

CIVIL ENGINEERING

ONE MARKS QUESTIONS

1. The symmetry of stress tensor at a point in a body under equilibrium is obtained from
 - a. conservation of mass
 - b. force equilibrium equations
 - c. momentum equilibrium equations
 - d. conservation of energy

The components of strain tensor at a point in the plane strain case can be obtained by measuring longitudinal strain in following directions

 - a. along any two arbitrary directions
 - b. along any three arbitrary directions
 - c. along two mutually orthogonal directions
 - d. along any arbitrary direction
3. For a linear elastic frame, if stiffness matrix is doubled with respect to the existing stiffness matrix, the deflection of the resulting frame will be
 - a. twice the existing value
 - b. half the existing value
 - c. the same as existing value
 - d. indeterminate value
4. Considering a beam as axially rigid, the degree of freedom of a plane frame below is

n

 - a. 1)
 - b. 2
 - c. 7
 - d. 6
5. IS:4343-1980 gives the minimum characteristic strength of prestressed concrete for post tensioned work and pretension work is
 - a. 25MPa; 30MPa respectively
 - b. 15MPa, 35MPa respectively
 - c. 30MPa, 35MPa respectively
 - d. 30MPa, 40MPa respectively
6. The plasticity factor of steel (or concrete as per IS:456-2000) is
 - a. 1.50
 - b. 1.15
 - c. 0.87
 - d. 1.14
7. The permissible stress in axial tension in steel member on the net effective area of the section shall not exceed f_y (where f_y is the yield stress)
 - a. 0.80 f_y
 - b. 0.75 f_y
 - c. 0.60 f_y
 - d. 0.50 f_y

Root time method is used to determine

 - a. T. lime factor
 - b. C_u , coefficient of consolidation
 - c. C_v , coefficient of compressibility
 - d. C_c , coefficient of volume compressibility
11. Negative skin friction in a soil is considered when the pile is constructed through a
 - a. fill material
 - b. dense coarse sand
 - c. over consolidated silty clay
 - d. dense fine sand
11. There are two methods of testing on the ground surface. One is square footing of dimension 'B'. The other is strip footing of width 'B'. Both of them are subjected to a loading intensity of q_u . The pressure intensity at a depth below the base of the footing along the centre line would be
 - a. equal in both footings
 - b. large for square footing and small for strip footing
 - c. large for strip footing and small for square footing
 - d. more for strip footing than shallow depth (SB) and more for square footing at large depth (>B)
11. A clay soil has a maximum dry density of 17.8 kN/m^3 and optimum moisture content of 12%. A contractor during the

of core of an dam obtained, the dry density of water content. This is because

- a. the dry density is less than the maximum dry density and water content is less than 12%
- b. the compaction is done on the dry side of the optimum
- c. both the dry density and water content of the compacted soil are within the desirable limits

12. A tracer is injected continuously from a point in an unsteady flow field. The locus of locations of all the tracer particles at an instance of time represents
- a. Streamline
 - b. Pathline
 - c. Streakline
 - d. None of these

13. The venturimeter of a Venturimeter, placed at a horizontal position, is turned to vertical position. The manometer reading will be

a. Zero

b. $\frac{1}{2}$ of the original reading

c. $\frac{1}{4}$ of the original reading

14. A horizontal bed channel is followed by a steep bed channel as shown in the figure. The gradually varied profiles over the horizontal and steep beds are



- a. M1 and M2 respectively
- b. M2 and M1 respectively
- c. H1 and H2 respectively
- d. H2 and H1 respectively

15. Total Kjeldahl Nitrogen is a measure of

- a. total organic nitrogen
- b. total organic and ammonia nitrogen
- c. total inorganic nitrogen
- d. total inorganic and ammonia nitrogen

16. The chemical formula of the nutrient produced by

- a. Chloroplast
- b. Mitochondria
- c. Chloroplast
- d. Mitochondria

17. The chemical formula of the nutrient produced by

- a. NH_3
- b. NO_2^-
- c. NO_3^-
- d. HNO_2

18. Bulking sludge refers to

- a. $F/M < 0.3/d$
- b. $0.31 < F/M < 0.6/d$
- c. $F/M = 0$
- d. $F/M > 1/d$

19. When the outflow from a storage reservoir is uncontrolled and the spillway is operating, the type of outflow hydrograph is

- a. the point of intersection of the inflow and outflow hydrographs
- b. at the intersection of the inflow and outflow hydrographs
- c. the tail of inflow hydrographs
- d. a point before the intersection of the inflow and outflow hydrographs

20. The intensity of rainfall and time interval of a storm are

Intensity (mm/hr)	Time Interval (min)
0-19	0.7
20-29	1.1
30-39	1.5
40-49	1.9
50-59	2.3
60-69	2.7
70-79	3.1

The maximum intensity of rainfall for 20 minutes duration of the storm is

- a. 1.1 mm/min
- b. 1.5 mm/min
- c. 1.9 mm/min
- d. 2.3 mm/min

21. On which of the following systems is the Punjab Irrigation Department based?

ob~ervullons lor proposing 1,i8 theory 00 stable channel~'1

- a. Krishna \Ve~t'''' Della t.'nmls-
- b. LAwcrBad [Juab ",ma,'
- c. Lower Chenab canals
- U. Upper B3.ri D<I~bcanalS

22. Which 01'1) of the ruowu'J! <:I:luoliQ'''' repn:senl. Lb~downstream proru'' 1)[Ogee spillway wilb vertical upstream thee') (~) are me eordinates Of the poinl Dn the downsrearu profile „iJb origin .1 the crest. of the spillWAY and "Lt ",the: design head.

ii. $L = \frac{6'S(\dots)}{H,} \dots$

b. $\frac{1}{R} \dots 0.5 \dots$

c. $\frac{1}{H} \dots \geq 0 \dots$

d. $\frac{J}{f} \dots 2.0 \dots$

23. The l~glll- of summit CIUve- on iill\vo lane two w.3Y highway depends upon ... allowable: rate of change Of oentrifugal .00el<:'.1'.1100

- II. ooaffiolcOl of IJot'''' .I. fr'raction
- c. ruq,iil'ed stopping sigl\L dlsbneb
- d. ,,quir.iI overtaking ~iglll distance

2-1-. Pruchnlh Mlllrj Gram Sadek Ynj,, (PMGSY), launched in the yeor 200d, 3im~to pff)vidd rural connec'ivily with aU-wcaUler reads. It 15 PI''po~ed to eenecs II'', hab't31.10nH in plain iJCHS of peupelation more-than 500 persons by the YOM

- a. 21)(15
- b. 20)7
- c. 20 Itl
- d. 20)12

25. Llst-I conl.lo. some prn''cr1i~, of bitumen. List-II. .giws u list of Laboratory Tests conducted on bitumen to determine the properliQli. M.I-h Ihe property with the corresponding [!;oil and ~le<:I the col answer using, the codes giv~D below the lis",

- Li''l-J
- P Resilance 10 I)<w
- Q, Al)ility 10dernnn under h**d
- R. ::;"f~ly

1.I\$~ii

- 1. Ductility test
- 2, Penclralion teJl
- 3. FI.5h nnd fin: poin. test

Code~ :

	p	Q	t~
a,	2	1	3
b.	2	3	I
c.	1	2	:I
~	3		2

26. Bjlllbtin''4Jj concrete IS a nih comprising of

- a. fill'' .g!,(regplc. filler and bitumen
- b. fill'' agg''gnte and bitumen
- c. coarse aggregate, fine 3gg''8Dic. filler arid bitumen
- d. ooarse'gg. egate.IiUer."nd biuIIIICll

Pa.31''Ole fill''lor Of fP(XTY)-' rTfr wil! b.

27. (lln~ider the m''ll'i<''~ X".I. Y.,I 11 .nd
a. (2 2)
II. (3 3)
e. (4- 3)
d. (3 4)

28. ('onsider a nun-hoonogene()ll\$ system of linear equ31.ioru; ""'t'I."cutlnjJ uu,\b~'1D.tic.Uy au over-determined system, \$u<:ll" sys\'''' will be
3. c(1n~isl'n1hn)\ng~. unique solution
b. consistent hajlng many sotutions
c. ;no)(,)\$il;t.,,1 h.vin8 ., uniqueSOIllliQn
d. in~(m~illtCnIhuvlol! 11;'.(llu,lon

29. Which nne of lhe following is NOT' true rur complex.umber Zj aud Z.,?

- a. $Z_1 = \frac{1}{Z_2}$
- b. $17, - .t, |S|Z_d + |Z, 1$
- c. $|Z_1 - \xi; 1'' |Z_1 - |z, |$
- d. $|Z_1 \dots Z_1| 4-1z, -Z_1| = 2|z_1| + 2|z_1|'$

30. Which 01'\'' 01' t)(, f,llowing ~1.f<m)ents L~ Nt JI' t~ue'l

- a. 'file measure „l' sllcwpccs i~dlJleil dml upon UIUallloul't of dJ~D)CC'lij~''
- b. In. symmeuie dislributiou, the values of mean, mode and median afO the same
- c. I'' • posilively skewed distribution, oltan .o median - ",otfa.

- d. $\mu < \text{mode} < \text{mean} < \text{median}$

TWO MARKS QUESTIONS

31. If principal stresses in a two-dimensional case are -10 MPa and 20 MPa respectively, then maximum shear stress at the point is
 a. 10 MPa
 b. 15 MPa
 c. 20 MPa
 d. 30 MPa
32. Draw the bending moment diagram for a beam as given below"

- Q. Moment distribution method
 R. Method of three moments
 S. Castigliano's second theorem

- List-II
 1. Force method
 2. Displacement method

Codes'

	P	Q	li.	S
a.	1			2
b.	1		2.	2.
c.	2	2		1
d.	2		2	1

35. All members of the frame shown below have the same flexural rigidity EI and length L . If a moment M is applied at joint B, the rotation of the joint is

The shear force at sections aa' and bb' respectively are of the following magnitude

- a. 100 kN , 150 kN
 b. zero, 100 kN
 c. zero, 50 kN
 d. 100 kN , 100 kN
- 33.. A circular shaft shown in the figure is subjected to torsion at points A and B. The torsional rigidity of portions CA and CD is GJ , and that of portion AB is $2GJ$. The rotation of shaft at points A and B are θ_A and θ_B . The rotation of shaft at point C is

- a. $\frac{M}{12EI}$
 b. $\frac{M}{6EI}$
 c. $\frac{M}{4EI}$
 d. $\frac{M}{3EI}$

For Q. 36 & Q.37 are given below. Solve the problems and choose the correct answers.

J. Cf a t

- CAB D
 L f L L I,
 Tl.
 0.1, +G/,
 Tl.
 b. GJ,
 Tl.
 OJ,
 TL
 c. GJt-G.J~

A truss is shown in the figure. Members are of equal cross section A and same modulus of elasticity E, a vertical force P is applied at point C.

I'
 C

2

L---

- 34 Match the following:
List-I
P Slope deflection; method

~

- 36, Force in the member AB of the truss is
a. $\frac{1}{2}$
b. $\frac{1}{3}$

- c. P
- d. P

J7 Deflection of the point C is

- a. $\frac{(2J_2+1)PL}{I EA}$
- b. $\frac{.fiPL}{IV}$
- c. $(2..E+1)~$
- d. $(J_2TI)~$

38. A rectangular column section of 250mm x 400mm is reinforced with 16 steel bars of grade Fe-500, each of 20mm diameters, Concrete strength is M30, Axial load on the column section, with minimum eccentricity as per IS:456:2000 using limit state method can be applied up to

- a. 1107.37
- b. 803.30
- c. 1806.40
- d. 1907.7

39. A concrete beam of rectangular cross section of 200mm x 400mm is prestressed with force 40kN at eccentricity 100mm. The maximum compressive stress in concrete is

- a. 11.5 N/mm²
- b. 7.5 N/mm²
- c. 5.0 N/mm²
- d. 5 N/mm²

40) The flexural strength of M30 concrete as per IS:456:2000 is

- a. 33 MPa
- b. 5.7 MPa
- c. 21.23 MPa
- d. 30 MPa

41. In a random sampling procedure for cube strength of concrete, one sample consists of X number of specimens, These specimens are tested, at 28 days and average strength of these X specimens is considered as best result of the sample, provided the individual variation in the strength of specimens is not more than ± Y per cent of the average strength, The values of X and Y as per IS:456:2000 are

- a. 4 and 10 respectively
- b. 3 and 10 respectively
- c. 4 and 15 respectively

- d. 3 and 15 respectively

42. The values of σ_{cr} for Q.42 & Q.43 are given below. Solve the problems and choose correct answers, Assume straight line instead of parabola for stress-strain curve of concrete as given below and partial factor of safety as 1.0

$$\frac{f_{cr}}{f_{ck}} = 1.0$$

$$\frac{f_{cr}}{f_{ck}} = 1.0035$$

A rectangular under-reinforced concrete section of 300mm width and 500mm effective depth is reinforced with 1 bars of grade Fe-500, each of 16mm diameter. Concrete mix is M20,

42. The depth of the neutral axis from the compression fibre is

- a. 76mm
- b. 51mm
- c. 87mm
- d. 100mm

43. The depth of the neutral axis obtained as per IS:456:2000 differs from the depth of neutral axis obtained in Q.42 by

- a. 15mm
- b. 10mm
- c. 25mm
- d. 32mm

44. An unconfined web section is fabricated from a 10mm thick plate by stiffeners as shown in the figure. If yield stress of steel is 250MPa, the maximum shear load that section can take is

200mm

- a. 70kN
- b. 350 kN
- c. 337.5 kN
- d. 300 kN

45. A fillet welded joint of 10mm size is shown in the figure below, welded surfaces meet at 60-90 degree and permissible stress in the

mlet weld is 108 MFA_ The safe load that can be transmuted by the joint is

100mm

12..

f_{FL}

- 8. 162,7 kN
 - 11, 151,6kN
 - c. 113.4 "N
 - d. 1095kN
46. Which one of the following is NOT correct for steel sections as per IS 800:1984
- a. The maximum bending stress in tension or in compression in extreme fibre calculated on the effective section of a beam shall not exceed 0,66 f_{yk} ;
 - b. The bearing stress in a beam when calculated on the net area shall not exceed 0.75 f_{yk} ;
 - a. The direct stress in compression on the gross sectional area of axially loaded compression member shall not exceed 0,6 f_{yk} ;
 - d. None of the above.
47. A cantilever beam of length l , width b and depth d is loaded with a concentrated vertical load at the tip. If yielding starts at a load P , the collapse load shall be
- 8. 2.0 P
 - b. $1 \sim P$
 - c. 1.2 P
 - d. P
48. In a constant head permeameter with cross section area of 10cm², when the flow was taking place under a hydraulic gradient of 0.5 (the amount of water collected in 611 seconds is 600cc. The permeability of the soil is
- 11 0,002 cm/s
 - b. 0,02 COI;
 - c. 0.2 cm/s
 - d 2,0 cm/s
49. Two observation wells penetrated into a confined aquifer and located 1,5m apart in the direction of flow, the head of 4m and 20m. If the coefficient of permeability of the aquifer is 30m/day and porosity is 0.25. the time of travel of an inert tracer from one well to another is

- a, ~167 days
- b. 500 day
- c. 7,0 day
- d, 3000 days

50,

Assuming that the river bed level does not change and the depth of water in river is 1.5m and the discharge in the months of February, July and December respectively of a particular year. The average bulk density of the soil is 20kN/m³. The density of water is 10kN/m³. The effective stress at a depth of 10m below the river bed during these months would be

- a, 300 kN/m² in February, ~50 kN/m² in July and 200 kN/m² in December
- b. 100 kN/m² in February. 100 kN/m² in July and 100 kN/m² in December
- c. 200 kN/m² in February. 250 kN/m² in July and 180 kN/m² in December
- d, 300 kN/m² in February, 350 kN/m² in July and 280 kN/m² in December

51L

For a triaxial shear test conducted on a sand specimen at a confining pressure of 100 kN/m² under drained conditions. The angle of shearing resistance of the soil would be

- a. 18.4°
- b. 19.47°
- c. 26.56°
- d. 30°

52,

A gravity retaining wall is supporting a saturated sand (saturated unit weight due to capillary action) of bulk density 18 kN/m³ and angle of internal friction 30°. The change in magnitude of active earth pressure at the base due to rise in ground water table from the base of the footing to the ground surface shall be ($\gamma_w = 10 \text{ kN/m}^3$)

- a, increase by 20 kN/m²
- b. decrease by 20 kN/m²
- c. increase by 30 kN/m²
- d. decrease by 30 kN/m²

53

For two infinite slopes (one in dry condition and other in submerged condition) in a sand deposit having the angle of shearing resistance 30°, the factor of safety was determined as 1.5 (for both slopes). The slope angles would have been

- 8. 21.05° for dry slope and 21.05° for submerged slope

- b. 19Ar Ibr UI) Sl6pO and 18''10' ror submerged slope
- ... 18A UII uJ) ~UI'''' und 21.0S tUI sut''''~r~ed J<J'lpe
- d, 22,6 Ihr dry slope and L9.41' Nr sull.II''I'god slope

A\ strip' tbot''!@. (8ru wide) is designed for n tullli soutemll,\I' of 40mlh. 11le IIafc bearing cnrcncy (shear] was 150kNlm~ and sn~c aUuwbnle soil P''''SIli1: IVA.' IOQkNlllIe. Due li'l unportuuce ef the .111I<I[ore, now 1111f0'111111;I' I~ tie red~\$igned for lolnl Sdlll~''Ilelllllf25mOI. The new width Uf U10 rooting will 110

- a. 5m
- b. 5m
- c. 12m
- d. 12,8 m

55. Dilling, the subsurface IDvest!SUII(IIS for design 01' foundations; Q slandard penetration test WIIS conducted III -1.5m below the ground snrtucc. The record of number "fblovs i~givcll below:

Ptutl,Uilutl depth (cm)	Number "r~tu....
(1 7.5	3
7.5 15	3
15-22.5	IS
22.5 30	6
3\1-315	11
37.5-45	7

ASSuming rhe water table UI ground level. soll as tiee sand lind correction factor for overburden o~ 1.0. the cnrrected "N' vfilu~ tor the scil would.be

- a. 1R
- b. 10
- c. 21
- d. 33

56. A soil muss contnins 4Q% .SIIIvel, 5\)% Sllnd and 11)% silt. This ~oil can be clllssifie,d as

- cL silly sandy e.rovel having coetllcieut of uuiforunty Jess ibU1100,
- b. "ilty gravelly saud having coefficient .)l' unil;'nnily "411011\ H)
- c. gravelly silty sand having C{)cllii!lonl ofllnilonnily greater thnn 60.
- d. gravelly silty stlod and Its coepllciut 01' unilormity CMIOI be determined,

- 57. A saturated soil mass has II lolal dens;"', 22k''li/m~ and n Will~re"ntu"t (lf Ic)%. The hulk density and dry den.it~ ofthis soil nrc
 - a. 12 kN{m' & 20 kN.m} respectively
 - b. 22 kNlp,J & 20 kN,m} respectively
 - c. 19.8 kN/, 'l & 19.~ lt'l/ml respectively
 - d. 23.2kN/m~ & 19.& kN/m~ respectively

- 58. A.~tNn", function i~given by:
 'I' : 2., 'y+ t(x+ I).,'

The 11,)10mte nercoss a linc joining points- AC.I.0) and D(O. 2'18

- u. OAllnil~
- h. , ,l unhs
- c. 4 UII;L9
- d. .5 units

59. The ci,,,!lllribn °1" around a circle of "udill,s 1 holts lor lh. velocity 'field u~2.,,-Jy and v --2)' is

- a. . 6Jr units
- b. - 12n units
- c. -1811 uniu
- .l. .241< wliis

- (c0. A 111n.kund 0 d~f1dC\01 ur~ placed (r" 11 friction.less [rLliley The lank i''''II~s water Jet (mass density .0f wut9r I()()Ol.glm>. which strikes the d~I1''''t'lr and 111m. I~ ~5<>.U' IJ,~ velocity of jet lcauing the delfectnr IN ""ml~ Dud discharge i. O.j ",jis, the force recorded by the spring will be

- a. t00N
- b. 100 J2 "
- c. 100 n
- d. 200 J'iN

61. Cross-section- of an objecl ('hny'ng same 800il)II IIQrmul 111 rhe ptlf,>'! submerged into u fluid OQII~'is1soro .<luolUof ~idl)S, 2m :.l.fid triangle iis .shown In the JiS'''' (1,, III;jeoll5' hinged 01 poi III I' that is on meter below tho fluid Jill" surface. If the obj~L ill-

'''''' k~plin
 flJe .positiou
 ns ~h'l'~1 lin
 the fis.~. _.. -
 the Ynh~ or
 -x' should
 be

answer using the codes given below the lists:

List-I

P. Suspended Solid concentration

Q. Microbiological organics

H. Bacterial concentration

S. Coagulant dose

List-II

1. BOD

2. MPN

3. Jar test

4. Turbidity

Code:

	P	Q	R	S
a.	1	1	2	3
b.	4	1	2	3
c.	2	4	1	3
d.	1	2	1	3

67. Match List-I with List-II and select the correct answer using the codes given below the lists ;

List-I

P. Flocculation of sludge by chemical oxidation

Q. Settling characteristics of chemical sludge

List-II

S. Reduction of oxygen demand

List-III

1. Decrease in volume of

2. Span of water by height

3. Digested sludge

4. Separation of water by

	P	Q	R	S
a.	4	3	1	2
b.	3	2	4	
c.	..	.	2	
d.	2	1	3	4

68. A circular primary clarifier processes an average flow of 5000 m³/d of municipal waste water. The overflow rate is 35 m³/m².d. The diameter of clarifier should be

a. 10.5m

b. 11.5m

c. 12.5m

d. 13.5m

a. 5

b. 4.3

c. 4m

d. 8m

62. Critical depth of a channel is 1.5m. The specific energy of the section is

a. 0.75m

b. 1.0m

c. 1.5m

d. 2.0m

113. A partially open sluice gate discharges water into a rectangular tail water depth in the channel is 3m and Froude number is 1.2. If free hydraulic

conditions are maintained, the sluice gate will alter the velocity of the flow. The velocity of the flow in the sluice gate should be (X is the velocity of the flow in the channel, u = 0.9),

a. 1.301

b. 0.401

c. 0.6901

d. 0.901

114. A circular irrigation lined channel has a

bed slope of 1 in 6000. If the side slopes of the canal are 1:1 and Manning's coefficient is 0.018, the channel depth of flow is equal to

a. 1.8m

b. 3.6201

c. 4.91m

d. 11.21m

65. The pH of a solution having a hydrogen ion concentration of 10^{-9.4} mol/L is

a. 9.94

b. 9.94

c. 8.94 x 10⁻⁹ mol/L

d. 7.94

66. List-I contains some physical properties of water and List-II contains some chemical properties of water. Match List-I with List-II and select the correct

6<) Maldl List-I with Lrst-II and „,lGOt tltO correct answer using the codes gillen below the list~:

l.isl-l

l'. Release valve

Q, Check valve

it Galç valve

S. PilOt vdl"~

Ltsl·JJ

1. Reduce high inlet pressure to lower outlet pressure

2. l.,uuIl the il" w uf water ln ~{tl"llo direcuon

j, Remove air hom the pipeline

~. Starring lhç 11tlIV of Willer ill the pipet inc.

Codes :

	I'	Q	I~	S
a,	J	2.	~	I
b.	.ll	2	I	.3
c.	3	4	.2	I
ll	I	'1	4	3

70 i certain simatlon waste waer tliS<lhQ~ed into u river mixes willi Ule river wAler Justantuneously nnd completely. Fulluwing is the dIJlllavailable:

Waste water [.)0 - 2.00 msll
Discharge rule= 1.10 o1/s

River woter DO = 8.Jmgtl Ph)w

ru~ ~.70m)/s

Temperarnrc - '20"C

Iwtlli.! t1UIU1(1L of DO in 11" mixture of waste and river shall be

- a. 5.3mgll
- b. (1.511g/l
- c. 7.611gil
- d. &.4111gd

Data for Q,71 & Q.72 ne'e !til'en l""10,.. Soh. the probl.IILS and choose correct answers.

l\city is going t" insttll tho rapid sand lifter .llor the sedimentation tanks.

Usc ille lolllllvng data,

Deliiigl11C1ndint'role 10the filter - 20{}),1(m~d

Design lluw role - 0.5 m)/~

Surface area per liher box 50m~

71 'Tho surface urea required for lbe rapid sand filler will be

- q. 110n1²

b. 115m~

c. 111ml

d. 218m²

72. The number of tilters required shall be

l. _1

b. 4

y. li

d. 8

73. The outhumble commanded urea lor • distri "UIJ" IS 2 ' 10³ In¹ The 'itl'~llsi!v (If irrigation lOr U crup is 40· • It' J(ur ~~"lOr depth and kor period llir the crop rue L40m and " weeks, respectively, the beak demand discharge.is

3, 2.6:"nl s

b. '1.6'3m'/s

c. 8,5~m's

d. IUS mJ-s

"14. Uplift l'tCS~llrdll points E and D (figure A) of n strnigt hOri7,0n111 floor of IIClJligi~l~ Ihickitess with j1 ~hel>l liiL: HI d()wnsl"QIII end ure ZM~ nud 20~". respectively If !,e sheet ple rs al upslr.lam end of the floor (fig II"" 11). the uplifi' P.,,"SII"" nl peli nts 1)1 and Ct ore

~ ~ o1 ir' -

.....

u. clR% 'llld 600;" t.!,~pocliv"D'

1>. 80." "nd72~" rcspectlvety

c. 8~. and "10% respectively

d. I(10"~and zero respectively

75 A luuuthing "prun is to he deslgued al downstream l)l" ll weir rot discharge int<losh)' of 65 III¹,ym. For the design 0f [aunching "pron" the scour deplb is tnken two limes of Lacc} scour deprh, The sill factor of the bed mol.rial. IS unity. If the lolll water depth is 4.4m. the leogth 0.' launching apron ill ihe launched position ls

u. J5-m

b. 'h7 m

c. 5m

d. 5..[5111

Data (OJ' Q;7G & Q.77 are given below, Sol". ,h. prublems and choose correct answers,

A four hour unit hydrograph of a catchment is triangular in shape with a base of 50 hours. The peak discharge of the catchment is 100 m³/s. The peak discharge of the catchment is 100 m³/s. The peak discharge of the catchment is 100 m³/s.

76. The peak discharge of four hour unit hydrograph is
 a. 40 m³/s
 b. 50 m³/s
 c. 60 m³/s
 d. 70 m³/s

77. The peak discharge of four hour unit hydrograph is
 a. 210 m³/s
 b. 230 m³/s
 c. 250 m³/s
 d. 270 m³/s

78. The peak discharge of four hour unit hydrograph is
 a. 210 m³/s
 b. 230 m³/s
 c. 250 m³/s
 d. 270 m³/s

79. The following observations were made of a catchment
 a. 40 m³/s
 b. 42 m³/s
 c. 44 m³/s
 d. 46 m³/s

- The standard axle-load is 80 kN. The equivalent daily numbers of repetitions for a standard axle-load are
 a. 451
 b. 481
 c. 800
 d. 1200

80. A transport company operates a scheduled dolly service between city P and city Q. One-way Journey time between the two cities is 85 hours. A minimum layover time of 5 hours is to be provided at each city. How many trucks are required to provide the service?
 a. 4
 b. 5
 c. 6
 d. 8

81. A single lane highway has a design speed of 100 kmph. The perception-brake-reaction time of drivers is 2.5 seconds and the length of vehicles is 50 m. The coefficient of longitudinal friction of the pavement is 0.15. The capacity of the road in terms of vehicles per hour per lane is
 a. 1440
 b. 750
 c. 710
 d. 600

82. A horizontal curve of 400 m radius is provided. The coefficient of lateral friction mobilized on the curve when a vehicle is travelling at 100 kmph is
 a. 0.07
 b. 0.1
 c. 0.15
 d. 0.2

83. The system of equations $AX = B$, where A is a scalar, X is a vector and B is a scalar. Let λ be an eigen-value and v be an eigen-vector for real matrix A . Let I be an $n \times n$ matrix. Which one of the following statements is correct?
 a. For a homogeneous system of linear equations $(A - \lambda I)x = 0$ having a non-trivial solution, the rank of $(A - \lambda I)$ is less than n .

- b. For matrix A of size $n \times n$ being a positive integer, $(A^{-1})^m \times t^{-1}$ will be the eigenvalue λ^{-m} .
- c. If $AT = A - I$, then $|A| = 1$ for all i .
84. Transform the given linear form $h(x, y) = 2x^2 + 4xy + 5y^2$ into its normal form.

iii. $\frac{dy}{dx} + (1-t)y = (1-t)t$ for $n > 0$

will be

ii. $\frac{dI}{dt} = (1 - n)pv = (1 - n)q$

b. $\frac{dv}{dt} = (1 - n)pv - (1 - n) < 1$

., $\frac{dv}{dt} + (1-t)y = (1-t)t$

ii. $\frac{dI}{dt} + (1 - n)pv = (1 + n)q$

85. A car engine accelerates from rest to a speed of 100 km/h in a distance of 280 m. Assuming constant acceleration, find the time taken for the speedometer to read exactly:
- 0 km/h
 - 8 km/h
 - 75 km/h
 - 126 km/h

86. The function $y = \sin(x)$ is the solution of the differential equation $\frac{dy}{dx} + y^2 = 0$.

in the interval $0 < x < \frac{\pi}{4}$ is $\frac{1}{\cos(2x)}$ by

a. $e^{-\cos(2x)}$

b. $\frac{1}{\cos(4x)}$

c. $\frac{1}{\cos(x)}$

d. $e^{-\cos(4x)}$

87. Value of the integral $\int_0^1 (x^2 + 1) dx$.

Here, C is the quarter circle in the first quadrant bounded by the lines $x = 1$ and $y = 1$ will be, (Use Green's theorem to change the line integral into double integral).

- $\frac{1}{2}$
- $\frac{1}{3}$
- $\frac{3}{2}$
- $\frac{5}{3}$

88. Consider the applicability of the Cauchy Integral Theorem to evaluate the following integral counterclockwise around the unit circle C , $I = \oint_C z^n dz$.

z being a complex variable, the value of I will be

- 0, if $n \neq -1$
- 1, if $n = -1$

$I = 2\pi i \cdot \text{Res}(f, z=0)$

- $I = 2\pi i$ if $n = -1$
- $I = 0$ if $n \neq -1$

- none of the above

n.t. for Q.119 & Q.90 Use the given information to solve the problem. Give the answer, Give the value of W , in calculating its reciprocal value by the Newton Raphson Method for $f(x) = x^2 - 2$.

81. The Newton Raphson algorithm for the function will be

$X_{n+1} = X_n - \frac{f(X_n)}{f'(X_n)}$

a. $X_{n+1} = X_n - \frac{f'(X_n)}{f(X_n)}$

c. $X_{n+1} = X_n + \frac{f(X_n)}{f'(X_n)}$

d. $X_{n+1} = X_n - \frac{f(X_n)}{f'(X_n)}$

90. For $z = 7$ and starting with $z_0 = 0.2$, the first two iterations will be

a. $0.11, 0.299$

b. $0.1, 0.392$

c. $0.12, 0.16$

d. $0.13, 0.1428$