25, 2.15, 2.50, 1.85, 1.35, 0.85. Calculate the volume of earth work according to  
 (i) Trapezoidal rule  
 (ii) The prismoidal rule

- Q.9 (a) What are the sources of errors while using a theodolite? How can they be eliminated? 07  
 (b) The following observations were taken with a tacheometer fitted with anallatic lens, the staff being held vertically. Determine the distance PQ and QR, and the RL of P, Q and R. 08

Inst. station	HI	Staff station	Vertical angle	Hair readings	Remark
P	1.45	BM	$-6^{\circ}12'$	0.980, 1.540, 2.100	RL of BM=384.25 m
P	1.45	Q	$+7^{\circ}5'$	0.830, 1.360, 1.890	
Q	1.57	R	$+12^{\circ}21'$	1.890, 2.480, 3.070	

Q.10 Write short notes on (Any three).

1. Auto reduction Tacheometer
2. Principle of tacheometry
3. Measurement of vertical angle
4. Area of multi-level section.

15

**SUBJECT CODE NO:- P-139**  
**FACULTY OF ENGINEERING AND TECHNOLOGY**  
**S.E.(Civil) Examination May/June 2017**  
**Concrete Technology**  
**(Revised)**

**[Time: Three Hours]****[Max.Marks:80]**

Please check whether you have got the right question paper.

- N.B
- i) Q No.1 and 6 are compulsory. Attempt any two questions from each section from remaining.
  - ii) Draw neat sketch wherever necessary.
  - iii) Figure to the right indicates full marks.

**Section A**

- Q.1 Answer the following question (Any five):- 10
- (a) What is hydration? Mention factors that govern rate of hydration.
  - (b) What is workability of concrete?
  - (c) Enlist factors affecting creep.
  - (d) What is curing? Enlist methods of curing.
  - (e) What are the factors affecting the strength of concrete?
  - (f) Enlist basic members used in framework.
  - (g) Explain shrinkage and enlist types of shrinkages.
  - (h) What are different types of segregation in concrete?
  - (i) What are admixtures? Explain retarder.
- Q.2 (a) Explain wet process of manufacturing of cement. 08
- (b) Why curing is necessary? Explain different types of curing. 07
- Q.3 (a) Explain the term normal consistency, initial setting time, final setting time and explain in short how they are found. 08
- (b) What is the classification of aggregate and explain characteristics of aggregates influencing strength of concrete. 07
- Q.4 (a) Explain what is bulking of sand & mention its significance. 05
- (b) What are properties of fresh concrete explain in detail. 05
- (c) What are different types of cement explain any one in detail. 05
- Q.5 Write short notes on (Any three):- 15
- (a) What is compaction? Why it is required and what are various ways of compaction.
  - (b) What is Vicat apparatus and for what it is use? Explain with neat sketch.
  - (c) What is percentage of various ingredients of level
  - (d) What are different types of test conducted on fresh and hardened concrete?
  - (e) What is initial and final setting time of concrete?

**Section B**

- Q.6 Answer the following questions (Any five):- 10
- (a) State the assumption in design of plastic concrete of medium strength.
  - (b) What is a self-compacting concrete.
  - (c) Enlist different methods of mix design.
  - (d) Enlist different types of mixes.
  - (e) What is high density concrete?
  - (f) What is pumping of concrete? How it is done?
  - (g) What is NDT? Enumerate different tests
  - (h) Define permeability and durability.
  - (i) What is shrinkage of concrete?
- Q.7 (a) Explain concept of mix design? 07

- (b) Name different methods of mix design of concrete. Explain I.S. method of Mix design. 08
- Q.8 Design concrete mix for M<sub>20</sub> grade concrete with following data: 15
- (i) Characteristic comp. strength at 28 days=20 Mpa.
  - (ii) Min size of aggregate 20 mm.
  - (iii) Degree of workability-C.F.=0.8
  - (iv) Degree of quality control-Good
  - (v) Sp. Gravity of cement-3.15
  - (vi) Sp. Gravity of C.A.-2.6
  - (vii) Sp. Gravity of F.A.=2.6
- Assume suitable data if required.
- Q.9 (a) Explain sulphate attack and chloride attack. 07
- (b) What is creep of concrete? Explain factors affecting creep. 08
- Q.10 Explain short notes on:- 15
- (a) Polymer concrete
  - (b) Mechanism of corrosion of reinforcement.
  - (c) Under water concreting
  - (d) Fiber reinforced concrete
  - (e) Types of repair



**SUBJECT CODE NO:- P-220**  
**FACULTY OF ENGINEERING AND TECHNOLOGY**  
**S.E. (All Branches) Examination May/June 2017**  
**Engineering Mathematics -IV**  
**(Revised)**

[Time: Three Hours]

[Max.Marks:80]

Please check whether you have got the right question paper.

- N.B
- i) Q.No.1 from and Q.No.6 are compulsory.
  - ii) Solve any two questions from remaining of each section.
  - iii) Figures to the right indicate full marks.
  - iv) Assume suitable data, if necessary.

Section A

Q.1 Solve any five from the following:

10

- a. Find the analytic function whose imaginary part is  $e^x \sin y$ .
- b. Show that  $u = \bar{e}^{\theta} \cos(\log r)$  is harmonic.
- c. Find the image of the line  $y=2x$ , under the transformation  $W=Z^2$
- d. Evaluate  $\int_0^{1+i} (x^2 - iy) dz$  along the line  $y=x$ .
- e. Evaluate  $\int_c \frac{e^z}{z} dz$ , where  $c$  is  $|z|=1$
- f. Find the poles of the function and the corresponding residues at each pole of  $f(z) = \frac{ze^z}{(z+1)^3}$
- g. Solve  $\frac{\partial u}{\partial x} = \frac{2\partial u}{\partial t} + u$ , where  $u(x, 0) = 6e^{-3x}$ .

OR

Find the Z-transform of  $f(k) = k, k \geq 0$ .

h. Solve  $\frac{\partial^2 z}{\partial x \partial y} = \sin x$ .

OR

Find the Z-transform of  $e^{-ak}, k \geq 0$ ,

- Q.2
- a. Show that the function  $f(z) = e^x (\cos y + i \sin y)$  is analytic and find its derivative.
  - b. Find the bilinear transformation which maps the point  $z = -1, 0, 1$  onto the points  $W = 0, i, 3i$ .
  - c. Find the Z-transform of  $\frac{\cos 2k}{k}, k \geq 0$ .

05

05

05

OR

Solve  $\frac{\partial^2 y}{\partial t^2} = C^2 \frac{\partial^2 y}{\partial x^2}$ , subject to the conditions

05

$Y(0, t) = 0, Y(l, t) = 0, \partial y / \partial t = 0$  at  $t = 0$

And  $y(x, 0) = \frac{3a}{2l}x, 0 \leq x \leq \frac{2l}{3}$   
 $= \frac{3a}{l}(l-x), \frac{2l}{3} \leq x \leq l$ .

- Q.3
- a. Find  $k$  such that  $f(x, y) = x^3 + 3kxy^2$  may be harmonic and find its conjugate harmonic function.
  - b. Evaluate  $\int_c \bar{z}^2 dz$ , Where  $c$  is  $|Z - 1| = 1$ .
  - c. Find the inverse Z-transform of  $\frac{Z}{(z-2)(z-3)}, |Z| > 3$ .

05

05

05

OR

- Solve  $\frac{\partial u}{\partial t} = \alpha^2 \frac{\partial^2 u}{\partial x^2}$  for  $0 < x < \pi, t > 0$  05  
 $\frac{\partial u}{\partial x} = 0$  at  $x=0$ ,  $\frac{\partial u}{\partial x} = 0$  at  $x = \pi$  and  $u(x, 0) = \sin x$ .
- Q.4 a. Expand  $f(z) = \frac{1}{(z+1)(z+2)}$  for  $0 < |z - 1| < 1$ . 05  
 b. Evaluate  $\oint_c \frac{\sin z}{(z-1)^2(z^2-9)} dz$ , where  $c$  is  $|z - 3| = \frac{1}{2}$ . By Cauchy's integral formula. 05  
 c. Solve the difference equation by Z-transform  $u_{k+2} - 2u_{k+1} + u_k = 2^k$ , with  $Y_0 = 2, Y_1 = 1$ . 05  
 OR
- Solve  $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 0$ , subject to the conditions 05  
 $u(0, y) = u(\pi, y) = 0$  for all  $y \geq 0$  and  $u(x, 0) = 100 u(x, \infty) = 0$ .
- Q.5 a. Under the transformation  $W = Z + \frac{a^2}{z}$ , show that the map of the circle  $x^2 + y^2 = a^2$  is a straight line, but the map of the circle  $x^2 + y^2 = b^2$  ( $b > a$ ) is an ellipse. 05  
 b. Evaluate  $\oint_c \frac{z^2}{\sin^3 z \cos z} dz$ , where  $c$  is  $|Z + i| = 2$  by Cauchy's Residue theorem. 05  
 c. Evaluate  $\int_{-\pi}^{\pi} \frac{1}{1 + \sin^2 \theta} d\theta$ , by using Residue theorem. 05
- Section-B
- Q.6 Solve any five from the following: 10  
 a. Find Laplace transform of  $te^{-2t} \delta(t - 2)$ .  
 b. Find  $L[f(t)]$  and  $L[f'(t)]$  of the following function  $f(t) = 3, 0 \leq t < 5$   
 $= 0, t > 5$ .  
 c. Find the Laplace transform of  $f(t) = (t-2)^2, t > 2$   
 $= 0, t < 2$   
 d. Find inverse Laplace transform of  $\frac{2s+2}{s^2+2s+10}$   
 e. Find inverse Laplace transform of  $\frac{e^{-\pi s}}{s^2+9}$   
 f. Find inverse Laplace transform of  $s^{-\frac{7}{2}}$   
 g. Find the Fourier cosine transform of  $f(x) = k, 0 < x < a$   
 $= 0, x > a$   
 h. Find the Fourier transform of  $f(x) = x, 0 < x < a$   
 $= 0, \text{ otherwise}$
- Q.7 a. Find the Laplace transform of  $\int_0^t \frac{1 + e^t}{t} dt$ . 05  
 b. Find the inverse Laplace transform of  $\tan^{-1} \frac{2}{s}$  05  
 c. Using Fourier transform, solve the equation  $\frac{\partial u}{\partial t} = 2 \frac{\partial^2 u}{\partial x^2}, 0 < x < \infty, t > 0$  05  
 Subject to the conditions  
 $u(0, t) = 0, t > 0, u(x, 0) = e^{-x}, x > 0,$   
 $u$  and  $\frac{\partial u}{\partial x} \rightarrow 0$  as  $x \rightarrow \infty$ .
- Q.8 A. Evaluate  $\int_0^\infty e^{-5t} \sinh^3 t dt$  05  
 b. Find the inverse Laplace transform by convolution theorem of  $\frac{1}{s(s^2+4)}$  05  
 c. Find  $f(x)$  satisfying the integral equation  $\int_0^\infty f(x) \sin \lambda x dx = \frac{\sin \lambda}{\lambda}$  05
- Q.9 Express the following function in terms of Heaviside unit step function and hence find their Laplace transform 05  
 $F(x) = \sin t, 0 < t < \pi$   
 $= t, t > \pi$

b. Solve  $y'' - 6y' + 9y = t^2 e^{3t}$ ,  $y(0)=2$ ,  $y'(0)=6$  by Laplace transform.

c. Find the Fourier sine transform of

$$f(x)=x, 0 < x < 1$$

$$=2-x, 1 < x < 2$$

$$=0, x > 2$$

Q.10 a. Find the Laplace transform of  $f(t)=e^t$ ,  $0 < t < 2\pi$ ,  $f(t)=f(t+2\pi)$ .

b. Solve  $\frac{dx}{dt} + y = \sin t$ ,  $\frac{dy}{dt} + x = \cos t$ ,  $X(0)=2$ ,  $y(0)=0$  by Laplace transform.

c. Find the Fourier transform of  $f(x)=\frac{1}{2a}$ , if  $|x| \leq a$   
 $=0$ , if  $|x| > a$ .

05

05

05

05

05

**SUBJECT CODE NO:- P-243**  
**FACULTY OF ENGINEERING AND TECHNOLOGY**  
**S.E.(Civil) Examination May/June 2017**  
**Building Construction & Drawing**  
**(Revised)**

**[Time: Three Hours]**

**[Max.Marks:80]**

Please check whether you have got the right question paper.

- N.B
- i) Q. No.1 and Q. No.6 are compulsory.
  - ii) Solve any two questions from remaining in section A and one question from remaining in section B.
  - iii) Use separate drawing sheet for solving Q.No.6 of section B.

**Section A**

- |     |  |              |
|-----|--|--------------|
| Q.1 | Attempt any five of the following:-  | 10           |
|     | <ul style="list-style-type: none"><li>a) What is pitch of stair?</li><li>b) Enlist the requirement of good acoustical material.</li><li>c) When scaffolding is required.</li><li>d) Enlist different types of stairs.</li><li>e) What are the advantages of cavity wall?</li><li>f) Define Aspect.</li><li>g) What is head room?</li></ul> |              |
| Q.2 | <ul style="list-style-type: none"><li>a) What is an energy efficient building? Explain.</li><li>b) What is the importance of principles of planning? Explain roominess and grouping.</li></ul>   | <br>08<br>07 |
| Q.3 | <ul style="list-style-type: none"><li>a) Discuss the points to be observed during planning 7 construction of building in connection with the fire proof construction.</li><li>b) Explain how damp proofing is carried out with the help of suitable sketches.</li></ul>  | <br>08<br>07 |
| Q.4 | <ul style="list-style-type: none"><li>a) Explain how the building bylaws affect planning of residential bungalows.</li><li>b) What are the different causes of failure of foundation? Explain any two in detail.</li></ul>   | <br>08<br>07 |
| Q.5 | <ul style="list-style-type: none"><li>a) Write at length on anti-termite treatment.</li><li>b) Write a detailed note on pit method of under pinning.</li></ul>   | <br>08<br>07 |

**Section B**

- |     |   |                              |
|-----|---|------------------------------|
| Q.6 | Draw plan of residential bungalow for a family.   |                              |
|     | <ul style="list-style-type: none"><li>a) Size of plot 12m× 18m.</li><li>b) Scale 1:50</li><li>c) Plinth height 0.75m</li><li>d) Requirements: Ent., Verandah, Living Hall, bedroom, master bedroom, separate w.c. bath, Kitchen room, dining room, store room &amp; stair case (dog legged).</li><li>e) Draw:-<ul style="list-style-type: none"><li>i. Working drawing plan</li><li>ii. Elevation</li></ul></li></ul> | <br><br><br><br><br>06<br>06 |

- iii. Section through w.c. or bath and stair case
- iv. Schedule of opening
- v. Construction notes

06  
03  
04

- Q.7
- a) Write a detail note on shoring.
  - b) Discuss the different types of stairs and their suitability.

08  
07

- Q.8
- a) Write brief note on wall cladding materials used to practice.
  - b) Discuss how safety in construction of site can be achieved.

08  
07



**SUBJECT CODE NO:- P-274**  
**FACULTY OF ENGINEERING AND TECHNOLOGY**  
**S.E.(Civil) Examination May/June 2017**  
**Fluid Mechanics- II**  
**(Revised)**

**[Time: Three Hours]**

**[Max.Marks:80]**

Please check whether you have got the right question paper.

N.B

- i) Question No.1 and 6 are compulsory.
- ii) Solve any two questions from remaining questions from each section.
- iii) Assume suitable data if necessary.

**Section A**

- |     |   |                               |
|-----|---|-------------------------------|
| Q.1 | Solve any five from following   | 10                            |
|     | <ul style="list-style-type: none"> <li>i) Define geometric similarity</li> <li>ii) What are the advantages of distorted models?</li> <li>iii) Find velocity of flowing water through pipe from following data : <math>C=60</math>, <math>m = 0.075\text{m}</math> &amp; <math>I = 0.034</math>, by using chezy's formula</li> <li>iv) Enlist the various minor losses</li> <li>v) Draw diagrams of different slope profiles</li> <li>vi) Define specific force.</li> <li>vii) Give the uses of syphon.</li> <li>viii) Define flow in open channel.</li> <li>ix) Give the different types of flow in open channel.</li> <li>x) What is the required condition for a symphonic action?</li> </ul> |                               |
| Q.2 | <p>a) Find the bed slope of Trapezoidal channel of bed width 4.0 m, depth of water 3.0 m and slide slope of 2 horizontal to 3 vertical, when the discharge through the channel is <math>15.0\text{m}^3/\text{sec}</math>. Taking the value of <math>N=0.03</math> in Mannings formula <math>C = \frac{1}{N} \text{m}^{1/6}</math></p> <p>b) Find an expression for loss of energy head for a hydraulic jump.</p>  | <p>08</p> <p>07</p>           |
| Q.3 | <p>a) Derive an expression for shear stress on the basis of Prandtl's mixing length theory.</p> <p>b) A pipe-line carrying water has surface protrusion of average height 0.12mm. If the shear stress developed is <math>5.5 \text{ N/m}^2</math>, determine whether the pipe surface act as a smooth, rough or in transition. The kinematic viscosity of water may be taken as 0.01 stokes.</p>  | <p>08</p> <p>07</p>           |
| Q.4 | <p>a) At a sudden enlargement of a water main from 26 cm to 52 cm diameter, the hydraulic gradient rises by 15mm. Estimate the rate of flow.</p> <p>b) Obtain an expression for chezy's formula for loss of head due to friction in pipes</p>   | <p>07</p> <p>08</p>           |
| Q.5 | <p>Write short notes on :</p> <ul style="list-style-type: none"> <li>a) Rapidly varied flow and gradually varied flow.</li> <li>b) Pipes in series and pipes in parallel.</li> <li>c) Dimensionless numbers.</li> </ul>   | <p>05</p> <p>05</p> <p>05</p> |

## Section B

- Q.6 Solve any five 10
- i) What do you mean by runaway speed?
  - ii) Define Impact of jet.
  - iii) Draw neat diagram of Inlet and Outlet velocity triangles.
  - iv) Define turbines and pumps.
  - v) Enlist the general component of hydroelectric power plant.
  - vi) Give the different efficiencies of a turbine.
  - vii) Define unit power and unit rate of flow of a turbine.
  - viii) Draw neat diagram of vortex casing.
  - ix) What do you mean by priming of a centrifugal pump?
  - x) Define reciprocating pump.
- Q.7 a) Find an expression for the efficiency of a series of moving curved vanes when a jet of water strikes the vanes at one of its tips. Prove that maximum efficiency is 50%, when  $u = v$  07
- b) The water in a jet propelled boat is drawn through inlet openings facing the direction of motion of the boat. The boat is moving in sea-water with a speed of 60 km/hr. The absolute velocity of the jet of the water discharged at the back is 30 m/s and the area of the jet of water is  $0.06\text{m}^2$ . Find the propelling force and efficiency of propulsion. 08
- Q.8 a) Draw neat sketches of Pelton wheel turbine and Francis turbine. 06
- b) A Kaplan turbine runner is to be designed to develop 9000 KW. The net available head is 6.0m. If the speed ratio = 2.0 flow ratio = 0.7, overall efficiency = 80% and the diameter of the boss is  $\frac{1}{3}$  the diameter of the runner. Find the diameter of the runner, its speed and the specific speed of the turbine. 09
- Q.9 (a) Define manometric head and obtain different equations for manometric head. 05
- (b) Draw neat diagram of air vessel and give its functions. 05
- (c) The diameter of an impeller of a centrifugal pump at inlet and outlet are 400mm and 800mm respectively. Determine the minimum starting speed of the pump if it works against a head of 25m. 05
- Q.10 Write Short Notes on : (Any three) 15
- i) Indicator diagram
  - ii) Hydraulic intensifier
  - iii) Governing of turbines
  - iv) Hydraulic accumulator

**SUBJECT CODE NO:- P-306**  
**FACULTY OF ENGINEERING AND TECHNOLOGY**  
**S.E. (Civil) Examination May/June 2017**  
**Surveying - II**  
**(Revised)**

[Time: Three Hours]

[Max.Marks:80]

Please check whether you have got the right question paper.

N.B

- i) Q.No.1 and Q.No.6 is compulsory.
- ii) Answer any two questions for the remaining in each section
- iii) Figures the rights indicate full marks
- iv) Assume suitable data if necessary

Section A

- Q.1 Answer the following ( any five ) 10
1. Enlist kinds of errors in surveying
  2. What do you mean by extension of Base line
  3. Give mathematical expression for spherical excess
  4. What is phase of signal?
  5. What are Towers in geodetic surveying?
  6. How strength of figure is determined
  7. Classify different triangulation systems
- Q.2 a. Derive the formulae for the correction to be applied when observation is made on the bright portion 07  
b. What is satellite station reduction to center? Derive expression for reducing the angles measured at the satellite station to center 08
- Q.3 a. State Laws of weight in triangulations adjustment. 08  
b. An angle A was measured by different persons and the following were obtained. Find out most probable value of angle A 07
- | Angle       | No. of observation |
|-------------|--------------------|
| 46° 20' 40" | 2                  |
| 46° 21' 20" | 3                  |
| 46° 20' 30" | 3                  |
| 46° 20' 50" | 4                  |
| 46° 20' 40" | 3                  |
- Q.4 a. What is figure adjustment in case of triangulation survey 07  
b. Explain how to compute the sides of a spherical triangle 08
- Q.5 a) Explain and derive the principles of least squares 07  
b) Write short note on Route Surveying 08

## Section B

Q.6 Answer the following ( any five )

1. What is  $5^0$  curve?
2. Give the relation between radius of curve and degree of curve?
3. Express mathematically length of long chord in curve
4. Explain the principle of EDM
5. What is trigonometrical leveling?
6. Differentiate between EDM and total stations
7. Define simple circular curve

10

- Q.7 a) Explain types of transition curves with the objective of introduction of transition curves 07  
 b) Determine the offsets to be set out at half chain interval along the tangents to locate a 16-chain curve. 08  
 The length of each chain being 20m, draw neat sketch

- Q.8 a) Explain fundamental measurements in total station 07  
 b) Explain modulation in E.D.M 08

- Q.9 a. Derive the expression for compound curve 07  
 b. Find the R.L of Q from the following observation : 08  
 Horizontal distance between P and Q = 9290m  
 Angle of elevation from P to Q =  $2^0 06' 18''$   
 Height of signal at Q = 3.96m  
 Height of instrument at P = 1.25m  
 Coefficient of refraction = 0.07  
 $R \sin 1'' = 30.88\text{m}$ , R.L of P = 396.58m

Q.10 Write short note on : ( any three )

15

1. Reverse curve
2. Lemniscates curve
3. Axis signal correction
4. Super elevation
5. Phase comparison

**SUBJECT CODE NO:- P-371**  
**FACULTY OF ENGINEERING AND TECHNOLOGY**  
**S.E.(CIVIL) Examination May/June 2017**  
**Theory of Structure-I**  
**(Revised)**

[Time: Three Hours]

[Max.Marks:80]

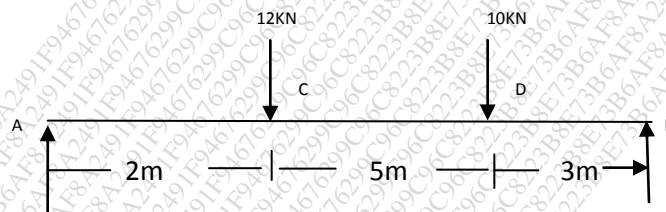
Please check whether you have got the right question paper.

N.B

- i) Q.no.1 from section A & Q.no.6 from section B are compulsory.  
 ii) Attempt any two questions from remaining of each section

## Section A

- Q.1 Write a note on following
- |    |                          |    |
|----|--------------------------|----|
| 1) | Conjugate beam method    | 04 |
| 2) | Advantages of fixed beam | 03 |
| 3) | Willot diagram           | 03 |
- Q.2 A girder of uniform section is loaded as shown in figure:01. Calculate deflection of beam under the Load C. Take  $E=200\text{GPa}$  &  $I=120 \times 10^6 \text{ mm}^4$  15



- Q.3 A crane shown in figure:02 has cross sectional area of the tie & Jib as  $2500\text{mm}^2$  &  $5000\text{mm}^2$  respectively. Determine vertical deflection at C when a load of 250kN is suspended from it. Take  $E=200\text{GPa}$  15

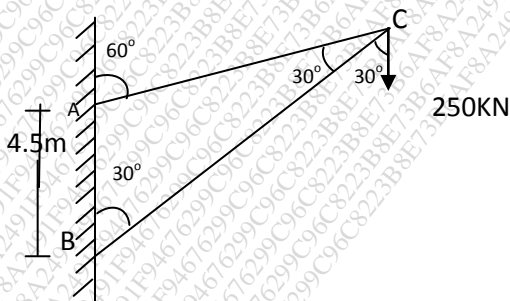


Fig:02

- Q.4 Draw the bending moment diagram for a fixed beam shown in fig.03 15

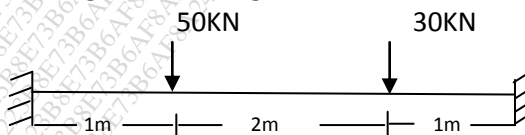


Fig.03



Q.5 A plate girder simply supported at end with span 12m consisting of web plate 600mm X12mm & flange plate 300mm X 18mm for each flange. The girder carry's a udl of 45 KN/m using 10mm fillet weld. Find the size of weld required for connecting flange plate to the web plate at support. The permissible stress ( shear ) in weld are  $102.5\text{N/mm}^2$  15

Section B

Q.6 Write a note on following 04

- 1) Calpeyron 's three moment theorem
- 2) Three hinged stiffening girder
- 3) Linear Arch

Q.7 For a continuous beam shown in fig.4 draw the SFD & BMD 03  
15

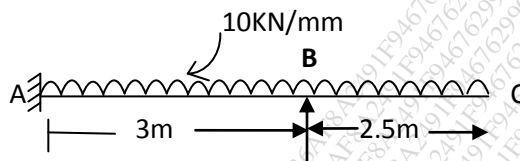
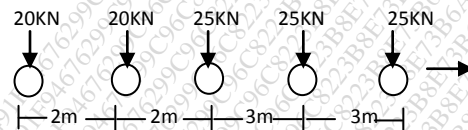
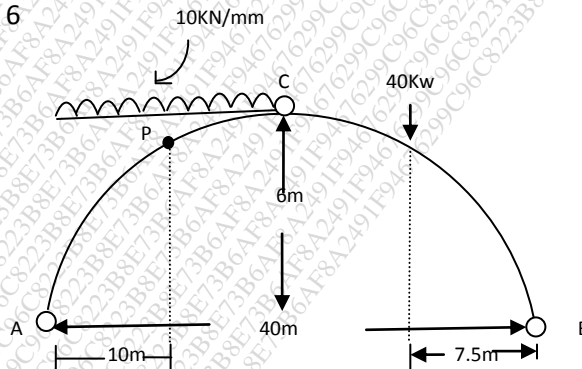


Fig.4

Q.8 A locomotive with wheel loads show in fig.5 pasess over a girder of span 26m find the maximum bending moment under the central load 15



Q.9 Determine normal thrust, radical shear & bending moment at P for the three hinged parabolic arch loaded as show in fig 6 15



Q.10 A superior bridge of span 150m has stiffened by three hinged stiffening girder. The cable has a central dip of 12m. the width of load way is 7m .The dead need is  $8.0\text{kN/mm}^2$  of floor area & line load of  $15\text{kN/mm}^2$ , cover left hand half span. find shear force & bending moment at loaded Quarter part also determine max. tension in cable 15