ICE GROUP OF EDUCATION
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MPPSC (AE) 2017 Test Series
Test 07

Booklet ID: 548795

Date: 28/06/2017

Time: 120 Minutes

Total Marks: 300

CIVIL ENGINEERING

Instructions for Candidates

1. Do not open the Question Booklet until you are asked to do so by the invigilator.
2. This Question Booklet contains **08** pages. After you are permitted to open the booklet, please check all pages and report discrepancies, if any, to the invigilator.
3. There are a total of 100 **questions** carrying **300 marks**. All these questions are of objective type. Each Question has only **one** correct answer. Questions must be answered on the Back side of the **OMR** by darkening the appropriate bubble (marked A, B, C, D) using ONLY a **black/blue ink ball point pen** against the question number. **For each question darken the bubble of the correct answer**. More than one answer bubbled against a question will be treated as an incorrect response.
4. Since bubbles darkened by the black/blue ink ball point pen **cannot** be erased, candidates should darken the bubbles in the OMR very carefully.
5. Questions 01 – 100 belong to *Civil Engineering* carrying 03marks *each.*
6. Unattempted questions will result in zero mark and also **there is no negative marking** for wrong answers.
7. Calculator, charts, graph sheets or tables are **NOT** allowed in the examination hall.
8. Rough work can be done on the question paper itself. Rough Work on Answer sheet is strictly prohibited otherwise answer sheet will be rejected.
9. *Use of mobile is strictly prohibited during exam.*
10. Before the start of the examination, write your name and registration number in the space provided below using a black ink ball point pen.

Name of Student	
Batch (B1/B3)	
Registration Number	

1. If the width of a simply supported beam carrying an isolated load at its centre is doubled, the deflection of the beam at the centre is changed by
(a) ½   (b) 1/8   (c) 2   (d) 8

2. The stress-strain diagram for two material A and B is shown below:
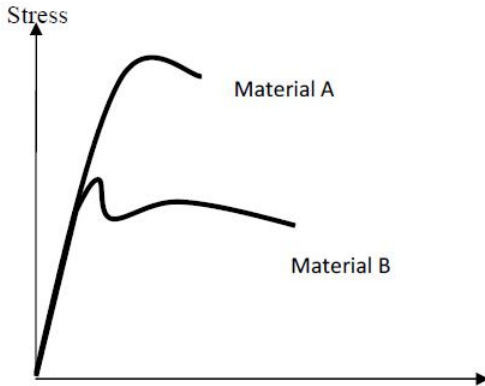
The following Statements are made based on this diagram:
(I) Material A is more brittle than material B.
(II) The ultimate strength of material B is more than that of A.
With reference to the above statements, which of the following applies?
(a) Both statements I and II TRUE
(b) Statement I is TRUE, and statement II is FALSE
(c) Statement I is False, and statement II is TRUE
(d) Both statements I and II FALSE

Q.3. Muller Breslau's principle for obtaining influence lines is applicable
i)   Trusses
ii)   Statically determinate beams and frames
iii)   Statically indeterminate structures, the material of which is elastic and
follows Hooke's law
iv) any statically indeterminate structure
The correct answer is
(a) (i), (ii) and (iii)   (b) (i), (ii) and (iv)
(c) (i) and (ii)   (d) only (i)

Q.4 A load 'W is moving from left to right support on a simply supported beam
of span T. The maximum bending moment at 0.4 1 from the left support is

(a) 0.16 Wl   (b) 0.20 Wl   (c) 0.24 Wl (d) 0.25 Wl
5 If in a pin-jointed plane frame (m + r) > 2j, then the frame is?
(where m is number of members, r is reaction components and j is number of
Joints)
a) stable and statically determinate
b) stable and statically indeterminate
c) unstable
d) none of the above

6. Castigliano's first theorem is applicable
a) for statically determinate structures only
b) when the system behaves elastically
c) only when principle of superposition is valid
d) none of the above

7. The carryover factor in a prismatic member whose far end is fixed is
a) 0 b) ½ c) ¾ d) 1

8. Select the correct statement
a) Flexibility matrix is a square symmetrical matrix
b) Stiffness matrix is a square symmetrical matrix
c) both (a) and (b)
d) none of the above

9.   IS:1343-1980   limits   the   minimum characteristics strength of pre-stressed concrete for post tensioned work and posttensioned work and pretension work as
(a) 25 MPa, 30 MPa respectively
(b) 25 MPa, 35 MPa respectively
(c) 30 MPa, 35 MPa respectively
(d) 35 MPa, 40 MPa respectively

10. An activity in CPM network has a duration of 4 days. The free float for the activity is 10 days and the total float is also 10 days. Find the maximum delay that can be allowed for the activity from occurrence of the preceding activity (in days)
(a) 4   (b) 6   (c) 8   (d) 10

11. PERT calculation yield a project length of 60 weeks with a variance of 9 weeks. Estimate the no. of weeks required to complete the project with a probability of 95%.
 (a) 50.73   (b) 70.86   (c) 64.94   (d) 84.15

12. Effluent from a wastewater treatment plant (flow rate= 8640 m^3/d, temperature= 25°C) is discharge to a surface stream (flow rate= 1.2 m^3/s, temperature= 15°C). what is the temperature of the stream after mixing?
(a) 10°C   (b) 15.77°C   (c) 20°C   (d) 24.99°C

13. The total water requirement of a city is generally assessed on the basis of
(a) Maximum hourly demand
(b) Maximum hourly demand+ fire demand
(c) Average daily demand+ fire demand
(d) Greater of (a) and (b)

14. Compute the population of the year 2000 for a city whose population in the year 1930 was 25,000, and in the year 1970 was 47,000.
(a) 85,983   (b) 65,745   (c) 75,459   (d) 95,574

15. The concentration of OH^- ion in a water sample is measured as 17 mg/L at 25°C. What is the pH of the water:
(a) 10   (b) 11   (c) 12   (d) 13

16. Which of the combination of surface water quality parameters will indicate sweep coagulation as the preferred mechanism of coagulation?
(a) High turbidity-low alkalinity
(b) High turbidity-high alkalinity
(c) Low turbidity-high alkalinity
(d) none of the above

17. A sewer of 400 diameter and slope 1 in 400, running half-full, has a flow velocity of 0.82 m/sec. What velocity of floe will be obtained if the slope is made 1 in 100?
(a) 3.28 m/sec   (b) 0.82 m/sec
(c) 1.64 m/sec   (d) 0.41 m/sec

18. A circular primary clarifier processes an average flow of 5005 m^3/d of municipal waste water. The over flow rate is $35/m^3/m^2/d$. The diameter of the clarifier shall be:
(a) 12.5m   (b) 11.5m   (c) 12.5m   (d) 13.5m

19. The organism, which exhibits very nearly the characteristics of an ideal pathogenic indicator is:

(a) Entamoeba histolytica
(b) Escherichia coli
(c) Salmonella typhi
(d) Vibrio comma

20. In a domestic waste water sample, COD and BOD were measured. Generally which of the following statement is true for their relative magnitude?
(a) COD>BOD   (b) COD=BOD
(c) COD<BOD   (d) Nothing can be said

21. Particulate matter (fly ash) carried in a effluent gases from the furnaces burning fossil fuels are better removed by:
(a) Cotton bag house filter
(b) Electrostatic precipitator (ESP)
(c) Cyclone
(d) Wet scrubber

21. Which one of the following is a wrong statement about mechanical flocculators over horizontal flow rectangular baffle wall tanks?
(a) Requirement of chemical is reduced.
(b) Less capacity of tank is required.
(c) Very small loss in head of sewage.
(d) There are no dead spaces in corners.

22. An old building has been purchased by a person at a cost of Rs. 30,000/- excluding the cost of land. Calculate the amount of annual sinking fund at 4% interest assume the future life of the building as 20 years and the scrap value of the building as 10% of the cost of purchase.
(a) Rs. 907.20   (b) Rs. 807.20
(c) Rs. 789.50   (d) Rs. 1100.89

Q.23. The portion of the roadway between outer edges of carriageway and drains in case of cuttings is known as
(a) Kerb   (b) Shoulder
(c) Formation width   (d) Right of way

Q.24. The order in which a road is built is
(a) sub-soil, base, sub-grade, sub-base
(b) base, sub-soil, sub-grade, sub-base
(c) sub-base, base, sub-grade, sub-soil
(d) sub-soil, sub-grade, sub-base, base

25. Base course of a road is built with
(a) gravel, sand and silt
(b) stabilized soil or selected gralunar soil
(c) bricks or boulders
(d) broken stone aggregates.

26. Camber is provided in the road for
(a) counteracting the centrifugal force
(b) effective drainage
(c) getting better sighting distance
(d) getting least stopping distance

27. A vehicle weighs 50 kN when empty. Its minimum velocity for skidding on a flat curve is v. When loaded it weighs 100 kN and its centre of gravity moves up by 50 %. The minimum velocity for skidding will be.
(a) $v/(3)^{1/2}$ (b) $v/(1.5)^{1/2}$
(c) v   (d) v/1.5

28. If the average centre to centre spacing of vehicle is 25 m, then the basic capacity of a traffic lane at a speed of 45 kmph is
(a)1500   (b) 1800   (c)2250   (d) 3000

29. Which one of the following is not a informatory sign?
(a) Speed limit   (b) Name of road
(c) Cross road ahead   (d) Name of destination

30. At a road junction at 90° with both-way traffic the number of conflict points is
(a) 6   (b) 8   (c) 12   (d) 16

31. Assertion: **The expansion of rails is equal to (L.α.t) is wrong.**
Reason: **Free expansion is prevented by the axial force developed due to fixing of rails to sleep same soil?**
(a) Both A and R are true and R is the correct explanation of A.
(b) Both A and R are true but R is not the correct explanation of A.
(c) A is true but R is false.
(d) A is false but R is true.

32. The bridge having its floor flush with bed of stream is known as
(a) causeway   (b) culvert

(c) viaduct   (d) minor bridge

33. ICAO recommends that for A, B and C type airports, any two points 3 m above the surface of runway are mutually visible from a distance equal to _____ times the length of runway.
(a) 0.4   (b) 0.5   (c) 0.6   (d) 0.75

34. The maximum bending moment at 6 m from end A in a simply supported beam of span 15 m due to a moving udl, spanning 5 m occurs when the tail of load is at _____ distance from A
(a) 1.8 m   (b) 2.0 m   (c) 2.4 m   (d) 4.0 m

35. Four point loads 8, 15, 15 and 10 kN have centre-to-centre spacing of 2 m between consecutive loads and they traverse a girder of 30 m spam from left to right with 10 kN load loading. The maximum shear force at 8 m from left support will be
(a) 8.2 kN   (b) 25.4 kN   (c) 30.2 kN (d) 42.2 kN

36. 'For a given structure and loading, if these exist any distribution of bending moment throughout the section which is both safe and statically admissible with a set of loads W, the value of W must be less than or equal to the collapse load Wc'. The above theorem is known as
(a) kinematic theorem
(b) static theorem
(c) uniqueness theorem
(d) none of the above

37. The element dij if a flexibility matrix is
(a) the displacement at coordinate j due to a unit force at coordinate i
(b) the displacement at coordinate i due to a unit force at coordinate at j
(c) the force at coordinate j due to a unit displacement at coordinate at i
(d) the force at coordinate i due to a unit displacement at coordinate at j

38. Assertion: In a cable structure horizontal thrust increases with rise in temperature.
Reason: Due to rise in temperature the length of cable increases.

(a) Both A and R are true and R is the correct explanation of A.
(b) Both A and R are true but R is not the correct explanation of A.
(c) A is true but R is false.
(d) A is false but R is true.

39. In plastic analysis of structures the following assumptions are made:
A. Plane section before bending, remains plane even after bending.
B. The relationship between compressive stress and compressive strain is the same as between tensile stress and tensile strain.
C. The defections are small.
Select the correct answer code from below:
(a) A and B are true but C is wrong
(b) A and C are true but B is wrong
(c) B and C are true but A is wrong
(d) A, B and C are true

40. Flexibility matrix method is known as
(a) Force method
(b) Compatibility method
(c) Displacement method
(d) Equilibrium method

41. In a two-hinged parabolic arch, A. if support yields horizontal thrust increases. B. if rib shortening is considered, horizontal thrust reduces Select your answer code from the following:
(a) Both A and B are true
(b) A is true but B is false
(c) A is false but B is true
(d) Both A and B are false

42. In design of a flat R.C.C. roof without access except for maintenance, imposed load to be considered is
(a) 1.5 kN/m2   (b) 1.25 kN/m2
(c) 1.0 kN/m2   (d) 0.75 kN/m2

43. In the design of a seven-storey building, while designing the columns of 5th storey reduction in imposed loads on floor is
(a) 0%   (b) 10%   (c) 20%   (d) 30%

44. In designing a structure at a height 25 m in a region with wind velocity V , the wind pressure to be considered in
(a) $0.45\ V^2$ (b) $0.5\ V^2$ (c) $0.6\ V^2$ (d) $0.75\ V^2$

45. Upto a height of _____ wind pressure on a structure is considered to be uniform.
(a) 20 m   (b) 30 m   (c) 40 m   (d) 50 m

46. Snow load need not be considered in the design of structures in cold regions, if slope of the roof is more than
(a) 25°   (b) 30°   (c) 45°   (d) 60°

47. Which one of the following is not correct load combination in structural design
(a) DL + WL   (b) DL + WL + IL
(c) DL + WL + SL   (d) DL + WL + IL + SL
where
DL = dead load
WL = wind load
IL = imposed load
SL = wind load

48. Which one of the following is not a post-tensioning method?
(a) Freyssinet system (b) Gifford udall system
(c) Long line method   (d) Lee-Macall system

49. The thickness of flat slab of 5 m × 6 m, which is provided with standard drop and is to be designed with Fe-415 should not be less than
(a) 125 mm   (b) 150 mm   (c) 155   (d) 187.5 mm

50. Water tanks should be designed by
(a) working stress method
(b) ultimate load method
(c) limit state method
(d) any of the above

51. *Assertion*: For simply supported beam up to span 12 m minimum width provided is 200 mm.
***Reason*: According to code, if width provided is 200 mm, there is no need to check for lateral stability of the beam.**
(a) Both A and R are true and R is the correct explanation of A
(b) Both A and R are true but R is not the correct explanation of A

(c) A is true but R is false
(d) A is false but R is true

52. *Assertion*: In column transverse reinforcements should be provided.
Reason: If transverse reinforcements are net provided column will buckle and fail.
(a) Both A and R are true and R is the correct explanation of A
(b) Both A and R are true but R is not the correct explanation of A
(c) A is true but R is false
(d) A is false but R is true

53. The loss of pre-stress with time at constant strain is called
(a) shrinkage   (b) relaxation
(c) creep   (d) all the above

54. Determine the ultimate bearing capacity of strip footing, 1.5m wide, with its base at depth of 1m, resting on a dry stratum. Take $\phi'=38°$, $c'=0$, $Y_{d=}$ 17kN/m³.
(a) 1976kN/m²   (b) 1728.25kN/m²
(c) 882.25Kn/m²   (d) 973.25kN/m²

55. Negative skin friction in a soil is considered when the pile is constructed through a:
(a) Dense coarse sand
(b) Over consolidated stiff clay
(c) Dense fine sand
(d) Fill material

56. A n-pile group has to be proportioned in a uniform pattern in soft clay with equal spacing in all directions. Assumed any value of c, determine the optimum value of spacing of pile in a group. Take n= 25 and m= 0.7. Neglect the end bearing effect and assume that each pile is circular in section:

(a) 4d   (b) 3.19d
(c) 4.39d   (d) 5.49d

57. On which of the soil is the standard penetration test useful?
(a) Cohesionless soil   (b) Medium clay
(c) Gravelly soils   (d) Very stiff clay

58. A 30 cm diameter concrete pile is driven into a homogeneous consolidated clay deposit (Cu= 40kN/m2, α= 0.7). If the embedded length is the 10m, estimate the safe load (F.S.= 2.5):
(a) 125.7kN   (b) 852kN
(c) 115k   (d) 528kN

59. Water content can be:
(a) zero to 50%   (b) zero to 100%
(c) zero to 200%   (d) zero to 400%

60. Soil has been compacted in a embankment at a bulk density of 2.15mg/m³ and water content of 12%. The value of specific gravity of soil is 2.65. The water table is below the foundation. Estimate the dry density, void ratio respectively:
(a) 1.21 g/cm³, 0.58   (b) 0.82g/cm³, 0.83
(c) 2.80 g/cm³, 0.67   (d) 1.92 g/cm³, 0.38

61. To remove organic matter from the soil sample to be used in sedimentation analysis, it is mixed with hydrogen peroxide at:
(a) 20°C   (b) 27°C
(c) 60°C   (d) 80°C

62. Settlement of soil under compressive load takes place due to:
(a) expulsion of air
(b) expulsion of water from pores
(c) restructuring of soil mass
(d) all the above

63. The average velocity of flow that will take place through the total cross-sectional area of soil under unit hydraulic gradient is known as:
(a) uniformity coefficient
(b) coefficient of permeability
(c) Stokes' coefficient
(d) Darcy's coefficient

64. A cantilever beam of length *L* and a cross section with shape factor *f* supports a concentrated load *P* as shown below
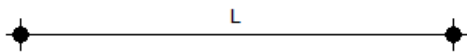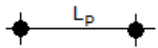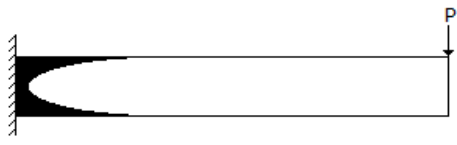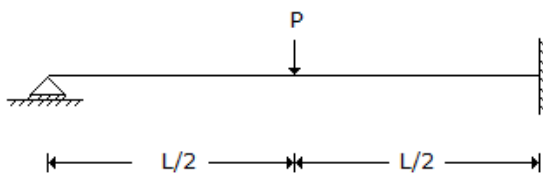
(a) $\dfrac{L_P}{L} = \dfrac{1}{f}$

(b) $\dfrac{L_P}{L} = L(1-f)$

(c) $\dfrac{L_P}{L} = 1 - \dfrac{1}{\sqrt{f}}$

(d) $\dfrac{L_P}{L} = 1 - \dfrac{1}{f}$

65. The plastic modulus of a section is 4.8 x 10^{-4} m^3. The shape factor is 1.2. The plastic moment capacity of the section is 120 kN.m. The yield stress of the material is
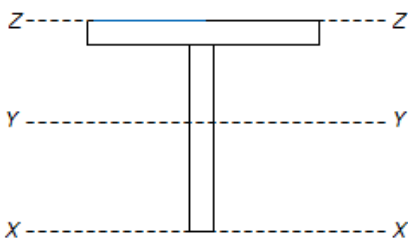(a) 100 MPa (b) 250 MPa
(c) 300 MPa (d) 450MPa

66. A propped cantilever beam in shown in the below figure. The plastic moment capacity of the beam is M_0. The collapse load P is

(a) $4M_0/L$ (b) $6M_0/L$
(c) $8M_0/L$ (d) $12M_0/L$

67. If *YY* is the centroidal axis of a *T* beam-section subjected to plastic moment, *Mp*, the neutral axis lie

(a) above the line *ZZ*
(b) between the lines *YY* and *ZZ*
(c) between the lines *XX* and *YY*
(d) below the line *XX*

68. A continuous beam is loaded as shown in the figure below. Assuming a plastic moment

capacity equal to *M$_P$*, the minimum load at which the beam would collapse is

(a) $\dfrac{4M_P}{L}$ (b) $\dfrac{6M_P}{L}$ (c) $\dfrac{8M_P}{L}$ (d) $\dfrac{10M_P}{L}$

69. For a fixed beam with span *L*, having plastic moment capacity of *M$_p$*, the ultimate central concentrated load will be

(a) 4 M_p/L (b) $M_p/8L$
(c) $8M_p/L$ (d) None of These

70. As per Lacey's theory, the silt factor is
(a) Directly proportional to average particle size
(b) Inversely proportional to average particle size
(c) Directly proportional to square root of average particle size
(d) Not related to average particle size

71. Wetted perimeter of a regime channel for a discharge of 64 cumecs as per Lacey's theory will be
(a) 19 m (b) 38 m
(c) 57 m (d) 76 m

72. Which of the following canal structures is used to remove surplus water from an irrigation channel into a natural drain?
(a) canal fall (b) canal outlet
(c) canal escape (d) canal regulator

73. Variability of rainfall is
(i) largest in regions of high rainfall
(ii) largest in coastal areas
(iii) largest in regions of scanty rainfall
The correct answer is
(a) only (i) (b) (i) and (ii)
(c) only (iii) (d) (ii) and (iii)

74. Which of the following method of applying water may be used on rolling field
(a) Boarder Flooding (b) Check Flooding
(c) Furrow Flooding (d) none

75. Optimum depth for KOR watering of rice is
(a) 135mm (b) 165mm
(c) 190mm (d) 215mm

76. The duty is largest

(i) At the head of water coarse
(ii) On the entrance of field
(iii) At the head of a main canal
The correct answer is
(a) only (i)   (b) (i) and (ii)
(c) only (iii)   (d) (ii) and (iii)

Q.77. The rainfalls of five successive days were measured as 100 mm, 80 mm, 60 mm, 40 mm and 20 mm respectively. If the infiltration index or the storm loss rate for the catchment area is earlier estimated as 50 mm/day, the total surface run off will be
(a) 50 mm   (b) 60 mm
(c) 90 mm   (d) 140 mm

78. The amount of irrigation water used by the crop to form its tissue cells and evapo-transpiration during its full growth is called
(A)   Effective rainfall
(B)   consumptive use
(C)   Consumptive irrigation requirement
(D)   net irrigation requirement

79. Hydrograph is the graphical representation of
(A)   Total Runoff and time
(B)   surface flow and time
(C)   Ground water flow and time
(D)   rainfall and time

80. Infiltration rate is always
(A)   more than the infiltration capacity
(B)   less than the infiltration capacity
(C)   equal to or less than the infiltration capacity
(D)   equal to or more than the infiltration capacity

81. Infiltration is the
(A)   Movement of water through soil
(B)   Absorption of water by soil surface
(C)   Both (a) and (b)
(D)   None of the above

82. The representative fraction 1/2500 means that the scale is 1cm equals to
(A)   0.25mm   (B)   25mm
(C)   25m   (D)   2.5km

83. Unit of runoff in M.K.S. system is
(A)   Cubic metre/sec
(B)   metre/sec
(C)   Cubic metre
(D)   square metre

84. The relationship between Duty (D) , Delta (Δ), and Base period (B) is
(A) Δ= 1.98B/D   (B) Δ= 8.64B/D
(C) Δ= 5.68D/B   (D) Δ= 8.64D/B

85. Optimum Depth for KOR watering for Rice is
(A) 135 mm   (B) 165mm
(C) 190mm   (D) 215mm

86. Largest base period (crop period) is of
(A) Gram   (B) Wheat
(C) Sugar Cane   (D) Rice

Q87. A high resistant bolt may be used for
(a) Slip Resistant Connection
(b) Bearing Type Connection
(c) A shear Connection Only
(d) Both (a) and (b)

88. If the diameter of bolt is 20mm then the maximum number of bolts that can be accommodated in one row of a 140mm wide flat are
(a) 2   (b) 3   (c) 6   (d) 1

89. Proof stress for minimum bolt tension is given by
(a) $0.5f_{ub}$ (b) $0.6f_{ub}$ (c) $0.7f_{ub}$ (d) $0.8f_{ub}$

90. The design capacity of a weld is reduced when the length of welded joint is greater than
(a) 16t   (b) 100t   (c) 150t   (d) 200t

91. Spot weld is used when two plates are placed
(a) One below the other
(b) One butting against the other
(c) One next to other
(d) At right angles to each other

92. In rolled steel beam, shear force is mostly resisted by
(a) Web only

(b) Flange Only
(c) Web and Flange Together
(d)None of these

93. For fillet welds subjected to normal (f_a) and shear (q) stresses, the equivalent stress is given by
(a) $(f_a^2 + q^2)^{1/2}$
(b) $(f_a^2 + 3q^2)^{1/2}$
(c) $(3f_a^2 + q^2)^{1/2}$
(d) $(0.5f_a^2 + q^2)^{1/2}$

94. In case of angle section lug angles, their attachment to the member should be capable of developing x% in excess of the force in outstanding leg of the angle where x is
(a) 10
(b) 20
(c) 30
(d) 40

95. If the outstand element of a compression flange of a rolled section is less than _____ the flange is classified as plastic.
(a) 8.4ε   (b) 9.4ε
(c) 10.5ε   (d) 15.7ε

96. The maximum restraining force in the case of series of a latticed beam connected together by the same system of restrained members should be
(a) 2.5%
(b) 5%
(c) 7.5%
(d) 1.25%

97. The thickness of base plate is determined from the
(a) Flexural strength of plate
(b) Shear strength of plate
(c) Bearing strength of concrete pedestal
(d) Punching Criteria

98. The aspect ratio for end panel of a plate girder, designed without using tension field action, should be in range
(a) 0.3 to 0.5
(b) 0.6 to 1.0
(c) 1.0 to $2^{1/2}$
(d) $2^{1/2}$ to 3.0

99. Gantry girders are generally designed
(a) As laterally supported or unsupported beams
(b) Only laterally unsupported beams
(c) Only laterally unsupported beams
(d) None of these

100. Live load for roof truss should not be less than
(a) 0.2kN/m²
(b) 0.4kN/m²
(c) 0.75kN/m²
(d) 1.5kN/m²