CIVIL ENG NEERING

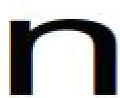
ONE MARKS QUESTIONS

1. The symmetry of stress tensor at a point in –ш body under equilibrium is obtained from
   a. conservation of mass
   b. force equllibrium equatlons
   c. mcmeru eqeilibnum equations
   d. conservation of energy

   The components 61'strain teusor at n point in the plane strain case Call be cbtained by measuring longitudinal main in following directions
   a along any tW0 arbitrary direcnons
   b. alcog any three arbitrary directions
   e. along two mutuwJ), onhogonal directions
   d. along any arbitrary duecuon

3. For a linear elasric frame. if stiffness matrix Is doubled with respect to the existing stlJIness mattix, lbe deflection of the resulung frame Will be
   a, twice the existing value
   b. half the existing value
   c. the same as exisung, value
   it Indeterminate value

4. Considering bC4l'l as axially rigid, the degr ee of Ireedcm of ιι plane fraille s-ωwτ below ιs



   a. ı)
   b ll
   c. 7
   it 6

5. 15,J343-1980 hmus the minlmum chnracieristic strength of prestressed concrete for post rensioned work and pretension work :ıs
   a 25MPa; 30l\1Pa respectively
   b. :!5MP4, 35MPa respectively
   c. 30MPa.. 35MPa respectively
   d. 30M Pa, 4t1l'vn'arespecl1vely

6 The p!|!1iCl factor of safel) (or concrete as per lS:456-2000 i$
   ıı. 1.50
   b_ LIS
   c. U.87
   d. 11.44(,'

7. The pemussible stress in axial tension <ı,ı In steel member on lhe net affective area of the section shall no! exceed If. is the yield stress)
   a. 0,80 f)
   b (1,75 Γ,
   c. 11:6u l',
   d. u,50 Γ,

   Rool time method Is used 10 determine
   ll. T. lime factor
   b. c., coefficrem ol' consolidatlon
   c. Ill. coefTicienJ of comp-sibil il),
   d, m.. coefficient of volume compressibility

!!. Negative s-ιo fridion in ₃ SOil ιs considered when the pile ιs constructed through a
   a. fill material
   b dense coarse sand
   c. over consolidated sll.lJ'clay
   d. dense fine-sand

I (l. There are IWO looriogs Testing on the ground surlce, One rooting i~square 01' dimension '8' The other is strip rooting of Width '.8'. Both of them are subjected to n loading intensity ot' q. -rile pressure intensity al an)' depth belo« the base of Ole looting along thecentre line would be
   a. equal ιn both foollligS
   b. large for square fooling nod small (or slrip tooting
   c. large for strip l'ooting and small for square footing
   d. more' for strip footing I1tshallow depth (SB 1 (lnd more for square fOOIlOg al large depth (>B)

11_ A cl~ytl)'~S'il has a maximum dry tlansilY of 1(j'kNfm' and epti mum moisture content of 12~.. A contractor during the

cQtlsU:UcQtJJI of core Of .an cJhII dam obtained, the dey de"sey 152kNJJl1' ®d. water coTit'enl il0/0. This roli§1:t11CI,on is ;cc"!'bl1,1e because

a, fite d'en.ity is Jess rrulr the maximum dry density andwater.contenl.is rul t;lry ~de."Foptimum

b. the compacuon <i(.\lsity is very low and watercontent is.less than 12%

c. the oompaetion is done. on the dry side of the optimum

it., both (he dry density-and ""ilt~r content of !he Conlpacted s,oil are wiihin the desirable limits

12 AI) (Pert tracer " IOjeclld continuously from a pointin an. unsteady flow field. Tlt" locus oflocattons ef all.fhe tracer particles. at an Instance of lime represents

a. Streamline

b, J11thllhe

c, Streamtnbe

d, Streakline

J 3 The riadul!J. of differentlal.manometor of a Venturimeter, placed at 'W' to ill" horizontal .is-llcm, If t.h~Venflirimeteris lurned to horizontal p(lsiu~ His .manometer reading will be

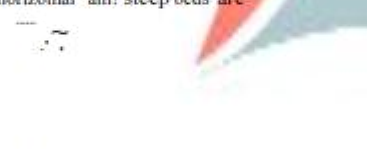
R. Zero

h. *Cill

c. 11 em

J. 11.,fi em

III. A horizontal bed channel is followed by a steep bed channel as shown in. the figure. Tlle !l'8dually·yaried profillS over the horizomal ani! steep beds are



a, R~,and Snxcsj)<1¢tively

b. R2!mel S!,respectiveiy

c- HJ and S. respectively

J. H-ann 5i respectlve.lY

15. Total KjeldahJ ll.ilr()geJlis n measure (If

a, total organic nitrogen

b. total organic and ammonia nitrogen

d. toll!]ammenianitregen

d. tobil inorganic and ammoniauitrogen

H), J Teu is equivalent to the OXlIO\lr produced by

a. 1n\glio[-cllLoroplatinata ion

b. 1 ms/lof platinum iOIL

c. l.mgll platinum in. fonn of chloroplatinate ion

d. 1 mg/l pfou;ancr,o)llot<1f\lntjn;1t1ljon

11 W aerobic ert";rl'll1llenlj, nitrosumonas. QQIIV~

a. NH.3 to 'N~

b. NO-- to l'1'03-

C. Jim .. l'0 N~O

d. Nth' 10 HNOa

1fl. Bulking sludge refers 10 having

a. F/M" 0.3Jd

b. 0.31dcs.FfM.: 0.6/d

c. FfM~zero

d. P.fM.> (l.tifd

19. WIletl the cutflow frQln a storage reservoir is uncontrolled ill! ill n free\y operating spillway, 1M of outflow IrydiogJ'aph occurs at

a. the·pOinl of intersection of'1he inflow and outflow .hydrographs

b. n POUt!: atrec the intersection of the inflow and outflow .hydrographs

c. the tail of'inflew hydrographs

d. a Pilmt, before the intersection of Ille inflow and outflow JlYdfO"grnplts

20. The intetl$'ty of rainfall and time Interval ofa,l:ypi."n1 storm are:

Tllli,: hllel'Val (mlhutes)	Intensi.lY of r.Jinrall (U1mlm.inule)
0·19	0,7
10,20	t.t
20·30	2~
30.·40	15
~0·50	1.2
:50-60	1.3
6()..7()	(l.!)
70·S.D	0.4

Tlle maximum intensity of rainfall for 20 minutes deration of ihe storm.is

a, .Unnn/minute

II. 1.f;5 mml1J1Ulll[;J

c.].~ ulltlflijhul"

d. 3_7 JTun/nlillute

11 On which of file canal systems. R.O KClIJle3y, cxecutivc-cagirieer in.the Pulljab Irrigation Department .made Jfis,

ob~ervul1ons lor proposing l,i8 theory 00 stable channel~'1

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

22. Whicb o↑ı of the ruuowu'J! <:I:luoliQ'" repn:senl. Lb~downstream proru" I)(Ogee spillway wilb vertical upstream thee') (~) are me coordinates 0f the poinl I)n the downsfrearu profile ,,IJb origin . I the crest. of the spillWAY and "Lt ",the: design head.

a. $L = 6'S(...!\_)'110$ $H;^{-}$ Hi
b. .1..._ 0.S(2:_ J'~| R, If
c. _'"-: 20(r~' H,
d. J' f(2.0 ..!... H;

23. The l~gll1- of summit CIUVs- on iIIlvo lane two w.3Y highway depends upon
a. allowable: rate of change of centrifugal .00el<':1'.1100
b. ooaffiolcOl of IJot"".I-fr!ction
c. ruq,iIl'ed stopping sigl\L dlsbnce
d. ,,,quir.il overtaking ~igll1 distance

24. Pruclhnll 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 cennecs II", hab't31.l0nH in plain areas of pepuletion more-than 500 persons by the YOM
a. 21)(15
b. 2()()7
c. 20 Itl
d. 2()I2

25. Llst-l conl.lo. some prn"cr1i~,of bitumen. List-Il. .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. Resislance to I)<)w
Q. Al)ility 10dernnn under h••d
R. :::;"f~ly

LI$t-ii
1. Ductility test
2. Penclralion te'Jl
3. FI.5h nnd fin: poin. test

Code~ :

	P	Q	R
a.	2	1	3
b.	2	3	1
c.	1	2	3
d.	1	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 biulllIC1l

Pa.31''Ole fil'llor 0f fP(XTY')-' rTfr wil! b.

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

28. Consider a nun-hoonogene()ll$ system of linear equ31.ioru; ""l't'L"'cutlnjJ uu b~\D.tic.Uy au over-determined system. Su<:l1" sys\"" will be
a. c(In~isl"n1hn\~ng~ unique solution
b. consistent ha\ilng many sotutions
c. ;no)(,,\$il;t..,1 h.vin8 ., uniqueSOlllliQn
d. in~(m~illtCnlhuvlol! 11;'.(llu,lon

29. Whioh nne of Ihe following is NOT true rur complex.uumber Zj aud Z.,?
a. Z,=<I,z. ZJ |Z,I'
b. 17.,- .t,l'S'lZd+lZ,1
c. lZ,- £;1" lZ,l-lz, l
d. lZ.. Z,l' 4-lz, -Z,l' =21z,l1 +2lz.l'

30. Which 01\" 0I' tl\(, f,llowing ~1.f<m1ents L~ Nt Jl' t~ue'l
a. 'file measure .,l' sllewpess i~dlUlei1dlml upon UlUallloultt of dJ~I)CC'lij~"
b. In. symmeuic dislributiou, the values of mean, mode and median afO the same
c. I" • posilively skewed distribution, oltan = median - ",otla.

d. ill IT negatively skewed distribution. mode > mean> median

TWO MARKS QUESTIONS

31 If principal stresses in a two-dimensional case are -10 MFa and 20 Mr.a respectively, then maxirnum shear sp'CSS81 the point Ij

a IOMPn

b, 15MP~

c. 20 MFa.

d. 30 MPa

32 flte bending moment diagram for a beam is given below"

•••••• - ••

TIle shear force. at sections aa, and bb' respectively lire of tl,ltl magnitude

a, 100 kN. 150 kN

b. zero, 100 l0'l1

c. 'Zero. .50'kN

d. l0<J!<N.:I 00 kN

33.. A circular shaft Shown in the figure is subjected to torsion Tal two points A and B. The torsional rigidity of portions CA and SD is GJ, aud that of ponion AS is G}j. The r()18tionS'of shaft Pl poirus A and 'B are a, and a,. The rotation a, is

J.. Cf a t

CAB ' D

L f L L L

TI.

0.1, +G/,

b. 7T.

GJ,

7T.

OJ,

<I. TL

GJi-G.J~

Q. Moment distribution method

R.. MOll00 of three momerus

S, Ca.~ligli~no'sseC()nd theorem

List-II

1 Force method

2. Displacement method

Codes'

	P	Q	li.	S
a.	1			2
b	I		2	2.
~	2	2		1
d.	2		2	1

35. All member (If !1e frame shown below have the same flexural rigidity E'I and length L. If n moment M is applied nt joint B. the rotation of the joint is

a. l:!!:_ 12EI

b. M. IIEI

c. ML SIY'

d. ML 7F.!

Dar» rOf Q. 36 & Q.37 are given below. Solve, the problems and cheese the correct answers.

A truss is shown -hi the figure. Members are of equal cross section A and same modul us of elasticity E, fl vertical force P 'is applied ar poinl C.

I'

C

2

34 Malch the following:

Llst-l

P SI9pe deflectior; method

36, Force ill dIe member AB 0f the truss iS

a, ,'/../2

b 1'1../3

c. I'II

d. P

J7 Oeflecrion or the poim C Is

a. (2J2+I)PL / I EA

b. .fiPL / lvl

e. (2..E+1)~

d (J2TI)~

38 A rectangular column section of 25Qmni x 400mm Is reinforced will! 1ke sleet bars of grade Pe-S()O, each of 20mm diameters, Concrete miN is M3Q, Alcial load on ~le col uum section ,vith miuimum eccentricity as per 1'8:45(;·2000 using linrit state-method ~'an be applied upio

a. 1107.37

b \80S,30

c 1806.40

d, 190J.7

39. A concrete beam 61' rectangular cross section of 200mm " 400mm is prestressed <vhh 11force 40ukN al eccentricity 100mm. l'he D;lllximunl compressive Stress in the concrete is

a. .I1.5'N/mm'

b. 7.5N!nuu'

c S.ON/nun'

d ~,5N/",m'

4() The flexural strength of M 3(I concrete as per 1S:456·2000 IS

a.),S3 MPa

b 5,~7MI'Q

c. 21,23 MPa

d J().O Ml'a

41 'In a random sampling procedure-for cube strengtb Of concrete. one sample conslsts oi X number of .specimens, These' specimens are tested, at 28 days and average strength of these X specimens is considered as lest 'result of lIle sample, provided Ihe individual variation in the strength of specimens is,not more than ± Y per cern of the average strength, The values uf X and V as per 1S:456·2000 are

a. 4 and 10 respectively

b, 3 and 10 respectively

c. 4 and 15 respectively

d. 3 and 15 respectively

Dllt" for Q.42 & Q,43' are given helew. Solve. the pro hi ems lind choose correct nnswers, Assume straight line instead of parabola for stress-strain curve of concrete as gi ven below and partial factor of safety as LO

JI/J °1.

0.1102 '0.0035

Ihlrt

A rectangular under-reinforced concrete section Qr 3{l00l0i Width and 5000111effective depth is reinforced with:1 bars of grade Fe"" 15, each of 1Clnundiameter Concrete mix IsM20,

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

a. 76nim

b. Slmm

c. 87mm

d. LOOnun

43. The depth of the neutral axis obtained as per 15:4S6-2000 differs from fhc.deptTl of neutral axis obtained ill Q.12 by

a. lSmm

b. 10mm

c. 25mn!

d. 32mm

44 An unsii ffened web t-seciion is l'libiic3ICd from a t0111" thtck plate by lill-f weldi ns as shown in the tlgure. If yield stress of steel is 250MPa, rhc maximum shear load that seotion-can lakeis

200mm

a. 7$OkN

b. 350 kN'

c. J37.5 kN

d ,00 kl'J

45. A tJllol-\ve]ded joint of (imlli size is shQIVO lll tile figure fbl!., welded surfaces mee HL 60-90 degree and permissible stress In the

mlet weld is 108 MFa_ The safe load thal ean be transmlued by tnejoim is

100mm

12.. f fL

a. 162,7 kN
ll, 151,6k'N
c. 113.4 "N
d. 1095kN

46. Whlch one of'the followi ng is NOT correct for steel sections as per lS (SO() 19841
a. The maximum bending stress in rensien or In compression in extreme fibre calculated on the effective section of a beam shall DOt exceed 0,66 l:,.
b The bearing sires:! ill nuty pari of" n beam when calculated on the net area shall not exceed 0.75,«.
a. TIle direct stress in compression oo the gross sectional area: of axially loaded compression member shall not exceed 0,6 ~..
d. None of the.above.

47 A cantilever beam of 1et1.:,~h width b 'and depth d is loaded with a concentrated vertical load at the tip. If yieldlng starts at a lo~d I'. the collapse. load shlll Be
a. 2. 0'"
b. I ~ P
c. 1.2 P
d. P

48. tn s constant bead permeameter with cross section area of 10cm'~, when the flow was lak'ing-place under a hvdrllulic gradient of 0.5_(he amount of water collected in 611 seconds is 600cc. The pcnu~bililY of the 5011 is
a 0,002 canis
b. 0,02 COlt:;
c. 0.2 *cmls*
d 2,0 *em/s*

49 Two observation wells penetrated into a confined aquifer .and located 1,5k}il apart in lite direction of Dow, i"dica.re head 0f 4~m and 20)11 If the coefficient of permeability of tho aquifec is 30m/day and porosity Is 0..25. the' limo of travel ofr .an inert tracer trom onewelllo another is
a, ~16 7 days
b. 500 day-~
c. 7,0 day9
d, 3000 days

50, Assuming- that .. river bed level does not change and the depth of Ivater in river "las tOm, 1S 111 and S' ru duciug the months of feb",.ry, Juty and' December respectively of a particular ycnr. The average bulk denslty of the, soil rs 2()l>N/m~ The densi ty of water ɜ— l!jkN/ro~ The effccliv.c Stress or ll depth of 10m below the river bed durins these months would be
a. 300 *kN/ru'* iu February, ~50 kNlm' July and]201c,NlmliItDe~"rllbllr
b. 100 kN/nll in February. 100 kN/lll~ July and 100 kN/m' in December
c. 200 *kJN/m'* tn February. 250 kNlm; JulY.!Ulld 180 .kNlm^2 fn December
d, 300 ki'l/m^1 In February, 350 k'Nlm' July *aM* 280 kN/n? in December

5L For a triaxial shear test conducted on a. sand specimen at a confining pressure of 100 kN/m› under drained cQnditiOl.15. resulted ill a deviator sums (o1 - (l)) at, fa:lure ol:100kNlm~. Tbe angle of sheari ng resistance oflhe ~ollwould be
a. 18.4.."
b. 19.47"
c. 2636"
d. 30"

52, A am higJ retaining wall is supporting a saturated send [saturated ellle to capillarY action) of bulk. density 18 kN/m^1 and angle of Sl,canJ1l! resislance.l0· TIle change ill magnitude of active earth pressure at the base due to rise in ground water table from the bose 0f the Jootlng to the ground surface.shall (r. = i0 kN/m^3)
a, increase by 20 *kN/m'*
b. decrease by 20 "N/",' c.
increase by 30 kNlm~
d. decrease by 30 kNllll?

53 For two infinite sIllPC> (one in 0'1 condition and other in submerged condition) in a sand deposit having the angle of shearing resistance *30-*, fa,Clor of safety was determined as 1 5 (for both slopes), The slope angles would have been
a. 21 05" for dry slope and 21 05" for submerged slope

b. *19Ar* Ibr UI) Sl6pO and 18"'10' ror submerged slope

... 18A IUI uJ) ~IUI'" und 21.0S tUI sut""~r~ed J<J!pe

d, 22,6 Ihr dry slope and L9.41' f\lr sull.Il"'l'god slope

I\ strip' tbot"!@. (8ru wide) is designed for n tullli soutemll,\I' of 40mlh. 111e IIafc bearing cnrncity (shear] was 150kNlm~ and sn~c aUuwnble soil P""SIli1: IVA.' 1OQkNlI1L. Due li'l unportuuce ef the .111l<l[ore, now 1111f0'111111;I" I~ tie red~Signed for lolnl Sdlll~"Illelllllf25mOl. The new width ULf U10 rooting will 110

a. Son
b. Sm
c. 12m
d. 12,8 m

55. Dilling, Ihe subsurface IDvest!SUII(II1S tor design 0l' toundations; o slandard penetrution lost WIIS conducted III -l.5m below the ground snrtucc. The record of number "fblows i~givel1 belew:

Ptutl,'Uilutl depth (cm)	Number "r~tu....
o 7.5	3
7.5 15	3
15-22.5	IS
22.5 30	6
3\1-315	8
37.5-45	7

ASSuming rhe water table ut ground level, soll as tioe sand lind correction lactor for overburden o~ 1.0. the cnrrected "N' vrilu~ tor the scil would.be

a. IR
b. 10
c. 21
d. 33

56. A soil muss contnins 4Q% -SlIlvel, 5\)% SIlnd and 11)% silt. This ~oil can be clllssific,d as

a. 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()cl1ii!lonl ofl1nilonnily greater thnn 60.
d. gravelly silty stlod and Its coefllcieut o1 unilormity cMlIOl be determined,

57 J\ saturated soil mass has II lolal dens;", 22k'!li/m~ and *n* WIll~re"ntu"t (ir 1c)%. The hulk density and dry den.it~ ofthis soil nre

a. 12 kN{m" & 20 kN.m} respectively
b. 22 kNlp,J & 20 kN,m} respectively
c. 19.8 kN/,"I &. 19.~ ltl'l/ml respectively
d. *23.2kN/m~* &. 19.&kN/m~ respectively

58. A.~tNn", function i~given by:

'I' : 2.,' *y*+ tx+ I).,'

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

a. OAllnil~
b. ,,!unhs
c. 4 units
d. 5 units

59. The ci.,.,.flllribn °1" around a circle of "udil.s 1 holts lor Ih. velocity 'field u~2.,,-Jy and *v* --2)' is

a. - 6Jr units
b. - 12n units
c. -1811 uniu
d. -241< w1ilS

60. A 1l1n.kund 0 d-f1dc\()1 ur~ placed o~ 11 triction.less [rLIiley The lank i""lI~s water Jet (mass density .0f wut9r 1()()Ol.glm». which strikes the d~I1""t'lr and 111m. I~ ~5C~I' 1J,~ velocity of jet Icaving the deflectnr IN "'ml~ Dud discharge i. O.j ".jis, the force recorded by the spring will be

a. tOON
b. 100 J2 "
c. 10() n
d. 200 *J'iN*

61. Cross-section- of an objecl ('hnv'ng same 8OOlil)lI IIQrmul 111 rhe ptlf,>'l' submerged into u lluid OQII~ls1sro .'<luolU of ~idl)S,2m :1Ifd triangle Its .shown In the JiS"" (1,. III!jeoll5' hinged 01 poi III I' that is one meter below tho fluid Jill" surface. If the Obj~L ill- ~ k~plin the positiou ns ~h'T\~I In the fis.~. the Ynh~ or -x' should be

a. -,5
b. 4,[3
c. 4m
d. 8In

62 CriliQal depUI al d ~""liO'l of a ~<ltJlIleu1ltr ehnnne] i~1.5m, The specific energy 01 lh"l aeerion is

n, 0.75111
b. 1.Om
c 1.5111
d. Wm

113. A partially open sluice gal': discharges, wa er into n rectangular "honn~11110 tail water depth in the chaMel i. 3m and Froude number is /12' If ~ free hydraulio JIl11TPs III be fumecl'llt dewnsireem of the sluice gate alter the venn ermtract of the Jd conatlg OUI "OIn U,e sluice- yaw. uie sluice gale ~penin!l sbould be (lXlelliot.'Ut of conti ac boll Co =u.9),

n. 1)301
b. 0.401
c. 0.6901
d, 0.901

(\'4. A lrinngular irrigntion lined C11nal carrie.. a <iis<lJlMgc "f2S01Jj~ "I bed slope 1/6000 II' tile side slopes of lfie canal aN] : 1 and Nfunning"s coefficient is 0.0]8. the ccnlml depth of'Oow i~equal to

a. ~1)8m
b. 3.6201
c. 4.91m
d. 1,a1m

65. II' iomQto juice i~having n pH of ~. I. [he hydrogen ion concentration "ill he

a. 10.94· 10" mollL
b. 9,94 Ill" mol11.
c. 8.94 x 10 'moliL
d, 7.94 10"' mo til.

66. L.lsl-1 ccnrains some j1fUpertic. of Wal~T/Wasl" water and Li~I-n: "<mtAins lisl of some lcijls 00 wated w ... te water. Match Li.sl-1 wilh L.il.l'-Unod select the correct

,mswer using lll~ codes given below the lists:

Lisl-l

P. Su.'p(;nd"d SOlid. concentration
Q. M<:t!lboli"'llrbiode8rnda~lc organics
H. Bacterial cencealration
S. Coagulanl desc

LIs[-II

1. BOO
2. MPN
3. Jar test
4. "UJ11idity

Code~:

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

67. Msrch List-l wilh LiM-[J 8"d select the ooiTo"i answer u~inS the codes gi"" below the lists :

List-I

P. Thiokenm!l. "f slud&e by ahem;",' oxidation
Q. St~bil.iz.ti(lllllf sludg" o. chemical
R. c'udifionillg of'aludge
S. Redu"lion 0[5111d80 f()'UIlion Of Sl·.vly

List-n

1. Decrease. in volume of
2. Scpanllion of WIltlT by hellt
3. DigcMion or sludge
4. Sep.rntiop of water by

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

6~. A circa l•• primM'y clarili er processeS on avon,se flow or 5005111³/d .'1' municipal waste lVater. Th... overflow l'l'l~ i. 35m³/m²/d.The- diameter of ol~ri(1er sbnll be

a. lO.Sln
b. Il.5m
c. 125m
d. 1,'.5,"

6<) Maldl List-I with Lrst-Il and ..,IGOt tlto correct answer using the codes gillen below the lisL~:

Lisl-I

I'. Release valve

Q, Check valve

it Galẹ valve

S. PilOt vdl"~

Ltsl-JJ

1. Reduce high inlet pressure to lower outlet pressure
2. L,uull the il"w uf water In ~{tl!llo direcuon
3. Remove air hom the pipeline
4. Starring lhẹ 11tlIV of Willer ill the pipet inc.

Codes :

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

70 10 u certain siuatlon waste water tIiS<lhQ--edinto u river mixes willi Ule river wAler Justantuneously nnd completely. Fulluwing is the dIJ1Ilavailable

Waste water [.)0 - 2.()O ms/l Discharge ruler 1.10 m³/s

River woter DO – 8.Jmgtl Fh)w ru~ ~.70m)/s Temperarnre - '20"C

Iwtlli.! ttuuttil of DO in 111' mixture of waste and river shall be

a. 5.3mgll
b. (l.5lllg/l
c. 7.611lgil
d. &.4111gd

Data for Q,71 & Q.72 ne'e !til'en 1"10,... Soh. the probl.l1LS and choosecorrect answers.

1\ city is going t" insttll tho rapid sand lifter .11or the sedimentation tanks.

Usc illc lollllving data,

Deliigl1lC1ndint'role 10the filter - 2O()",1(m~d

Design Iluw role - 0.5 m)/~

Surface area per liher box 50m~

71 Tho surface urea required for the rapid sand filler will be

a. 110n1²
b. 115m~
c. 11liml
d. 218m²

72. The number of'tilrers required shall be

a. _1
b. 4
c. li
d. 8

73. The ouhumble commanded urea lor • distri "UIJJ" IS 2 ' 10³ In¹ The 'itll'~llsi!v (If irrigation lOr U crup is 40· •. It' J(ur \~"1Or depth and kor period lllr the crop rue L40m and " weeks, respectively, the Ieak demand discharge.is

a. 2.6: m³ s
b. '1.6'3 m³/s
c. 8,5~m'ls
d. lUS mJ·s

*14. Uplift I'l'CS--llrdll points E and D (figure A) of n strnight hOri7,0n111 floor of IIClJligi-l~ lhickitess with a ~hel>1 IiiI.: HI d()wnsl"QIII end ure ZM~ nud 20~". respectively If !l,e sheet plle rs al upslr.lam end of the tloor (fig II""· 11). the uplifi' P.,".SII"" nl pdi nts I)I and C'I ore

a. dR% '!lld 6()0:' t.!,~poctiv"I)'
b. 80" "nd72~" respectlvety
c. 8~. and "10% respectively
d. 1(10"~and zero respectively

75 A luuuthing "prun is to he deslgued al downstream l)l' u weir rot discharse int<losh)' of 65 m³/.ym. For the design Of [aunching "pron" the scour deplb is tnken two limes of Lace} scour deprh, The sill factor of the bed mol.rial. IS unity. If the loll water depth is 4.4m. the leogth 0.l' launchlng apron ill ihe launched position Is

a. J5-m
b. 'h7 m
c. 5m
d. 5.[5111

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

J\ four hour unit hydrograph of ɹ catchment ,I~ triangular in shape ""Ih base of SO hours. The ,te. ofthe c.(dllnent ,i~?2tlkm". 111d base Flow and ~ indClt Arc 30m-'i. Md I mml1~resl_livel)'. A 6101111,)(,4 em oc:cun; uniformlY In 4hours over lhe .:':.tchmtnL

76. l'he peak discharge of four hour unil hytlJ'OgJ'lIplls

n. 4() roll"
b. 50 tn"s
c. 60 m-lls
d. 70 mJ/~

77. The peek fiQC)dd;';uharjle due ... Inrm i~

a. 210m}fs
h. 230m!15
e. 2(oOm³/s
II. '72OIII²'S

78. P.)l' ~ .25cm ~,ick cement concrete pavement, ~11~lysi. of stresses gives U,. followi"!! values:

Wheel load stress due to comer loading " .. , ... 30l;g/l!m'
WhC<l1 Imld strC$S due III cld!!" 103din~ , 3 2\:.g(cllf'
Wnr.ping stress al comer region dur.ing suJumer ~4._"",_, ·.9kgJcm~
W.rping stress .1 corner region during winter 7kWQJJ1~
",f.rplog stress .1 edge l-egion during, summer 8k.gfcru:
·W.rpin.S slreSS .1 edge region duritlS winl"r 6k.g.cnl'
-Frictional stress' dUliltg summer ,.., ,.......... 5kglcm"
Fricj;I)I1,1 ~ltess during winter .... .4kglcm~

The O'O~1 ~ritiC'.l $Ire;;~ value rOt tbJ~ pOVomiJ#1 is

n. 4Ukg/cm!
b. 42kglcm'
c, 41lks/cm'
d. 45k1!/cm'

79. I'he Yol1l1willgbservations were made o(lin ~-()-Illad survey '10 • I'1)nd:

~tlp load' (~	Repctiti<)11S pc... dDy
3S43	8(IO
75-85	~O(1

Wolll

TIle itandard axle-load j& 80kN. P.quivalenl daily numbers ofrepetltl'otls fer II." standard axle-load ore

D. 451)
b. 4&1
c. 800
d. 1200

SO. A trlUCiport company' operates • schedubid dolly 11'1101; service between city I~and city Q. One-way Journey tltn~ between Ihesol two cities lil 85. hours. A minimum layover tim" cd' 5 bo"n; is to be provided ·.t each city. How mony trucks are required 10 provide IIIis."rvi~c~

'l. +
b. ()
e. 1
d. 8

8]. A single. llUIeunidir""lionol blghway hilS. d•• ign speed of u;kmph. The perception-brake-reaction lime. of drivers i< 2.5 seconds ~ud the IIVCDII.0 lengLb of vehicles is SUL The coefficient of longitudinal fiction of (he paVern":" i. (l.11. '!'he capacity of ntis 'road in terms IIF "Vehic.tes pe.l.hour p.:r lane' is

a. 1440
b. 750
c. 710
d. 6~)

82. A l'0;,.1 i~having " horizonlal curve of 41K'm mdiu. 1111 \\'~icb ₀ 'Supc:r.. eJe"~tiQn l.f ().(17 is provid~d. The coef'li.cienl Of lal~~al .lli~tion mobilized on the curve- wl1cn ",'chicle is travellIng a; 100 kmph is

a. ().OJ
b. O.1~
c. ().IS
d. 11.4-

S~. rlln~lder the: system (If equntions' Av,.•, "O"U = %,,0' .where, .. IS ~. sealer, tel 0.'1,) be an eigen-pair or an eigen value and ils couespouding oig.,;n vector for real In.lrlx A. Let I be • (n nl ruul matrix. Which one of the following statement i~ 1'101' Conlact 7

•. For. homogeneous n n Ilystem of lineal' equations. (A-)j)x = ()havin,g • noutrivial 5010(;011. Lbo'rank of IA-"J) Isless than n.

b. Fat malrix A"" m being o posinve integer, (l·1^m•X t"'l will be the eigen-p"ir l~r~U

c. II AT = A-I. then |A| = 1 lor all i.

II> ff AT =A. then i.1 is (e.1 for all i.

84-. Tnmslorm.li"n to linear form h~ .11bStillting v ~ yHt ul'tbcequ.liou

tty
iil pill>' q(t) y': n > 0

will be

ll. tI, dt ı (1- nlpv =(1- –)q

b. dv dl I (J-II)pv-(1~II)<1

•,_dl + (I~It)Jlv= (l-11)I1

II. dll –ı +(1"- n)pv= (I+n)4

~5. A fail engine accelerates Irom it ~tatio"nr'y I>osllion tbr & seconds .ud tl'lIveh ~ distance of 280m. Ac.cordill.!! 10 d,e Mean Value TIlcONm. (he speedometer .ft a certain' lime during acceleration m'nsl read exactly

a. 0 kmlJL

b. 8 km

c. 7S.km!h

d. 126 kmlh

86. The ,,'1)1utiol) of dl), <l-l 12 dl' dx 17)"',0' ..\{Ç'–L dY(X) dx 4 =0

iu the nu~c 0 X "!! 4 is e "yy,"t' by

a, e. (c'O~4.,,!sin.l..)

b. .' (cos4.\' ~.in ·l·x)

w. .,· , C,,~."'-±Nin.~)

d. e....(cos~ ... ~ltin4:t')

87. Value of the iDtegralifl(,tf<Jv - í tlT), 'l here, c is the sqU3l'e cut from the fI.l'st (Jlladranl hy the linesx - 1 and y = 1 wlJJ be, (Use Green's theorem to change the line inlcgrlrl into double ii.tegr.l)

a. $\frac{1}{2}$

b. 1

c. $\frac{3}{2}$

d. $\frac{5}{3}$

88. Consider 1ike1yapplicability (If Duchy'. lntegrol Theorem 10evaluate the following i:niegroJ counterclockwise around the unit circle c. I= 0l see :uz • z being • c.oiupic.- variable, 111,0value of I will 00

a. r 0.! singularities gel ~

b. I -- 0 ~[flsul4ril[e!! SOL – I.: 2 1~')mn =0.1. i . . . }. . . .

c. I – ni2 : singularities s~t (:tllir;" =0.J.2 ....",.)

d. none or.bove

n.t.Il fnr Q.119 & Q.90 Ute ginn ""I uw. S"rV~ Ih~ lrllbl.OIs 3n\f r.hlltlS~ cnneci answer, Give" ~ we Wl,,, tn calculare its reciprocal value l1a by U.ilg Newton Raphson Metl\Qd for t(~)=0

8II. The Newlun Ral'hsnn olgorid.m for the function will be

a. X,L"=-2l(KC>.l "'t I

b. :L · =c<"2"t ;

c. -'7-, = 1,~,,a :~/

d. ¨01= 'r-Z^xJr

90. Fur a = 7 and starting. wilh x0 = ().2. the fir.t two iterations will be

a. 0~11_0.J299

b. Q.U 0.1.392

c. 0.12, O.JA 16

d. 0.13,0..1428