CIVIL. ENGINEER NG

ONE MARKS QUESTIONS

1. Mohr's circle for the stare of stress-defined by [3U (I 3t1 MPa is a errcte with
   a. center at ((1,0) and radius 30 MI'a
   b. center at «J,I)) and radius (0() MPn
   c. center at (:lO,H) and ra(liu.S 3U MPII
   d. center 01 (30,1)) and zero radius

2. A long .shalt of diameter IS subjected 10 twisnng moment Tal Its ·ends. The maxi mum normal stress 'acting at ,IS cross-section is equal 10
   iL zero
   b. 16T / nrcF
   c. 327' / I;tt—
   d MT / IT4'

3. The iJuc~llng load P — 1'0 fQf the cotumn AB in ti~ure, *as* K,. approaches infl nll~. becomes $a - \frac{Ji'EI}{7:}$

Where o: rsequnl to
   a. 025
   b. 1.00
   c. 2\05-
   <I 4.0()

If the characserisuc strength of concrete f'.~ is defined as the strength below which 11.01 more than *SOli!.* of the test results .are expected 10 fall. the expression fer I;"" ill terms of mean strength I,, and standard deviauon S would be
   a. f'; · **0.16458**
   b. f';-Lf>45S
   c. fn
   d. f_m _ L645S

5 Which or Ihe following statement is NOT true in the context of capiUruy pressure In >'0U:?
   a. 'Water is under tension in capillary zone
   b, Pore water pressure *is* negative to capillary zone
   c. Effective stress Increases due to capillary zone
   a C~pill:lcy pressure is more In coarse grained soils

c. For steady now 10" lully pe.n0ltQling well in a confined aquifer, the drawdowns at radial distances of r1 and r~from the well have been measured *as* s, and So respectively. for a pumping rate of Q. The iransmrsslvuy of the aqw fer is equal to

a

b. $\frac{Q\,Cn(ro\text{-}r,))}{2\pi\quad (8,-.1',)}$

c. $\frac{-0(1^{mm}}{2n}$

d $\sim ITV\ n\ If.$ $-m(\sim)$

7. The runge 01' void ratio between Which quick sand condition .oCCUTS 'in cohesionless gmnulat soil deposits is
   a. 11.4-0,5
   b. II.6-V.7
   c. f).~ cbl
   d. UJ-J,.1

II. To provide safel~' lISainsl pipllig failure, witb a factor of'sqJety of 5, what should be the maximum permissible exit gradient for-soil with specific gravity of *2.S* and porosil), of 0.351

a 0.156
b. 0,1<'7
c. () HiS
d. (1,213

0_ Figure. given below shows 3 smooth vertical gnwhy relainmg wall WIth cohesionless soil backfill :h.aving an angle. of imemal Inction ◦. III the graphical representation of Rankmes tlclive earth pressure for the retaining wall shown in figure, length OP represents

o

a. verucal siressat the base
b. vertical stress 61 a helght HlJ from the base
c. Intenl(earth pressure at the base
d lateral eruih pressure at o 'height *HI)* from the base

A syruhetic s;<mplt! of wareeis prep3J'ecl by adding lOIL'1S K;toJioile (a ela), nnneral). 2()()mg glucose, I(,Kmg NaC I, I~(jmg. NI.gSQ" nod 111rng C~Cll I" 1 lill"' OI pure water The concentrations of 10101 soUds CfS') and fixed dissoll ed sollds (FOS) respectively in the- soluuon ;l) ,,,gll ale equal to

a 699 and 59~
b 51)<) and J9!l
e (j9'hmd 11)<1
d.. 69'J and 399

II "0 determine the 13005 of D was te water sample. 5.. I() and 50ml aliquots of the waste water were dil\11~(1to 300rul nod

Ih~'STll,e resu I|S were as ◦,j 0\YS.

S~"I().	Wuste-water volume 011	Initial OO. mgll	DO after *S* days. mgf(
2.	IJ	9J	4A
3.	50	*8,.1*	U'U

Based on the data. the average Bo.O, oj the waste water is IIIIual IIJ

I). 1.>9;5 *mg/l*
b 126.5*mg/l*
c. *10').8 mgtl*
d. 72.'2 *mg/l*

1.2 The cumulative noise. power distribution curve BI a certain Iccaiion is gl VIIII below.

The value of L,"1s equal ro

a. 91ldBA
b, 'SOdBA
c. 7ltdBi\
d. GOdBA

13. In case of govermng cquailons for calculanng wheel loud Stresses uSIing Westergaard's approach. the Ibllo\\~n!1 statements are made:

I Load stresses ate rnverselj p'ropOrtionlli to wheel.load,

11 M()duills of subgrade rene.liM ilo usefut for luad' stress calculation

a Both.statements are TRUE
h. lis 'fRUE and Ilis rALfsE
c. Bolh statements arc F" lSE
d. 1is FALSE and II is'l'RUE

Name the Imlllo SIIIV~ data whfell is ptoued bv means of'Desire tines,

a Accideru
b Classifled volume
c. OOglil and Destinauon
15 d. Speed and Del~~

If aggfllgJtte shc of SIt-ill mm IS 10 be rested for finding (Jill Ihe p<>",on of elongated aggreg!lles using leugllI guuge. Ihe slor hmgllI ol-,be g3\lge. s!o<>uldie

a. 81 mm
b, .fS nun

16. d. iJ(j mm

The ncccssarv nod sufficient condition for a surface to Iw called as a 'free- surface' IS

h. tensile stress acling on it must De zero
c. shear stress acting on II must be zero
d. no p01n1 on ,t should be under any
17 stress

A channel with :1 nuld slope IS followed by a borizontul channel 311Uthem by a sleep channel. What gradually vnried Ilo» profiles will occur?

M"H.S.

b. M'1. liz. S:

c. M"Hl.S,

d. M,. Hl.S,

18. ttl.uti!}· tIN FALSE S~.I~".e"l lrom the following. Th~ specific speed of lhe pump [nereases with

a, increase ill shaft ~'11d

h. increase in discharge

c. iJO::<:l'encein gravitaticnal acc.elerillitld

d. incrdl.i~ in head

I') S"IIllioll for IJ,e Systelll defined by rho set or l'CIII~.~Qns1' - 3. -\!; 2r z - 2 uud 3~' i ~v=j is

a. .f x 0: v ~ J::-=<j 3

h. ,.=0: ,,=- 1/2 ,,=2

c. .'(:l¯r:-;;:-= 1/2 2

d. Nou-esistem

'0 'fl- dit'erenna l cqlJatiOll UI'/dx = 02:y' IS [0 be cSiJlved using the backward (implicit) li,jl"r'. method wittl the boundary condition y ~ I at x - 0 and ,with n step Ji7:c "l' l, Whal """lid be the ",d". etv ut ~ l',

a, 1.33

b. l.((!

a, 2,00

d. 2.33

two MARKS QUESTIONS

31 A thin-walled lll"g C)Il"dn~al liln~ of inside rod;l1Sr is snbjeGred simuhnneously ro intcmal gll,'i pressure II and axial compressiec force F nl its ends. In order 1o produce 'pure shear" state of SINSSit the wall oflhe cylinder. F should be cqnnl to

a. npr'

b. 2.nl'r

c. 311Jlr'

d. 4npr

22, Consid<ltha beam AB ~h()wtl ii the figure below. Part AC lll' the beam is ri.sid while P(lfl CB hos the. f1e~VTtl rigidity l';£ (de)1Lit) lha ourr.!tl O()111binulicIll III' da-cli(n at end Band bendin(menent at end A. nlspeolil'~ly

j &11

C B

"L L

a, PI}13P.1.7PI ,

b. PI ';.lEl, 1'1.

c. 8PL'!.!BI.2PL

d. 8I'VIJE1. PL

IJ. A ~il1ply supported 00.111, All hus ihe bending moment diagram as. shown in the tbllowing Ilgure;

'1t~8

L L L L

Th" Ileum is possibly under llia aetlou of following toads

0" Couples or Mate 0",1 2M al 0

b. Couples <if 2M III C Qnd M "I f)

c, C()ncentTdteci toads (If MIL til C and 2M'L all)

d. Concentraled. load or MIL 01 C and couple ot'2M . l D

24. A beam \r1lb the cross-seetlon given below- is subjected 10 a positive bending moment (causing compression at tho 101') of 16kN"m acting around the horizomat axis. The tensile force acting on the hatched area f1f the cross-section i.

a. zero

b. 5.IJkN

c. 8.9kN

d. 17.8kN

25. If u beam Hl- 1l:":-Inngulur cross .seOhuli is subjected lu U venicsl, sh".,. 1'0"" V_ 0,0 shear torce carried b~ lh~ upper one-third of the cross-seciion is

u, ton'

b. 7V'27

c. 8V!27

d. VI3

26. For Ule sectlon shown below, second 1110m6nl or the area about un n~is dill dismllCe above tht bOIlO'll ufthc area Is

8 bd[1]/48
b. bd)1I2
c, 7bd"/48
II bd)/3

27. l-section of n beam is Iormed by gluing wooden plunks as shown in the figure below, If Ihi~ beam lrl1n~miL~ II constant vertical ~"I1i:anforce of 3000 N. the gllit al any of the lour joints wil] he subjected 10 a sllenr force (in kN per '!1etur length) 1)\"

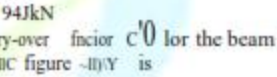
a, 3.0
b. 4.0
c. ~.O
d. 10.7

Data roO'Q.28 & Q.29 are given betow. otve the problems and choose the correct answers.
elm.ider D propped eamllever beam ABC under rwo loads ()f magnitude Proch as sh,)wn In the til!ur~ hel()\•. flexural rigidity tll"lbt beam is !:it

2~. The rellcliOn Ill C i~
a. 91'al161. (upwards]
h. 91'11/161(downwards)
C. 9Plll81. (upwards)
d. 9PalRl.. (downwards)

29. The reunion Ill D is
:t. SPL;t!16EJ (clockwise)
b. 5PLal16F.T (anlicl"c~ll'iS~)
c. 59PLull6EJ tclockwise!
d. 59PLa6ELlanhdockwJse)

30 Vertical re3Cli(Ul developed al B in uie [rtlmll below due III the applied loud 0f IO()kN (wflh I~O,OOOJftmt cress-sectional area lind 3.12~ • 10'ml11' momenr of inertia lilr Ilmh members) is



8. 5~C)kN b.
JO.2kN c.
66.3kN
d, 94JkN

31 Curry-over fncior C'0 lor the beam shown ill tllC figure ~ll)\Y is

III 1/4
b. 1/2
c. -Tll
d. I

32. Consider tile beam AI3c:.D Md the Ill1luence 'line as shown below, The Influence line pertains 10

a. reaction at A. RA
h shear force at 13. V 6
c. shear force 011 the lefl uf e, V,.
d shear force on th~ nghl ur C, v:

33 AsslliUing concrete below Ihe neutrul axis III be cracked, the shear stress across Ihe depth of a singly-n:inll,roc(1 rccillngulnr beam section

a. Increases rnrabolicall:r to the neutral *h~is* nod Ihen drops sudUcnly to 1.«0 vntue,

b. increases paj'Qb6Ii~lIy to du: neutral a:o<iSand then remains constant over the- Ttrn,tllnin8 depth.

c. increases linoady 10 Ihe ntutral Axis ~nd then I'eltInOI$an~.nt up to the tensifro steel,

d. increases parablllico.lIy to the neutml ll.'ts and then remains constnnt Up to the tension .steel.

34 As per ~S'45G-200(). consider the rOllr)\\~ngstatements;

1. 11,e modular rutin considered In lh" working slies_ motlwd delllmds Oil dte; type of steel used.

1. There I. an upper limjl od the nominal ~h~ar .h-ess In beams Ieven lVith shear "l:lnfofC<:menlJ due to the possibility <lf lJ11.Lhlng of concrete In dingonlll compression

'1 A ~ecl.nf!lililr .Iab whose leogth l~ ~q.1J.11 10 Its width runy nOl be • two-way slnb for some support conditicns.

lhe TRUll statements: are

a. l and 2
b. 2 and 3
n. I nod"
d. L2nod 3

|S. Consider the f(lll.m log state",c.,(.~

1. 'nre widllHlHhiclU1CS' ratio lhnitatlons On the plote etemenls under compression in stee:l members :t", iJllrOS~.J by IS:800-1984 ill, order tu uVJlid r~bri""tiou. dMocJlltics.

2. In a doublv-reinforced concrete beam. the fit';i" in compressive .'Ciufurocw<lot i1 higher thsn Ute slr.in in the ~djoinlJlg concrete.

~. If a cantilever L-"ection $UPp0rt... sl:ah ""nsfn.clion all alollll ils len!)lh wilh suflid.,"l frictitua between them, the pennissihle bending .~ in compression will be the same a. il1a~111 kl1S1Cfll.

The nUll.! slal"""1l.l!i arc

a. .1and 2
b. 2 and 3
c. 1 and 3
d. 1.2.and 3

Oal. for Q.36 & Q.37 ar., ginn l>~low.~otv~ Ihe problems and'cboose c{)rr~cl aoswer ..

hl d.. d""[gn of be:t!ILS/br UIU lim.it .tote or coLLpoe in flm.re "" per IS.456.2000. let the maximum strain in concrete be limited to 0,0025 (in place of 0.003S). FOr this ~ituatl()n. cOn.ide.- Jl "",lnnsuln" beam sc|tion wili. breadtll ab 250mm. effective ilcilth .~ 3SOnml, u,'Ctlof lCll~i(lll~I~I As 15001111;":. m(1 cl1)""~teri~tic ~lr""8ths of concrete nnd sree) as 30MP. lind 250MPl. tespecllvely.

36. The depth ef neutral a.,.;" for the balanced lDilurc i.

a. 141)01m
b. lS6mm
c. 16~rllln
d. 1~5mm

37. A.I the limitingslate: of collapse in Ilexure, th.. force acting On tho compre.. len ZOO" of the section i.

a. 326 l>N
b. 389kN
c. 424 kN
d. 542kN

38. C9iuidL'Tthe follo,,;ng statementst

'I. "Effectlve lenSlh of. battened column is ll,U.lly increased 10 account for the ..dditional load on battens due to lhe lateml expanaion of column s.

2. ll.~per lS180()-19S4, pemiss.thle tlreS. in bending, compression depends on h.nk Euler bucl;IiJll! stress and the.)'i~ld stress (Ifsteel.

3. A" pCI' IS:800-1984, 0,,, effective lengt" of. colomo efi<"'lively held in p<JSiliol1 at buO, end, but 1101reStrained .g,.i,lllt flWUOU, is taken 10 be greater than that in the ideal end eenduions.

The 'I1U.1f, RI.lemenls are

a. I nnd 2
b. 2 .'ld 3
c. 1 Dlld 3
d. 1.2 nnd:;

39. [0 the ae.tJ!D of welded lCl1$iQnmembers, consider the folloWing statements-

1. ll.l: oi1fite c"'8s-$,:di.)n~ I 3rc:t 0l' the connected, lcg is Il&sumdd to .;olll.'ibute to the effective .[cUl i" east: of angles,

2. Two angle. beck-to-beck and I.ck-welded as Per the OQdal requirements lll1lr be :wumed to behave as a lee sooLion..

3. jl chc.ck on slundwllass ra.t:io Dla~ be nec",.~ary In ~oq,e en.os '11,e "RI fP. s~lcm~n~ are

a. 0111)'1 0"112

b. unly 2 .llll ~.

e. only I pnd :-

d. 1.2i1l1d~

-IU. When the triongul"r —tmu Γ. be.", as shuwu below bc.:.oon.~a plastic hinge, the compressive force ~tiJlg on the section. rWilh "y denoting the yield Nt"",) becomes

u. bb"I·/4

b. 2bhGyJ9

1: llloa) 12

d. bhayJ3

41. A sample of satnrated cohesionless soil tested ill a drained IJ'iaxi31 compression lest showed an .ngl .. of internal Jfielion of 30·. The d""u,le,;c .stress a1 fuUuro Ibr tho semple at a confining pressure of 2110kl'a Is equal (o

a. \IJ0kP-J

n. -lOOliP.

c. 6()OkP.

d. S\)(I-J'a

42. wst-' below gives 110.J"I.sible types of llo.iJurefo,' " [mite soil slope Olnd List-Il 8i\<(:$ thlO 1""-·Om' tor these differellt IYlles of failure,

M"t~h the item. in List-l wilh the iwms 10 t,;5l·n and selec; II,,, correct answer 111111 Ille codes gJvc,n below the lists:

Li~t-1

P. Base failure

~. F~ce f~ilu",

R. 'roe r"ilure

l,isHl

1. So1ls above alld b~lo\\ the 100 11JI"~ R~m¢strength

2. Scil above lhe toe is comparJtivol)' weaker

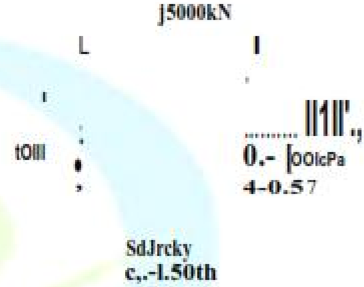
J. Soli above the toe is comparatively stronger

C'.odes:

	P	Q	R
ll.	1	2	~
h.	2	3	1
c.	2		3

d. .; 2 I

4~, For the ~i)ilprofile shl)"o in figure belli'., the minimum number 0:1' prc:c.IJlt CI'I\C6d!c JliJll$ of .,OOmOl di.umeler ~(l~irc:d iii ~nfely carry tln load for given l'll"l" of 8afety 0Γ ~5 (nsSuming 100% "Jlicieney for th" .I,ile.gmllp) is .:qllalto



a. 1t)

b. 15

~ 20

d. 25

-14. In n "Inn~.rd pmclo. lest, 1.8 kg of moist soil ".s IlJHog the mould (volnme = 944ccl after cO"'I.acli"o A sojl sample weighing lBg was t;okCll Irom. the mould BOd ovendried fer 24 hoUfll .1 • temperature of I life Weighl of the d,'Y sample was found to be 20g. Specific grnvily of soli solid, ~ G' 2.7. Th" theoretical O1o.";o)U01 value of lhe dry uoil weighl of' the .soil al th.1 W.l .. r conrent ls equal to

•. 4.67 kNI"'~

h. U.s kNfm 1

c. 16.26 liNton'

d. 111.85kNlol"

Dl1la rfor Q. 45 & Q.46 are gl\'(~' bill"... SC)lv~ Ih~ l)roble.lU< and chol),", the «Ir.,,",1 uuswers,

The 11vcrngc effective wt'n'nJ1'dcn pressure on lOon thick homogeneQltll saturated cl:IY "'yer 1~ 1501d'., Con~"IJdDl;l)n ItS1 nil an undisQlI'bed sojl ,amJllt Illken [i'om the cl~y layer showed tiJlol010 vbld wt,o decreased frOl11 0.6 10 0.5 by increaslng the Klre~s m1eoul1), from ,lOOltPa 111300kPa (G ~2.~S).

-lS. The.initi ..1void ratio ofthe doy layer 1.

n. 0.2119

b. 0.563

e. 0.746
c.l, 1.00t)

~6. nn. Inial co"solid~liq" seulement llf the clay 10),"" un, 10 ll,. construction of a structure imposing DO .ddition llll —ir"" inlonsity nr2OQkP~ 1;
a. 0.10 m
b. (I.25m
o. 0.35m
U. O.SOm

D~l:a for' Q. -IV & Q. -IS lire f,~w""<!low. solve Ihe "robl~m' and chllUse II,. correct answers, L(lPOTlitory s.~ c ,m.IYSis was c;,nle4 out on u .soil sample llSing • C9JIII,letc sel of s!"L(i;lrdlS sieves, Out of SOOg of SQU used in the (<m WQg W~~ retained 0" IS 5(1)", sieve. :lSOg I\'OS r.!Il ined on IS 500f' sieve and Hle rem.inlng 50g W3. retained o.o lS -l25J.Lsieve,

-17. "0 coclJidcnt ofunif()rmily of' (he SQil.is
n. 0,9
b. 1.0
Co 1.1
d. 1.2

48. ntc c'as.ilic:llJl)n fiflb. ~"ils
u. Sl'
b. SW
e. Gt>
d. GW

49. I'he composition 01' a certain MSW sample anti speciJTe wvights til' Its "Ilriuu~ CU",pCluQllb are. given bulo\\:

Componenl	er cent y weigh ı	S.,~~ilk weight (k""~"l
.Fuod waste	50	;100
UM, lIIId.-\~h	30	500
PJn~liC'l	10	65
\Vood & Y ard	10	125

SJieclfie weight ("<IIm') of the MSW sample is
a, **319**
b. 217
c. 21)1)
d. l»,>

S,l. Ibe m~'m indoor .irhome ('hlo,nlj,rm IGHCIJ) COIICllllltr.tiOll in a n!(lm wul< determined 10 be OAILS/)IIL

Usc the following d~t~ T = 29;; K. P = I alf1lQSl'here, R 82.1)5 • 10 ~ 3lm,m' mol-K, Alom,clVelghts;C"= I2,H= 1,('1=35.5. TIUs eouecntmtiou oxpres$cd in POlts p<:r billion (volume basis, ""bv) ;)t "qu~IIO
a. 1.00 ppbv
b. 11.20ppbv
co 0.111 pphv
d. ()'08 PII~V

nlll.U ror Q.51 & Q.52 are gh...u below, Sulve the prQlilem~ ~lId chouse correct answers,

In a rnpid S.IIel filler, the time ro, reachlng particle break Ihrough (TAl is defined ..s lb." lill)e elapsed from ~!IlrLof filter run 10 lhc lima ill which UI" lurbialLy of the al'lluent from .the filter is greater than 2.5 N"IU The time lilt reaching terminal head loss ('TH) I~datined 3,.. the lime. "lapsed ii-um the ;<mrt or the filull' run ttl the time when head loss across lllC 51L". is greater l.h.," 3m.

Sl. The effect of increa~in8 the fiher depth (while "depmg all other Q(lllldlLions- unle) od TIl.nd TfC'IS
n. Tn TnQtc3S<;$ end Tu decreases
b. ~Qth 1'0,,"4 Ttl incfe,,~e
c. T'a decreases and 1'", increases
d. both '1'eand TR decrease

52. The "Hect of increasing' tbe filler lo.ding ...Ia (while keeping ill oilier eenditions ~3mc)ıı: 'J'a and 'ro iS
n. 'rll i",:R13~es apd TITdeere:J~'~
h. both 1'1)and Tu increase
c. Ts.decreases and T" increases
d. both Tn And T., OOOI""t

O.Rtn fnr Q.53 '" Q.5-I urc giwn Ill'low. Soil'\' th~problems :lnd ch()(1~ correct answer. .
A w~l<tcontains II,~rllllowiM djsS(I)vc:dions:
f!>Ja-) ~ S6 UllVi: rCa:>'] =-tO mg/l;
I'M!? .,- 30 mg'l; ~Aljl 3 mgt!!
nrco 11" 19O.mg/l: ICll '" t6~'"1Yl

Water pH '" 7•
-\tOmi~ wtillhlS. ('4 .411:Mg. *14:* II I : 17; H : I: C'! 12:0 : Hi: N" t 2:i: Cl : 35.5

5:,, The 1.0,",1 hardness i)fLbes.mple in *mgt!* 3S f'aCU"ls
a. -18;1
b. 450
c. 242
d. 22S

54. The non-carbonate hardness of the sample In fistl as c-.CO, is
a. 225
b. 156
c. 86
d. 0

55. DlUinS. 31m", storm event, it w•• "bserved that ~II .b.lr~cli(ms other than il11lllC.tion are ntglil!ibJe. The rainfall wail id",,1W:d ~. 3 0116 Iieur storms of int_ity 10 mm/hr, 20 mmlhr nnd 10 mrn/hr ff:$pCellvely lind the in1~tratioll IV.' idealiZed as • Hortnn "\II'Ve f - 6.5 ı 8.1 c.Xp(-I) (fin mmfhr and I ill hr]. \V1,al i~ the ell'edive rainfall'
a. !tWOm",
b. 11.33 mm
c. 1243",01
d. 13.63 rum

56. Iii • cultivated 'il'''', the soil has. porosify of 4,5% and field cop,city of 3'8'~.for" p.r1icul.r 0111'. Ihe root ..one daplh is It) ııı. the: 1"000lUlcoL wilting point, is 10~" und the censumptive use is l5 rom/d. If the irril!~lion .. mciellcy i~ what should he- the frerluenc:y of in:ig.tiqll ","ch thuL Il,. Ul,,[slur e conteut doe nul raU below 50[1]." Dl" tbe maximum available moisture?
a. 5d
b. 6.1
c. 9d
d. l5d

D~t. r')r Q.S7 & Q.58 nr e given bdo",_ Solve the prohl.ms ilnd choose correct answers,
Filf " calcl1lnenl. the S-curve (or S-hyd"ollT3J)hl due (I) • roinf.U of in~t.y t onvlU' ls given by Q : 1 (1 ı t) e.'1f' (() (I in hr nnd Q in mj/~l.

57. What ill 1l.e;!,,,,,, orthecatchm enl'1
a. 0.0l~m:>
b. \I.3V1o"~
c. LOOkm[1]
d. 1.2l1km[1]

58. Whal wrll be the ordinate of a "l-hour llOil hydrograpJ, for this catchment ııı I ~3 h~u(!
a. 0.13·m If.
b. (I,20 mJI~
c. **0.27** m~Js
d. 0.54 m! s

59. 119UIS IRe 37-19~4 "Guidelines tor Ihe. Dt:!lign ot' I'lc;"lblil Pavements" and the folIOwi"!: .1.14. chOQse Ihe t()lai 1l11~~ne.$~ (If the pavemenL

NumbeT of "",run"",i.1 vehicle. when con,truction iii compleled	'2723 \'Chld~I'
Annual gT()wlh flit...nl' lI,e lr.ffic	5.0Q.)
Design life of lile p3v~menl	10 yea.'S
Vehicle dam1l2e flletor	2.4

D.tA rUI"S%CBR value Number'MSl1I"dar,1 .\J:l,'S ııı~.	Tut.,1 Thlcltl""$, mm
20	620
25	6'10
30	670
4ll	700

a. 620 mm
b. 640mm
c. 670 "lin
d. 700mm

60. A vehtcle moving .1 Mkmph on an ascending g,radi<:nl Qf. ltigbway IL1S to cOlU~ to slop po.ilion ı() avoid collision with. Ill,tion.ry object. The ratin of lag In brake distence is 6:5. Considering 101~1 l'eacUOl1 time Of U,~ driver a.s 2.5 seconds lind the coefficient of tongilud;lIol friclio,u 35 0.36, the value of ascending gtndiėllt (%) L~
a. ~,3
b. 4.M
c. 3.3
d. 6.S

61. AI • norizonl.1 curve portion of n .ı lam, undivided Colrrifigeway, ~ Irall~ition curve is LO be introduced Lo lltL1ln. required super-elevation, Th e design sH,(.<d. 60kru1"' and radius of the curve is 2~5m. ~sllme length of wheel bas .. <If', longest vehicle as 6m. "uper elevation rot" .. .5". and fill.. of introduction of ll.is sUpIr .:I"""tlon as I In 150. The length Of the transition curve (01·) required, if Ute pavemenl is .",Iale<! abou! lnner edge is
a. 81.4
b. 85.0
c. 915
d. 110.2

62. FcyrdeSigllinga'2'pbnse fixed typ" signal al mtersection having North.SOU~' and Eit1;l-Wesl road where unly sLnlighl ahead Inlilic Is permuted, the i'oHull'inj.: (1111is "~II.I"hlc.

Parameter W""1	'"urlh	Soulh	EIIS!	
Design .HQw-flow (PCU-hr)	1000	7C)II	900	550
Saturation flow fl'CUlbr)	2500	25:00	3000	.3000

Tulu! lime lost per ~ycle Is 12 seconds, The ,-ycle Jength (seconds] IIS per Web~le~·. npproach i.

a. (i7
b. 77
c. 87
d. 91

(,3. On "Jl urban road, the free .na,ul speed wns measured us 70 kmph and the o\~ng\" spacing between the vehicles under jam condition us 7,0m. 'l1lin"C,'tl-llow-dcnslty equation i.given by:

where,

I' ; space-mean speed (kmllh):
\t,r~ lree mean speed (kmph);
It- densily ('l!¢lll\m);
", =jum d.,"~iry (veil/kill):
'1 = (·)<)IV (vehihr).

TIle mnximum Jl.ow (wMIf) per lane for this conditicn i~equal to

a. 2000
b. 2500
e. 3000
d. Non~ of the above

64. A SlJhgrUl.I. soil sample WhS tested wilDg l'faodnrd CDR appannns and the ebservaiions are below.

wad,ko
~(1.5
80.S 5.0

AsStu1I1us, that !b~ lead-pcnctnniou CIUVo ill ~ollv~x throughout, Li,. CBR ".1,," (O,~). l)f1h~ sample 1,

IL 6,)
b. 5.5
c, 4.4
d, 3.!1

65. The observed magnetic bearing of ,, lint': OR ~tns foulld 16 be 18-5" If \V'IS 1m.". discovered thut statio" 0 hud 11 1.,""1 al1rodlon "r 11.5"_ 'Inc uue hearing of ih. line OK conslderlag n magnetic declination of3.5"EshnJl b.

a. J80[b]
b. 1.87·
e. 190[o]
d. 19:\°

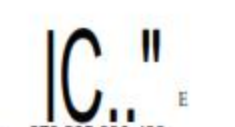
1i6. A Bench M(II'<.lk(BM) with Reduced Levet (R.L.) 155.3(15111 bas been c.... blished nr the lloor of a P\)OIII. JI is required 10 lind out the IlL of t,he underside of Lbo roof IR) Of the room usillg Spirit Levelling. lhc Dade l!HShl(BS) to the BM has been observed as I.SOOm whereas the Fore Sigbi (FS) to R. bas been ..bserved as 0;57501 (Sluff held inverted), 'llle RL(III) of R will be

:L Ii5.8RC/
b. t3(>.230
c. 1.51.38U
d. 157.1160

67. Consider tll. JOIIOWUlg figure. which is au extract from d comour "IUP (scale = 1:20.(JOO) Of un area. An alignment Qf n mad al a ("ling. gradient of 4')~ is to be fixo!'tl from the point, U and beyond. Whnt should b. th(l-rudius of th~ arc will' 0 us tb~ center 10 lloi th~ p<)Jli. !)!' nlignment Of 111E_n~t~Otlt0llt ,lo_1he nu.r?

a. 0.025 em
h. 0.25 em
c. 2.5 eru
d. 5.Ucnl

68. I" ,he figure giv"" bdow, tht 1011glh.., PQ (WCB ! .10") a"d QR (Wel3 : +5") t<>!;p<cLlWljip uo thl'ce places ef dcelmal



a. 273:205.93&.J86
b. 17:l.20S.551.81.5
e. 551.l!IS.551.815
d. 3~4.lh.ll.938.IS6

69. DurinS a levelling work. utMg •)bUing gradient using" DUDiPY-Levol und SuLff of 3m length, 10110,,;ng succesaive temling' we", tnken: 1.785, 2.935, O.3(iO, 1.320. Whal will be tl,e cQITeCIorder ()f; I>OOking lit',.. [our readings ill u level I><101;'1(85 Bouk Sight. IS ; lJ1tl"mt:dii1le Sisbt. FS: F!)re Sigll1)

u, BS,!'S. IfS, FS

b. BS,. IS. FS.FS

o. as. IS, IS, FS

d. as, IS. Bs..FS

70. The velocily field for a flow is given by:

r -f5.~+6)'~7.:')i + (6.,,+ 5y+.9=}j

,(3 .•• 21' ..<)k and the dlm5ily varies

.~ p:p<exp(-2r), In llrderthal tbem ass

Is conserved. the value on, should be

a, '12

b. ,10

c. -8

d. 10

71. A bydrnutic jump ocC,jl~01' teelaugulM, ItorizC)nL1- fri,lilmles8 channel, Wh.1 ",<)uld he the nil-.iump depth if the Ji.clwge per ullil ll'idtll ls 2m" -1," and the dtl'"gy less is Im?

II. 0.;101

b. ll.3m

e. 0.8ru

J. 1).9m

72. A "Of)' wide ",ol.onsul.,- lib;lJUlcl iA d"'!i-sned III —Ilrry" discharge Ql' 5mlJ~ per meter lvidih. The design is based 1-0 the MMning's equation with the roughness ccoetJjoient ohlllined froru lbe ljr:W1 size u~ing Stiqkldr·. eqUJ\tion and results in ~ norma L depth of LOrn. By m.i1!lltk<; however, the engin e..., lloed 11.< groin dl;lmeler 'in mm in tile Slickler'" ~(lu:t'ion iJ1~leocJof io meter. \VII'" ~ho,jlel be tll~ correct normal depth'l

.•• 0.3'2111

h. 0.50m

e, 2.0(lrn

d. 3.2011t

73. The llOW (,f 8.)Y<ll:tio(kinematic vi~co~ltv v ; :5 10'I11'1sl in an open channel i.. l~ be ",odeled in " laboratory Flume us ins water (\ = IO-<i",~!.)s ,he llo"';ng fluid, ll' both gravity ..nd viscosity ore important. what should be the lengtl. scale (l,b .. r:ulo 01 IlrotOlype 10 model dunensions) FOI' m.int.ining_ dyrillnllc 5icnllllJ'ity?

a,]

b. 12

c. G3

d. 300

74. 11,. thickness nf the l.ruinA" boundary layer On • n~1,lIJle at •. POlO' A i~+ em pod at a point a. I,,, do\\ nstream or A. ",. 30m. Wl!lll is tho: di6111Uctbf a l'ortn the ltading. edge of Ill. plnto'l

a. 0.50m

b. G.80",

c. I.Mm

d. J.25cn

Data ror Q.75 a"d Q.76 are gr.'t]l ""l(l)\'. Soh ... th. problem. and choos. ""rrt'ct ||'"||,

An upward Hll\V 1)l' oil (n",ss d.n~lty~OOkglPlj. llyn.mi. vIscosity (l,jlJ'glm.& I lakes plaCe under laminar conditions in an inclined. (lipe lll' 0.1 m lli.Older A shown III the ·tig!!'e. 'The m1t1)8llr;~ al sections l and 2 ore llleMw"d as A = ~55.bV I nr nod p, = 'J.Oll!;;N'l

75. The di!iuhltrge in the pipe i~<I'"1 to

n, (l,J 0ll ml.;

b, 0, f27 m'l.

c, 0,144 ml.s

d. 0.161 m^l.<

76. If the flow i~reversed, keeping. the snme di~eh"rgc, and fhe prcsMUn: .1 section (i.~ m•.lDWinod as 4,Skl'lfl1l'_ the- pressure .1 sooro.n 2 L~equal to

a. J88 k'Nllu'

b. 549kNlm'

c, 586 kNiro'

d. 6l.f kNfml

77. For n given matrix A = one "flhQ eigcn values i~3. 'llie other two eigcn values are

a. 2,-5

" 3,-5

c. 2:5

d. 3.5

78. The directionel derivative of lis.. y. 20) = 2)(' - $3l$ - 2.2 At the point P[2. 1.3) in the ditection ofthe vector. ~ i-2k i~

a. -2785

b, -2145

c. 1.789

It 1.000

7~. A class Of IU'st Ye.1r 13. Tech •• rudents j. composed Of four batches A. B. C and 1). ea~h consisting of 30 students. It is found thai the sessional marks of .I\ulentl 'n Engineering Drawing In batch C have n Ille.'I'of 6.6 and sta,ndard del/iotion or 23. The mean lind standard ,le"iot.ion of the mrrrks tot the entire cl,.~s are 5.S anti -l-2, ""Peclivcly, It is dccidell by th~ c#11inie insuucter ιο nermslize the ιu.t~s-of 11t~ .tud~n"" of all batches 10 have Lbo ~.m" m ea n and m.nd.RI deviation as th.t of Ihe enli,~ cl.~s. Due 10 tlti", tlte I1t.ik~ oj' ~ student in batch Care chan!Loo front 8.5 10

a, 6.0

b. 7,(1

c. S.ll

d. !I.O

811 A. 2"1 degree polynomiaL f(x) hIlll vnlues j)r L 4 nod 15 "' tc O. J and 2. '<:sp.-!liVely. 1110 ;nwS".1 ∫ [(:r)cir i> to be estimated hy "I'plying the Inl))w.<lidnJ rule ιo uns ooια. Wh.l is the errol' (denned us "true value ..!lpproxiullste v:a.(ue-L,.in.IIH: estimate?

• 4

~ 0 3

<l. 1-

81. Whal is lite area common 10 the circles r = " ~ndr= 2a co. S1

a, 0.524.1

II. Q,614.'

c, 1.047 +11

d. 1228.'

n. Usillj} ~uchy', i"legml theorem, the vallle tll' the integra I ~tinhlg'nllU11 boitlg taken in counter clockwise din'cLion)

rf.~- 6 ... dz j: ... /t-l

b. " 6!π 8

c. 4", 6'1π 81'

d. I

83. There utc 25 e3J~ul3t/)~ Tn a box. Twq of II.,.," 3ti: ~cfc;tli"e. SUj)pOMc 5 ~le\lI:tlj,P.I at" random ly l,io.kcQ for ioHI,.,clinn (i.e., cnell It.! the same chalice of being selected). whal is the probahility tlt.t Qllly one !If t.h~ deli:ctiVe ealeulators wall be Included inlhe inspq:liQo2

•• L 2

b. 1 3

1 4

d. 1

84. A spherical ntlphth.IClto ball exposed 10 the atmosphere loses volume nt • rate proportion. I to il'S instantaneous surface area due to evaporation. IF the initial diameter of the ball is 2 cm and tbe diameter reduces 10 I <lin nft~r 3 months, Ute balL completely evaporates in

a, OIllonUts

h. 9 months

c 12monUts

d. infinite iimu

85. The solution of the diffo"mtial equation, .Ct '!; i-2.t)'-.,+I=O Sl\-enlh.t at x= I. y=n ß

u. $\frac{1}{2} - \frac{1}{x} + \frac{1}{2~?}$

b. '2';-2;,J

c. $\frac{1}{2} + \frac{1}{x} - \frac{1}{2.\'}$

d. $\frac{1}{2} \frac{L}{x}, \frac{1}{2';}$