C V L ENGINEER NG

ONE MARKS QUESTIONS

L. A bar of vaiy ing square cross-section is loaded SyJIIIUetrically as showr m the figure. Loads shown are placet! oo one or the axes of symmetry of cress-section. Ignoring self weighr tlle mn~1miJnl l"nSile stress in 1'ollmrn' anywhere is

a. 1|>.(1
b 10.()
.e, 25 o
d Jl).()

A curved member wub a strargnt verucai leg is carrying a vertical load at Z; as shown in the figure, 1i.e stress resultants In the XV segment are

a. bending moment, shear force and axrut force
b bending moment and axial force only
Co bend'ngTIlOmenl and shear force only
d axial.Iorce Only

3, The sliftness ((of a beam delJecring to a symmetric mode, as shown 10 the figurilC. Is

a. ///
T.
b. 2£1
L
c. ~/il
t:
d. 61iJ
I.

4, Muller Breslau principle m structural ru.(~yslSis used for

a. drawing Influence line diagram fOr any force. function
b. wnring virtual work equation
c. superposition of load effects
d. none of mese

5. The effective length of a column in a reinforced concrete building frame. as per IS:456-2000. is mdependent of the

a frame type i.e., braced (no sway) or on-braced [with sway)
b. span of the beam
c. height of'the column
d. loads acting' on the frame

6. Maximum strains in an extreme fibre in concrete and in the tension reinforcement (Fe-415 grade and e. = 200 *kN/mm')* in a balanced section at Iinnt stare of flexure are. respectively

a. 0.0035 and 0.\)038
a. 0.002 and 0.0018
c. 0,0035 and 0.0041
ll, 0.002 and 0.003 I

7. The working srrcss method of design specifies the value of modular .rauo, m = 280 (3c:r,h,). Where c:r"" is me allowable stress in bending compression in concrete. To what extent does' the 'above value of 'o:r make any allowance for the creep of concrete?

a. No compensanon
b. Full compensation
c. P,irflol compensanon
d. The two are unrelated

I----It------ot
tll Jlliiban

8. In the design of b~ing system for a built-111'steel ~()Ill111nthe maximum ailoIV3ble .Ienderness ratiu (if Illucin~ bM is
   a. (21)
   b. I~)
   c. 180
   d. 250

9. Which "I the IhUowing elements oi a pitched roof industri.1 steel building. primn.;jy ros.,"s lateral load paralle! to the ridge"
   .s, bracings
   b. purlins
   c. inTSS
   .L column.

10. A masonry dam is lounded on pervious sand ""ving porOSity equal 10 <1-5% und specille !ll'.vity or .8.(1 partido. is 2.65. FOl'a desired fncter Of .nfe!y of 3 .guinol s"nll boili"g. Ihl!' muxlmum perm;'sihle upward gradient \\ til be
    a, 0,225
    b. IU02
    c. I.0
    d. unne Of Ihese

11. Water .s pumped from ;1 well rappmg an unconfined "quil;" at • certain diAcha"ge t.1e and the 'lcIIdy suue drawdewn (XI ill an observotion well u monitored, Sui>sequlmll),. 11", I1uml'illg di.<ch.r8c is d(lubl!:d and U1. 5lel1dy stut. drifWaOWO in tlte .arne observation well is found \0 be more limn double (i,e.. more than 2:\:), 11\~ clisfln'I'Mtion3tc drawdown **i~**oused by
    a. WeD losses
    b. Decrease ill. thesaturated thickness of 'the .quil ....
    e. nonlinelwflo,'
    d. delayed lll'ovlj,yield

12 A double .[r:11nml! ct" layer, 6", dud. settles by 30mro, in three years unci",' the-Influence of certain loads. **1~ IIMI** consolidation settlement has bam estirnnted to lie 120m",'. If a thin layer of ~3ncl h"vinl!, negligihle thicknel'll 1" il1llVduetld til II depth 1,,'I.Sm btlow the lOp surface, the nnn I 00n80 Iidatiou ,';oIement' of glayl.yenvill be
    a, **6()rn)n**
    b. 12!)IIIm
    c. 240mm
    d. none of'th •• e

13. A 2SkN point lo•d .Clt on fhe .urlilcc of all intinite elasuc medium, 'I'he vertical pressure intenslly in IINlm⁻¹ at a ptl,"tti,Om below and 4.(lm .W.y fruln the I".d .qill be
    U. 132
    h. 13,2
    c. 1~12
    d. n, rsz,

14~ A .grnll.u.!ru4oU possesses saturated denaity of'20t..:Nlm' lis eWeotiye ~ngle of mten ra l friction. is 35 degrees, 11'the desired factor of .afoty is 1.5. the sun, angle of stepe Jar **this Noil. when! seepage** occurs ~I **and** parallel to the slop" surface. wilt be
    a. 251)
    b. 23~
    c. 20"
    d. ~o

15. In:1 plate ""..1 1"1. conducted 011 C()I1t:s;lIr.(t:.lso,!. a 600mm square I,,,~I plate settles by 15mm under ~ 10:111 Intcn.~ityof O.2N1mm'. .'-':11 conditions remaining tlte same. seulement 01' a Im square lholins will be
    a. I,,"~ thuo, 1.5mm
    b. ~ntc1' than 2S 111m
    c. t5.60 lD'U
    d. 20,50 mm

16. I'm ~ tlvll-dimcnKillfl~1 irf{}~lion.1 nl/.o, tho velocity potential is defined us ~~In(x' ***I)*** \Vllicbofth"foUuwing.is
    • possible stream function 'V for Uti" tlow'/
    ~, ~r'tl' ty ,_)
    b. Ino" 0' ".)
    C, 2I<ln-\(."I.<)
    d. *'21~n'(x/v)*

17. A I\"l pl••e is ktt)1 In an infinite nui~ medium, The j]urd hn., 0 unifQlm free-stream velocity J"raUel IQ the plate, For Ihe laminM h(llmlla.), lay~r f()rm",1 on rhe I,l.~e. piel:: the tvJTO(!I tipri(ln matcrung LiKI-I and List·n.
    Li~J..J
    P. Bound.r}' "'~C Ihklo.b1!1

Q. SI,clU"~tres',~IIhe plMe

R. Pressure 81'udicnl "lnnglhe plato

Li~t-n

1. Decreases **in** tho **,flo,. direction**
2. Increases in the flow direction,
3. Remmns unchanged

Codes;

	P	Q	
0:	I	2	:;
...	2	2	2
c.	l.	I	'2
(I,	2	1	3

18. A Inhi1l·.lury model of. rivCI'is built h' " gllometric.::',le 'lf l: lOn, The fluid u~oo In the "Hldd is 011u(m:l'~ den~jl)' 9(l()~gl,"' Tho highcs.l !lood in (be river is I(),O(lOJ/s. The COI'tdipOlldin8 discharge- in the mod,,) shall be

n. (),095 m³.

b. (l,100 m'/s'

e. (l.WS m³'s

d. 10.) m³.,.

19. 11,. result. IIf nnal)"Sh of " rnw water s'11l~le are sillell below:

l'uriudlly : 5mg" pH: ~,4

Fluorid.s:2. Smw' 'rolal Hl1rdne1ls:30OrnglI

lfu" • ~.I)01S/l Ml'tlj ~50 per H)lll11/

Prom the, IL'I;) gillen above, h call be> ,,,I:erred that water noc'li~removal of

a, I:w:hidil¥ rol1(l'~ed h~ disinfctofion

b. n~"ridt:.s nnd h.rdnc~H

c, iron. followed by {lisiQIOclillJl

II. 'nubrides. hardness and iron li,II0Wed by,lisillf':dit/lt

ZU Zero hardness of water is achieved by

u. lime soda process

b. excess Iime truulmcul

c, **ion** exchange treatment

d. "'~."'s alum and lime lleatutCIll

21. Whiol, of Iltc Iollowing sewage ltlJalment methods has inherent problems of odour, pondfng 1llldfly n\li•• m:~'1

n. UA~iB~yslem

h Activated sludge process

c, TTi~lil)g lillc11!

d. Slnbiltzali(ill ponds

22 {'mOl .",',"gst lho:: fl1!1owi1)g ~ewag. lll;.bu,:nl J1"ll()1IS, I"rgesl 1:1R~ lqulfenlCht> for n.!ii""n discharge ,vil1 be needed lor

a, hic.kling filler

h. Imoemblc pond

c. oxidation ditch

d. O);id,tiol111ond

23. The vertical hydrnulic conductivity Of the top soil al certain stage is 0.,2 cnuhr. A storm of iutensity 0.5 cmlhr occurs ove- the loi1 for nn indefinite period. Assuming the surface drainns. 10 be adequate, the -lilfiTtraJiotl rate nfter the storm bos Inst~d rOrll "cry long time, shall be

u. smaller thau 0.2 cm/br

b. U.2cm/hr

u. between 0.2 and 0.5 cmlhr

d, 0.5 c1ll1itr

24. TI,e totnI .•rig..ion depll, Of water. required by • certain crop in its entire gr<>win,g period fl50 days), L~25.92cm. The culturable command area for a distrihuUlry channel is 100.000 h,,&f'tlS. The distributary channel .I",11 be designed for. discharge

3. 1"'8 than 2 cumecs

b. 2cwn.:es

c, 20 eumees

d. more lhon ,:W eumees

25, The moi.h,ln! conrenr ~fsoil in the Tool ZI)Q~IIf ~lLngrieU'lIJI'~(crop 01 certain srsge lS found to be 0,05. Thil field cap.oiLy of the soil is 0,1S, TI,e root zone depth U; 'I.1m. Il,. cl!nsumplive lt'" of crop '11 this stnge is 2.5mmldny 'OII there is nu precipitation during Ibis period.

Irrigatlub tllicil;Jll,\)' i~ (1~'}nJt i~ intended IQ r.me the moisture conlenl 10 lite field cap. thy in g J.YS Ihr()u~h trrig;ltiOn, 1'11" necessary uqJlh "I' ilTi!!lllu" i,

u. 115 (lUO

II. 1.69mn

c, 2()() 11111)

d. 22511)10

26, Temperature slrci!~e~ n1 ceneeete p'VCWCUIII may cause the .lob 10 crack, If • .lab cools uniformly then the crack will develop .1 \~hioh' of lhe follo,viol! lUIUlllOn$llf ~,c $lab't

a. ALeel1....

b. .Nou, ed~es

c. corners

d. Near edges told nt corners

27 rbe speed aud delay studies 011 u defined section of lughwav are conducted by

a. radar gun

b. trnffic counters

c. moving cur method

d. enoscope

28. Given Matrix rAJ: ~ 3 4

II 2 1

[0

Illo.icofll", matrix;$

a. 4

II. :I

c. 2

d. I

29 f\ box cont"in. 10 screws, _-0I' which nre defective. T\VII SL"'-WN lire dnrwn JT randem with replacement The I'f\'>b.bility ;haL none- (If the: t\vn ssecivs is defective II';II be

a. 100'',

b. 50"0

c. 49'!~

d. none of these

30. It' P, Q and R arc three points having coordinates (J.-2,-I). t1.3.4). ('2.I,-2) in XYZ SJ'I'CC, then the distance from point P 10 plane OQR CO be/nl! -IC origin of the coordinate systemj is given by

a. 3

b. 5

c. 7

d. 9

TWO MARKS QUESTIONS

31. The suue of 111'0 dimensional stresses ncting on II concrete laminn consist. ut' 0 direct tensile stress, <l. - 1,5 N/mm'. and shear stress. r = L20 Ninuu'- which cause crackIng or concrete. Then the tensile strenegh ot the couonsc ruN/nun! .is

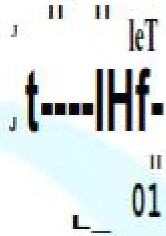
a. [.50

b. 2.I'111

c. 2.17

d. 1.25

32. A "H" shaped f.arne uf uniform Ilexum] rigidJty El is loaded as shown lil the ligon,"" The relative 011tward displacement between puill.l/l K und 0 is



a. RLh' / lET

b.

c. Rill / 3£1

d. R~'il / 3111

33. A Slnlply supported beam of uniform reetaugular crl'J,;s"c'i:tiun of \\'idlll h und depth hTs, subjecled 10 lineDr h!11p.rtliure gradient. O· ui the top nod TO at the bottom, as shown in the Iigure, The coefficieut of lill.11n;~pu,u;iQn of rhe beam mnteriul I. l.l. The ...'.,0111118 vertical detlecuun at the mid-span 0I' the beam [s

a. (.t17. / SI. upward

b. alll' / 81l upward

c. (YIIh', / 111.' downward

d. (ITil' / 8II. downward

34. List-I shows diilereol loads octiog 00 a beam lind List-II show~ dltlerent bending nh'menl di-lribuliuns. Mulch lhe load with the corresponding bending moment dingrnm.

UsH

I',

I) t

Q.

f ! , t

~! *
f •• '~

S,

~

list-II

1.

~

2 [redacted],

C;;;;==-

.L

~

.1.

~

5.

CVIles.

	P	Q	R	S
a	..	2		3
h.	~	4	I	J
"	2	5	3	
d.	2."			3

3S. A long slnl~llml column (lenglh = L) Nlth hoth end, tlingt(lls lleled ,upon by an lL'(inl compressive Il1n(l, " ll,t differenlial cqU8lil)rl goycmlllg ihe bending of column is gNL'Jl b/;

m ,V? -p).

where v is: the SLtuClUrol lateral deflection and El' i~(he n"xural rigidity. The lir.ll critiouiluad II" celumn l'-SP()l\Ribk lill' iL'\ buckling h given by

-, ;'l"£l / L'

b .JLr! lir ıı.

c. 2p.'mll'

d. 4,rD IL'

36. Ill n redundant joim model, three bar members are pin connected at Q as shnwu 11the figure. Under some load placed al Q. lhe etonganon of the members MQ and OQ arc found 10 be' 4Hmm and 35mm respectively. Then the horizontal diptsccmcn: ',,' Q"d 'the verticnl displuecmcnt 'v' or the node Q. ill mru, will be respectively,

M N O

MN.. 400_
NO-500mm
NQ-500_

Y,w

a -6.64 and 56.14

b. 6.(14 ""d 51). 14

c, 0.0 and 59.'11

d.. 59.4 I and 0.0

'37 A truss, ııs shown ill lhe figure. il; carrying, 1110kN load et node- l.~The foNt in lhe diagonal member MIU, will be

U 0 U

I'–

1, 1, 1,

bM

1O-- """@4m-2Am--oI

n. 100 kN tension

ll l()()kN compression

c. 80 kN tenston

d 80 kN compression

OafS ror QJ8 to Q.JI) are given below, Solve. the problems and choose 'the correct answers.

A beam PQrtS is. 18 ın long and is simpl) supponed at points Q and R 10m apart. Overhangs l'Q anu RS arc-3m nnd 511 respectively. A train of 1W\ Jl()inl.londs of 150 kN anti 100 kN. Sill npart, emsses th is beam from lell ııı rigbl wilh 100 kN lPHd leading.

:ls. The m..xirnurn sagging moment under the 150 kN load anywhere R
a. .s()()kN-m
b. 45QIlN-m
c. 41X11rl'l-m
d. 37~k'N-m

39. During the passage 01' ih" loads. the mn.'(uutJul and the minimum l'eacli(')u8 3t support R. ill!:N. ~'" I\.~p""liv"Jy
a. 300 and -30
b. 300 Olltl-25
c. 225 UJ'ld-30
tL 225 and-25

40. The 1O'l(imul1\ hogging: momeat in the beam nnY'vhere is
a. 3(lOkN-m
11. 45QkN-m
c. S00kN-ltl
d. 750kJll-.m

41. List-I ccntains, some prope,rti05 of ccncrete/cenrent nnd List-Il contains li~t of some tests on IlOncret.:icemelll. Match the properly 'w1th the c:oJ7~pondiug test,

Lisll
1'. WOl'knbility "I' conceete
Q. Directleniilc strength of concrete
R. BuM ()cIIV""o cutlcrel" 311tl steel
S. Fineness lICCCllo"UI

Lisl-n
I. 'Cylind.er splitting 1.51
2. Vee-Bee le.1
3. Surface area leSI
4. 'Fin(;n~'iS rhudlllll~ I"st
5, Pull o.Illesl

Codes:

	P	Q	R	S
n.	2	1	S	
b	4	S	I	3
c,	2	t	S	+
				II

42. t(QP rings lictor :jelf.n tl\[~c ~ onk eamt. "

111)01tension (if 121)k>'1. Tile bC!llJIIuru)tl,~~ Se.:tIQn i. *250mm* wide And ~OOmm deep and it m ff:lnl\)re~d Wilh 4 bars fir '2(lmm diameter lit' 1'1:-41 5 !l'lIilc. MilllulOrratio iof Ihe concrete i~tll. The 1~II!iJc—tt""— in *N/mm!-* in t"ll0 concrete i'

v... 1.02
d. 1.26
d. 1.32

A concrete column carries an axiDI load o:f 45Q kN and. bending moment of 60 kN-m at il. base, An isolated foolins of lrize 2m « 3m sido along ~'" plane of the bending moment, is provided under Ih" column .. Centres 01' gravhy 01.' column and looling coincidO, nil! tlet maximum and the minimum pressures in j;Nfm! On soil under the footing are respectively,
:., "lS M'~05-[
b. 9S and 75
c. 75 and 55
d, 75 and 15

Oatu rur Q.44 .lt QAS Dr. gin'D below, Sulve Ih~ I'robl~m~ and cbQo~'r' correct *"n~"~er*
,\ reinforced concrete beam, 5(0) 200l1lm wide and 300,nm deep o\'cull is simply supported over • 'pu" of 3'uL II is .subjeeted 10 IWO point lo.d. P of equal magnitude plnced .. , middle third points, lbe two lo,ds' are S'"ddually increased slmultaneoustv, Beam is ,,,lnforQed ,villi 2 UYSD bars of J6~ diam.,t~[placed at an dl'ccH"" cover of 40mrn on bottom fsce and oominal shear reintoreement. The ~hal"dcierisllc compressive §trengU. nod the bending tensile .It'O"gtb or ~,e ecncrete are 2t).O Nllllm' and 2,mUIII"" ""I'tctively.

1,1, Iglloring the presence of le'"llon reinforcement, Ole value of load I' in kN when the fitsl flexure crack will develop lIt the boom .is
a, 43
b. 5.0
c. 6,6
d. 7.5

45. The, theoretic. 1 r.ilu,'C lOlla ur iho 11.00 lfor I'l~,inn)en\ nt' li1,l1il .{':ltl: of collapse in n",xure is
s', 13.7 (lll
h, 2S.., t&J
c. 2H,7 *k'N*
d. ill.1i kN

"l. List-l contslns some elements in design or u sbnply supported plate girO"" and, List-Il gn'C'S .some qualitative locations on. UIII girder Match ihe items of two lisl. as per

good design practice and relevant code provisions.

I~.1.1

I'. Flange splice

Q. Web splice

R. B,etUll1gs stiffeners

S. Horizonral summers

Ust·1I

I. AI sUPP<lrlimm'inllm)

2. A way ii'OIII C.eIIU·C 01' span

J. Aw"y itom "tIPP\'rl

~. In. the middle Of spau

5. Longitudinally somewhere ill tho ecmpression flunge

Codes :

	P	Q	R	S
o	1	3		5
b.	-I-	2		3
0.	3	,I	2	I
d.	I	5	2	3

47 A steel pOrt'll l'rume haS dim"n"on s, pl",'lic 1111)mcht cupaUill~,. and uppljct! loads AS showu III the tigure, The vertical load is alway. twice at' the. hotizomalJcad. The collapse load P required for Ibe. development (If a bcPlll mechunism rs

P r T

M, r L

a, 3,\I[/ L

b. ~M= / f.

c. 6,1{~ / L

li. [redacted]ki r· / L

Ditta cor Q'I8 & Q.49 sre gi"en below, Solve the (Ir(Jblenl~ .mtl chol:",' C')I'1'~CIlInsW"""

A uuss de c(lnsisling Of 2 ISA 75 " 75 " Bmm carries u pull 01' L50 kN. Al euds the I"'1.'angles ure c\lnrlccl~d,. one Cll~1Jon .'ther ;ride 'If 1l10mOl thick gusset "Jute. b) 18 111m d[p'\I~\er rivets IIIT'JDged pI one row. The tl.lloll'uble SlreSSCS In .nYol arc.£, -90.Q Nlml11: lind f", - 250N!mm,.

'is. Mnximurn tensile stress in Ihe tie inNlmm2 IS

a. 9.3.6

b. 87.5

c. 77.2-

d. 66.Q

41). Minimmn number or rivets required 01 each end is

a. 2

b, 3

c. 4

d. 5

S0. For the soil strata shown ill tJgure, the water table I$ lowered ~)' drainage by 2lll lind if the top 2m thick SIlly sand stratum remains saturated by capillary action even alter loweri ng Of waler table. Ihe increase ill effective vertical pressure in kJ'a at mid-heighr orolllY lnyer will be

a. 0.2

b. 2.

~\ :lo

d. 200

:II AI 11 reclamation site ll~rwhleh the soil streta is shown in figure, u 3m thick layer Dr • foil material is tn he IBid in.1nnll1llCnnsJy on the lOP surface, IΓ the coefficieni of volume CI1O'PlVl>,;bilily, " [or 0:;1.)' is 2.~ , H)~ m~'kN. the COIl\iOlidulillLsettlement ,,!, the ~l,,)'loyer due to placing H(lill material will he

\L 695 LUU

b. 139 mID

c. 228mm

d. "21S 111m

52. A braced cut. Sm wideand 75m deep lS proposed in a cohesionless soil deposit havmg effective cohesion c' = 0 and elfecrlve merion angle. ~. =36". The. ITrSI row of smus is 10 beinstalled al a depth ◇f U.Sm below ground surface and spacing between the struts should be I .sUL If the horizontal spacing or struts is 3m.und ullil. weight of the deposit Is 20 kNlm2, tho maximum strut load will be

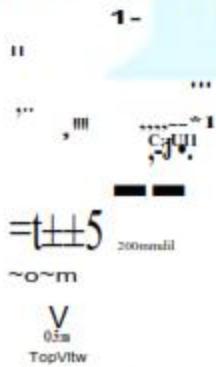
a, 7Q.87 kN

b. 98.72 kN

c. 113.90kN

d. 151.86 kN

53. For the 0' x 3) pile geoup shOwn In ih" figure, the settlement oC pile group, tn. normally .consohdatcd clay stratum having properties as shown in the figure. \\ in be



54. Compaction **of an** embankmem **is carried** our in 50Clmm thick layers, The rammer used tor compaction has a foot area of O,05m' "lid fll€ energy huparted in every dr(lp of rammer is 4VON-m. Assullling 50% more energy m each pass over the compacted area due to overlap. the number of passes required to develop compactive energy cqllj~.l(jr\t to Indian Standard lighl cornpaction for each L.,yor would be

a. lU

b. 16

c. 10

d. 26

55. Matoh .Ih< List-l (Boring methods) with Lisl·11 [Field conditions) and select the correct **811S\ver usillit** the **codes** given below the lists:

List·]

P. Almer Boring.

Q Wash BOnDI!

R, Percussion Drilling

S, Roillry Drilling

L'SHI

1. Below water table in all scll types except hard soils and rocks
2. Large dramcrer boreholes .ovc-ISO mm **in size**
3. Exploratiuns fOr shallow foundauous and highways
4. BOllldclJ' lind gravelly strata

Codes :

	P	Q	R	S
n.	3		4	2
~		2.		3
~.	2	J	4.	1
d.	3	I	2	4

56. Match the items of List-I with List-ll und **select the** correct answer **using the codes.** give below the Iisis:

Ljst-l

P. Modulusof subgrade-reacuon

Q. Relative density and strength

R. Skin friolioll and point bearing resistance

S. Elastic constants

LisHI

L -Cychc pile load lest

L. Pressure meter test

3. Plate load h<st.

.j. Srandard penerraiien test

5, Pyn:ultjt cqnu penetration **tcSl**

Codes:

P Q R S

a,	I	3	2	...
b.	t	2	4	J
c.	'2	J		J
d.	3	~		2

Datn for Q. 57 & <:2.58 ace given below. Solve the problems aod choose the ~orr.Clanswers..

A canal having, ~iOe .loVell I ; t is 1/r000llSed_fi> be .constructed fu a cohesive soil (0 a depth of J Om below the ground surface. TIle sQil properties are '1",= 1;l', C,.= I'lkPlI, e = I,Q-0, ~2,65.

57. If Taylor's S:llhili.ty Numbee, S•. is 0.08 lind if Ilt~ C"l{aiJlows fiill, I}I~(aclO' (.If safety with respect 10 c(1)tesi"" ~aillsl Iliil~ of the canal barik slopes will be

a. 3,7
b. 1.85
c. 1.0
d. none of these

58, If there .is a sudden. drawdown -of water il1 the canaland if Taylor's Stability Number for the reduced value Of 'l.. is 0.126, Ul~ mctor \)l' safel'Y with respect I~ cohesion -against the failure cf'bank ~lores \l'11 be

a. 1.SS
b. LIS
c, :0.84
d, .0.53

Data for Q. 59 &, Q.60 are gh'en 1!9J()w.SolV~ the prllbl"n1~ ~hichoose the cOrrect answers, figure s"ow~ the geumelzy of a _rol) ibociqg sUjlpo!1ing the load hearing walls of a three s-toried building and tile properties of clay layer.

59. If the pressure a.ctlng on lhe fp,}1iJlg Is 40.kP.l, the cεnsolidation settlement ofthe tOol:ing 'Will be

a. O..89mm
b. ...mm
c. 89:0mm
d. none of these

60. If the elastic modulus ami the Poisson' s. ratio· of the clay layer are respectirely 50 , lOl.:kPa and 0,4 and .if the influence factor for the ai:til? tQoti'll!: is 1.'75, tile elnstic settlemenrofthe fooling will 'be'

a. O.~.lmm
b. 1.41nll\1
c. 14.1 mm
d. none of lhese

61. A 110ltz04ta1 jet snikes a frlctibltles~ vertical pjate (the plan view i~shown 111 the figure), II 18 then divided illt(\ two parts, as shown itt tile figure . .If Hle IfilP)LCl IQS~isneglected, wnat if;.the value -01'9'7

a. 15"
b. 3'0'
c. 4~h
d. 60'

62. Two pipelines, p,ie carrying oil (mass density 900 *kglm)* and the.other water, are connected to a manometer as shown ill figure, By what amount the jitll$sW.eirι til- \VaLetpipe should. 'be increased so 111a-4lle mercury lilVel.S in both ihe limbs of the l1\;ntomeler become cqunJ'/ (Mass qan!<it)' of rnercury =] 3.'\S()J(~1m3 and S = 9;81ml.t)

a. 24.7 kPa
b. 26.51iPa
c. 26.7kPa
d. 2S.91iPa

63. I'\ solid sphere (diameter 6mm) is nsin~ OI)'\)llgli oil (llaJ<S dmlsity 900kglm, dynamic viscosily 0.7 kg/ms) at a COHStanl velocity ... What ... 'SH eci1:io

weight of tll~ msterink{"'lll' whtoll Uld sph~r.ls. mude? (Tdkll g 9.81 nl/~1)

n. '1..' kNlm~

b. 5.3 kNlm'

c. 8.7 *kN/m'*

if 11., liN/ln'

64. A hydraulic jump .ukes plnee in " lri.II!!nlar channel of vertex angle 90·, A·' shown in figure. The discharge is I m Lg and ll,,, p.~'jump <k:pO. ill 0.5111. ""'but will be tll_ post-§ump dttplh~ (Take! g ~ 9.81 lUIS:)

a. 0.57 m

b. 0.91 m

c. 1.02 m

.I, 1.57 m

J)H,,~ Iftr Q:6S nnd Q,(06 ""(' gi".n .,.,low; Solve Ih. pr .. ".'"', ali" dll,,>:<e correc ,1ll'!We,.".

A pipeline (diruneter Il,~m. length 3km) carnes water frmn point P to polnt R (see figure), Tho piczomul"" beads al P and R "" to 1)(: maintained ııt lOOm and 8001, respectively. To increase the discharge, n second l>;l"is added ln pnn,lloi to tho ""i.tinS pipe IT0ll, 10 R. '11,e length of the 'ldiJiuonal pipe is also 2lun. Ass llme .the frietiUll fs()tor. f = 0.04 for all pipes and Ignore mluor losses.

65. \Vl,.I ŀJ Ute inere •• e in di.chnrgu if tl.d Ilddition'~ pipe hi'll.same diamlll"" (O.3m)?

:1. 00,0

b.• >.3%

c. 41~o

<l (,7".

66, If there Is no restriction (In Ihe dillneter of the tlddítiomlf pipe whut \\l)uld he th~ m1L':irollm inere ..,,, in ui~"b.rgu theoretically pc... ible from llti. nrrnngement?

a. ...

b. 51)%

c. 67u~1

d. 1."0,

.Dgtn ror Q.67 md Q.6lI nrc given b"luw. Soln rho probl.m. And ch"'". 00'"«1 "nlllve ... ,

A VOI)' wid. rooU1l'!gulnr uhnnnel carries • disch.rge of $m:lls penn width. The channel hA. abed slope 0Γ OJ)\)4 9nd Mnnnmg's roughness coefficiem, n : Il,015.AUlc.e.rlliin section of the ullunllcUlle AI)\\' depth iS lm.

61. Wl1.ι Gruduully Varied l'1~l\' Ill'()file exists at Uii.-seetion?

a. M:

b. M,

c. S~

d. ~I

68, AI what disl~lD~from Ih~-secrioo the now depth will be U.9m'/ (Woe the direct step method employing n singfeslep.'

... 6; m downstreem

b. 50 m downstrenm

c. 50 m upstream

a. 65. m ups,,,,,,ni

69. Res uhs of s water !loJJrpf. lUlnl),.;. lire 3. follows:

Culton	COIl"~Dtm(i.," *(me/l)*	Eqlllwltllt "Vtill.bt
l'<.-	40	23
lv~<J	10	112
Cnrl	5S'	20
".'	2	39

(milliequivalent wuighl of CnCOJ ~ 50 my/meg).

Hardness of the wnlCr MlmRl,. in *m8/l* .. C;.COcll.

•. 44.8

l>. 89.5

c. 179

d. 358

70. An ideal h()n'l.ilflhl flow ~clllin8 ba~in is 3,,; deep h.vwl! !lu,fuL" utt><DOOn,l. Wruer tJow~ III Ute rare of 8QQOur'ld. tıl Wllier temperature 200(' (~t- lO-J J..Illm• nnd p = I()OUkglm[3]), A5Kominl!~tokc-s lnw to be valid, Ihe propol1ion (percentage) of sphencal s31)d particles to,!) I!llm tn

diameter with specific ilfiivity 2.65). tidd will be removed. is

a. 32.5

b. 67

c. 87.o

d. 9;,;

71. Malch List-I (Type of w..ter impurity) with List-II lMelhod or treatment) and select IImeoluicci answer using the codes givtu below the lists:

LiSl-j

I). Hardness

Q. Brackish werer from ~ea

R. Residual t<.WN fmm .lilters

S. Turbidily

Linl-(J

1. Reverse OllmO$Ul
2. Chlorination
3. Zeolil .. T".JIlnlenJ
4. Congulation and Flecculaticn
5. Coagulation, Flecculation nnd Filtration

Codes :

	P	Q	R	S
n.	1	"2	4	5
b.	3	2	2	4-
c,	2	I	3	S
d.	3		2	5

n. Settling lQ)l on , samph dnlwn lrom l80()rngl/) was carried out wilh I lilr<> .ample,. Tlte test yielded • Mottled volume of lMml. 'i'he vnhre of Sludge Volume Index .hall be

a. 14.0

b. ~4.2

c. 71.4

d. 271

Malch l.isl-1 (C'har.ct'1fislics of sewage disehMged lnlo inland wat<m» u itll List-II. (Allowable limit, O1gll) and select the correct answer u..ing. the cod..., given below lhe.list$;

List.'

P. SO[)s

Q, COO

R. bil and Grease

S. 'fOlnl S.'W"ndf:<) S"lids

List-II

1. 250
2. 30
3. 20
4. 10
5. 5
6. 3

Cqdc~:

	P	(J	r–	S
'}	1.	5	4.	1.
b.	4	1	6	4
c,	~	I	..	2
d.	2	1	6	3

Uut~ ror Q.74 & Q.75 are given ""low. Solve the problem! and' choose correct answer,

A water treatment plant treating 101Vl/d of water requires 20mgll of filler Alum. N;(SO.,llt H,.o. l'h.co water bas 6Ul~1 of alkalinity uı CnCOj.

lAl - 26.97. S - 32, C - 16. H 1. C. - 40, and C 12).

74. TOlal alkalinity requirement (10' Dlg per day .~ ('.C01) malching filler Alum .hall be

a, I80

h. 12()

c. ()(I

d. 60

75. Qunnlit)' ()fQuicl;. Lime requ;,.W (I()~mg

a. 2131.

b. ~\)O{1

n. +132

d. 61.31

I>.13 f0f Q.76 &. Q.77 are gh'fU beluw. Solve the problems "lid choose correct unswers.

A conventional AcHv•.tad Sludge Plant treating ·Jt)()OmJ(dbf municipnl waste water disposes of,,,, anaerobically digested sludge 0" relatively impervious larmlsnd. Use tbe lellowmg data:

1. Raw Sewage	SS- 225mg,/ (7(Y'. volatile)
	.800= 1900JJSlt
	(E)lec:ls activated sludge> l'Ctun,td to primary)
2. Primary SottJing:	SS-50-" removal
	BOD- 30'1. rcme)Vltl

~. EXcess- \otjv(>l~d SItJtI8~	UAg \ISS produced per 8 BODuppliod (80% voliltll~ O(tol~1)	
II. Anaerobic Dig"l	VSS reduced 50" o DigllSled concen irNllon - ~t)h Sludge Specific Gravity-I	.IDdl!"
5, Application on: t:,rmland	2nllh a,d	

71i. rolal volatile ~ll~ended ,olid~ 1(1 be: 'm3cnl~ically digeSlod. (kgJd VSS) sh.11 be

n; 1.33,

h. 168

e, 233

d. 245

77. Area ""luiremcots tbn, for di'jlo,,1 (If 0,,, sludge on far.mlAnd !liuill be

a, 2.95

b. US

c. 0.95

d, t),5~

78, Whllb .pply'ing Ulb Railonnl famull. for computing the design discharge. the rainfall duration is stipul'led .s the t,me of ecneentrntiou beeause

.1- Uus !ead.8 ttl lh" lnrge$l ponlble rainfall intensity

b. tlli. leads 10 the s1Ooll<,.. Il0ss ible mint,1l inlen.~ily'

e, the time Of concentration i—the smatlest raintltll duration ~o't Which ihe- Rational timoulnı—ilppli""blc

d. the tillc of C;Ol1C<;!lllmtionis the JDl'I!osl J~inflll durol ion fQr which, the Rat.ioo~1 formul.; I. QJlIllienble

79. Mntch t.ist-l with r.isr-Il' :",d Kelect the correer . eTS Wlin!! the cl)dOl' given below U,e li$l1:

Usl-!

p. Rllinflll wtcmsllY

Q. RainfaU excess

R. JU.ll,£., ll awraging

S. M.ss curve

Lisl-n

L lsohyeis

2. cumulative milllillJ

J, Hyetogt3ph

4. direct runoff hydrograph

Codes :

	P	Q	R	S
a.	t	?	2	4
~.	3	4	1	'2
c.	1	2	4	;
d.	S	4	2	1

110, While designing a hydraulic structure. tit", piezometric hea d ar bottom of Ihe 1100r t. computed as tOm, '!'he datum Is ,m below Iloer l;>o(1.;>Jlhu: ""00 .standing ",at..,.- depth above the Iloor is 2m- The specific- gravity of the floor material is 2.5. 'the floor thickness lhould be

a. LOOm

I), ~,3';111

c. 4.40m

d. "-01)111

81, The plan Brell or 0 n:scIVtnf U l~~n',The water lcv~1 ill thc' reservoir- i:i observed I" decline by 200m ill II certain pc'T,io.L flloring Ibi" period lite reservoir receives a ~Urf3oo 'n.Ool\ of 10 heetere-rneters. and 20 'hectare-rueter •• re abstracted from uie reservou tor irrigAtion and row, ... 'the l'-In evaporation and ra lo[3lJ l'e.:ord<\d during lhe 'same period at a nearby rneteoeologIcal statien uro 120m nnd oem rc:.peclively. The calibrated P'D f,rctol' i. u.7. The seepage-jess th,m the reservoir during this period ill h0~tlIrc'IJlel,t:(i5

D, 0.0

h. 1.0

c. 2.4

d. ·tll

I)~a mr Q.82 &' Q,BJ Hr. l:iven IWIOI>, SOlw lIte Ill'oblcnos ,"d choose co.reel answerS.

All average rainfall of 16cm occurs over • catchment during a period of 12 honrs with • uniform intensity. :rhe nnit hydmgrnph (tmit·depth lcm, duration ~ 6 houow)of the "",cltmenl rises lineerlv from 0 to30 ouill= in six. 110un<and ll,t4'1l I:~U!'ll~early from 30 to 0 eumecs in the ,nc.'Ci12 hours. a ind..x of the catchment is ~l111w" n, b. 0,501111lllBose 110." in the river il; l;OOWII to be 5 CUJII""~.

82 Peak di~ch.rg~ of the resulting dJI'CChun offhydrogrnpb shall be

a. 1S0 cuonOe

b. 225CumCC8
c. 230 cumecs
d. 360 cumees

83. Aren of the catchment in hectares j,
s, 91:20
b. 270
e, 9720
d. 2700()

84. The a.41ign speed for a Notional fliSIlIV.)' IS I()(jkmph. 11'the maximum penrnssible super elevation ı—0.10 and Lhe coeJ:tjdenl of lateral Jl~IJOn t~ 0.15. 'Ihb ruling minimum **radibll ofhorizonlal** curve **on tho** highway should be
;' 260m
b. 315m
c, **300m**
d. 4l()nl

~S. A traffiu stream in a particular direction of n two lane **road is** moving with **a** consrant ~Ilted of 50kmph. with an aver:1g~ he.dll"}- of2.52 seconds. The longirudinol distance between two consecutive vehicles **is**
L −1)In
b. ***3S'm***
c. 38m,
d. 42m

XG. In the II-I.rsh.lll11elhod or mix design. the coarse "!1cgreg.Idll. line. ll'l!'!1oregat"". filler **and bitumen. having** respective **8piJcifi(!** gravities of 2.62.2.72, 2,70 and),!l2 ate mixed in Ute ratio of 55.34.6. 4:8 and 5.6 per eeut; l'<lspi:<>liv~iyThe U,oorctie,,1 specific tlrav1ty ofthc mix would be
a, 2.36
b. 2.40
c. 2,44
d. 250

87. The plate. load ►◄ conducted will•• 75crn diameter plate on soil subgrade yielded • d~l1eetiOD of 2Smm under a stress of 800N/~III'. Thl: modulus of .JnsLiclly oftb. suhsrndesoiL in kN/cm⁻¹ is
,~].11.6
b. 1~.6
c. 1(,0.0
d. 18j.~

88. List-I 11"'0\\ ~ives • liSI Of Ilh,ysiCloi prOD'erties. IIE aggregates which should be determined to judge their suitability in mad cnnMrol!lion. List-Il gives 3 lilll (If 1.1~)t4turv lc&L'l-Which arc etmdlJctcd II> detem'iD~ these properties. Mutch List-1 with L,M·n and select th" correct ~as\\r1;1" li-Om IheeqUes given beluw fhe 1-'lS;
1.i~1·1
P. AardnC8.
Q. Porosity
It Toughness
S. Durability
Lin·ll
l. Water ad-sorption
2. Impact test
il. Sn~ncl",:.s 1c~1
4. AbrasiOn test

	P	cJ	R	S
•.		2	3	4
h.	~		2	3
c.	3	4	1	2
d.	2	3	4	1

If I. defines the L>pl.ce Transferm nf a function, L lsin (oOlll'ill be equal to
n. ,It.l_~2)
b. *ales>-.')*
c. ***W(•~-,.")***
d. **~I\~=-.')**

!III. The Fourier series expansion or D sYlll,n<:trieand e en function, r~)(}where I(x) ~ I + ('2"ht). -,,<;.,\~O IIIId = 1-*(2w7:).* I)SXEr.
will be
a: L(4~lTlnl)(1Hx'S/IJl')
b. *I(41G"'I)(1-ooS11J')*
c, $\frac{i}{m}(4_i rn'')(1-.in\ nil)$
d. L(4./ "'n')! 1.+ siu,m 1