

PAPER CODE

22161

PAPER – II
CIVIL ENGINEERING
(English)

Held on: 05-03-2023

Question Booklet
Number

225000



Question Booklet Number

EA-1622

Duration : 150 Minutes

Max. Marks : 150

INSTRUCTIONS TO CANDIDATES

1. Before opening the seal of the Question Booklet check whether the Paper Code printed on it is matching with the Paper Code printed on the Hall Ticket with the respective session. If it is not matching, immediately bring to the notice of the invigilator and obtain the Question Booklet with correct Paper Code.
2. Please check the Question Booklet immediately on opening and ensure that it contains all the 150 multiple choice questions printed on it.
3. Carefully note the Question Booklet No.
4. Separate Optical Mark Reader (OMR) Answer Sheet is supplied to you. The OMR Answer sheet contains boxes for filling Hall Ticket Number, Question Booklet Number, Paper Code, Signature of the Candidate and Invigilator. Fill the boxes with Blue/Black ball point pen only.
5. If there is any defect in the Question Paper Booklet or OMR answer sheet, please ask the invigilator for replacement immediately.
6. Since the answer sheets are to be scanned (valued) with Optical Mark Scanner system, the candidates have to USE BALL POINT PEN (BLUE/BLACK) ONLY for darkening the circles in the OMR Sheet including bubbling the answers. Bubbling with Pencil / Ink Pen /Gel Pen is not permitted in the examination. If any mistake is done by you on the OMR sheet, it will not be replaced.
7. The Question Booklet number is printed on right corner of the cover page of the Test Booklet. Mark your Question Booklet number on side 1 of the OMR Answer Sheet by darkening the appropriate circles with Blue/Black ball point pen.

అభ్యర్థులకు సూచనలు

1. ప్రశ్నా పత్రం యొక్క సీల్‌ను తెరిచే ముందు దాని పైన ముద్రించిన ఉన్న పేపర్ కోడ్ ను మీ హాల్ టికెట్‌లో ముద్రించబడిన ఆ సెషన్‌కు సంబంధించిన పేపర్ కోడ్‌తో సరిపోల్చుకోండి. ఒక వేళ ఆ రెండూ ఒక దానికొకటి భిన్నంగా ఉన్నచో ఆ విషయాన్ని ఇన్విజిటర్ దృష్టికి వెంటనే తీసుకెళ్ళి సరైన పేపర్ కోడ్ ఉన్న ప్రశ్న పత్రాన్ని అడిగి తీసుకోండి.
2. ప్రశ్నా పత్రాన్ని తెరచిన వెంటనే అందులోని 150 ప్రశ్నలు వాటికిచ్చిన ఆప్షన్లు అన్నీ సరిగ్గా ముద్రించబడ్డాయో లేదో జాగ్రత్తగా పరిశీలించండి.
3. క్రెషన్ బుక్‌లెట్ నంబర్‌ను జాగ్రత్తగా పరిశీలించండి.
4. సమాధానాలను గుర్తించడానికి ప్రత్యేకంగా OMR సమాధాన పత్రాన్ని ఇవ్వడం జరుగుతుంది. అందులో హాల్ టికెట్ నంబరు, క్రెషన్ బుక్‌లెట్ నంబర్, పేపర్ కోడ్, అభ్యర్థి సంఖ్య, ఇన్విజిటర్ నంతకాలకు సంబంధించిన వివరాలు నింపడానికి గడులు కేటాయించబడి ఉంటాయి. గడులను నింపటానికి నీలి/నలుపు (బ్లూ/బ్లాక్) బాల్ పాయింట్ పెన్నులను మాత్రమే ఉపయోగించాలి.
5. ప్రశ్నా పత్రంలో కానీ, OMR సమాధాన పత్రంలో కానీ ఏదైనా లోపాలుంటే వాటిని మార్చనలసిందిగా వెంటనే ఇన్విజిటర్‌ను కోరవచ్చు.
6. సమాధాన పత్రాలను ఆప్టికల్ మార్క్ స్కానర్ పరీక్షా వద్దల్లో మూల్యాంకనం చేస్తారు. కాబట్టి దానిపైన ఉన్న వృత్తాలను (జవాబులకు సంబంధించిన వృత్తాలతో సహా) నింపటానికి బ్లూ/బ్లాక్ బాల్ పాయింట్ పెన్నులను మాత్రమే ఉపయోగించాలి. పెన్సిల్ లేదా ఇంకు పెన్ను లేదా జెల్ పెన్నులతో బల్లింగ్ చేయటం పరీక్షలో అనుమతించబడదు. OMR పత్రంలో అభ్యర్థి తప్పులు రాసిన/దిద్దిన యెడల దానిని మార్చి ఇంకొకటి ఎట్టి పరిస్థితుల్లో ఇవ్వటం జరగదు.
7. ప్రశ్నా పత్రం పై క్రెషన్ బుక్‌లెట్ నంబర్ ముద్రించబడి ఉంటుంది. ఇది ప్రశ్నా పత్రం కవర్ పేజీ పై కుడి మూలన ముద్రించబడి ఉంటుంది. ఈ క్రెషన్ బుక్‌లెట్ నంబర్‌ను మీ సమాధాన పత్రం యొక్క పైడ్-1 లో దానికి కేటాయించబడిన స్థలంలో బ్లూ/బ్లాక్ బాల్ పాయింట్ పెన్నుతో జాగ్రత్తగా నింపాలి.

SEAL



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Example to fill up the Question Booklet number.

If your Question Booklet number is 102365, please fill as shown below :

Question Booklet No.

1	0	2	3	6	5
1	1	1	1	1	1
2	2	2	2	2	2
3	3	3	3	3	3
4	4	4	4	4	4
5	5	5	5	5	5
6	6	6	6	6	6
7	7	7	7	7	7
8	8	8	8	8	8
9	9	9	9	9	9
0	0	0	0	0	0

If you have not darkened the Question Booklet number at side 1 of the OMR Answer Sheet your Answer Sheet will be invalidated without any further notice. If it is darkened in a way that it leads to discrepancy in determining the exact Question Booklet number, then it may lead to wrong result / rejection of the Answer Sheet and candidate himself / herself will be responsible for the same.

8. Each question is followed by 4 answer choices. Of these, you have to select one correct answer and mark it on the Answer sheet by darkening the appropriate circle for the question. If more than one circle is darkened, that answer will not be valued at all. Use Blue/Black Ball point pen to fill the circle completely. Make no other stray marks.

e.g. : If the answer for Question No. 1 is Answer choice (2), it should be marked as follows :

1 2 3 4

9. Mark your Hall Ticket No. as given in the Hall Ticket with Blue/Black Ball point pen by darkening appropriate circles in side 1 of the OMR Answer Sheet. Incorrect/ not encoding of Hall Ticket no. will lead to invalidation of your Answer Sheet and also will lead to rejection of your candidature without any further notice.

Example : If the Hall Ticket No. is 1309102001, fill as shown below :

Hall Ticket Number

1	3	0	9	1	0	2	0	0	1
1	1	1	1	1	1	1	1	1	1
2	2	2	2	2	2	2	2	2	2
3	3	3	3	3	3	3	3	3	3
4	4	4	4	4	4	4	4	4	4
5	5	5	5	5	5	5	5	5	5
6	6	6	6	6	6	6	6	6	6
7	7	7	7	7	7	7	7	7	7
8	8	8	8	8	8	8	8	8	8
9	9	9	9	9	9	9	9	9	9
0	0	0	0	0	0	0	0	0	0

10. Get the signature of the Invigilator affixed in the space provided in the answer sheet. Candidate should sign in the space provided in the OMR Answer Sheet.

ప్రశ్న బుక్ నెంబర్ నింపడానికి

ఉదా : ఒకవేళ మీ ప్రశ్న బుక్ నెంబర్ 102365 అయితే దాన్ని కింది విధంగా నింపాలి.

Question Booklet No.

1	0	2	3	6	5
1	1	1	1	1	1
2	2	2	2	2	2
3	3	3	3	3	3
4	4	4	4	4	4
5	5	5	5	5	5
6	6	6	6	6	6
7	7	7	7	7	7
8	8	8	8	8	8
9	9	9	9	9	9
0	0	0	0	0	0

OMR సమాధాన పత్రం యొక్క సైడ్-1 లో మీ ప్రశ్న బుక్ నెంబర్ నింపక పోయినచో ఎటువంటి నోటీసు ఇవ్వకుండానే మీ సమాధాన పత్రం మూల్యాంకనం నిలిపివేయబడును. ఒకవేళ దానిని సరిగ్గా గుర్తించేలా నింపక పోయినచో ఫలితం తప్పుగా వచ్చే అవకాశం లేదా మీ సమాధాన పత్రం తిరిగినింపబడే అవకాశం వుంటుంది. దానికి అభ్యర్థి పూర్తి బాధ్యత వహించాల్సి వుంటుంది.

8. ప్రతి ప్రశ్నకు నాలుగు జిడ్డుకాలు ఇవ్వబడతాయి. వీటిలో ఒకదానిని సమాధానంగా ఎంచుకోవాలి. సమాధాన పత్రంలో దానికి సంబంధించిన జిడ్డుకాన్ని నింపవలెను. ఒకటి కన్నా ఎక్కువ జిడ్డుకాలను నింపినచో ఆ సమాధానం పరిగణించబడదు. జిడ్డుకాలను పూర్తిగా నింపటానికి బ్లూ/బ్లాక్ బాల్ పాయింట్ పెన్ ను మాత్రమే ఉపయోగించాలి. మరే విధమైన గీతలు గీయటం గాని మరకలను అంటించటం గాని చేయరాదు.

ఉదా : 1 వ ప్రశ్నకు సమాధానం (2) అయితే దాన్ని ఈ క్రింది విధంగా నింపాలి.

1 2 3 4

9. హాల్ టికెట్ నెంబర్ ఇవ్వబడిన హాల్ టికెట్ నంబర్ ను బ్లూ/బ్లాక్ బాల్ పాయింట్ పెన్ నుండి OMR సమాధాన పత్రపు సైడ్-1 లో ఇవ్వబడిన సరియైన జిడ్డుకాలలో నింపాలి. హాల్ టికెట్ నంబర్ ను తప్పుగా నింపటం లేదా అన్యలు నింపకపోయినచో మీ సమాధాన పత్రం మూల్యాంకనం చేయబడదు మరియు మీ అభ్యర్థిత్వం ఎటువంటి నోటీసు ఇవ్వకుండానే తిరిగినింపబడును.

ఉదా : హాల్ టికెట్ నంబర్ 1309102001 అయితే ఈ క్రింది విధంగా నింపాలి.

Hall Ticket Number

1	3	0	9	1	0	2	0	0	1
1	1	1	1	1	1	1	1	1	1
2	2	2	2	2	2	2	2	2	2
3	3	3	3	3	3	3	3	3	3
4	4	4	4	4	4	4	4	4	4
5	5	5	5	5	5	5	5	5	5
6	6	6	6	6	6	6	6	6	6
7	7	7	7	7	7	7	7	7	7
8	8	8	8	8	8	8	8	8	8
9	9	9	9	9	9	9	9	9	9
0	0	0	0	0	0	0	0	0	0

10. సమాధాన పత్రంలో కేటాయించబడిన స్థలంలో ఇన్విజిటర్ నుండి తీసుకోవాలి. అభ్యర్థి కూడా OMR సమాధాన పత్రంలో కేటాయించిన స్థలంలో తప్పనిసరిగా సంతకం చేయాలి.



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11. Rough work should be done only in the space provided for that purpose in the Question Paper Booklet. No other loose sheet of paper will be allowed into the Examination Hall except Hall Ticket.

12. Do not mark answer choices on the Question Booklet. Violation of this will be viewed seriously.

13. Use of Calculators, Mathematical Tables, Log Books, Pagers, Cell Phones or any other electronic gadgets is strictly prohibited.

14. The candidate should write the Booklet number and Sign in the space provided in the Nominal Rolls while ensuring the Bio-data printed against his/ her name is correct.

15. No candidate should leave the examination hall until completion of examination time.

16. Before leaving the examination hall, the candidate should hand over the OMR Answer Sheet to the Invigilator, failing which action will be taken for malpractice.

17. Candidates are permitted to take away the Question Paper with them after completion of the exam.

18. The OMR Answer Sheet will be invalidated, if the candidate :

i. writes the Hall Ticket No. in any other place of OMR sheet, except in the space provided for the purpose.

ii. writes irrelevant matter, including the religious symbols, words, prayers or any communication whatsoever, in any place of the OMR answer sheet.

iii. uses other than Blue/ Black ball point pen to darken the circles.

iv. forgets to bubble the Question Booklet number or bubble multiple circles in a row while filling the Question Booklet No. or bubble Hall Ticket No. other than allotted to him/ her.

v. resorts to wrong/erroneous/incomplete bubbling of circles or using ✓ or ✗ in the circles.

vi. uses whitener on the answer sheet.

vii. attempts any type of tampering (rubbing the circles with chalk powder/ scratching the circles with razors etc.) on the OMR Answer Sheet.

viii. adopts any method of malpractice.

19. No correspondence will be entertained in this matter by the commission, if the Answer Sheet is invalidated or his / her candidature is rejected due to the above reasons.

20. The digital copy of OMR Answer Sheets will be made available in the Commission's website after completion of the Image Scanning.

11. ప్రశ్న పత్రంలో కేటాయించిన స్థలంలో మాత్రమే చిట్టచివరి వరకు చేయవలెను. వర్క్ గదిలోకి హాల్ టికెట్ తప్ప మరే ఇతర పేపర్ కాగితాలు అనుమతించబడవు.

12. ప్రశ్న పత్రంలో సమాధానాలను గుర్తుపెట్టడం తీవ్రంగా పరిగణించబడును.

13. వర్క్ గదిలో కాలిక్యులేటర్లు, మాథమాటికల్ టేబుల్స్, లాగ్ బుక్స్, పేజర్స్, సెల్ ఫోన్స్ లేదా ఏ ఇతర ఎలక్ట్రానిక్ వస్తువులను ఉపయోగించడం నిషిద్ధం.

14. నామినల్ రోల్స్ లో ముద్రించబడిన తన వ్యక్తిగత వివరాలు సరియైనవని ధృవీకరించుకున్న తర్వాత అభ్యర్థి తనకివ్వబడిన ప్రశ్నపత్రం యొక్క ప్రశ్న బుక్ నెంబర్ నంబర్ ను నామినల్ రోల్ లో దానికై కేటాయించబడిన స్థలంలో రాసి సంతకం చెయ్యాలి.

15. వర్క్ గది వ్యవస్థాపక వరకు ఏ ఒక్క అభ్యర్థి కూడా వర్క్ గదిని విడిచి వెళ్ళటానికి అనుమతించబడదు.

16. వర్క్ అనంతరం వర్క్ గది నుండి బయటకు వెళ్ళే ముందు ప్రతి అభ్యర్థి OMR సమాధాన పత్రాన్ని ఇన్విజిటర్ కు తప్పనిసరిగా అప్పగించి వెళ్ళాలి. లేనిచో అతని పై మారే ప్రాక్టీస్ కింద చర్యలు తీసుకోబడును.

17. వర్క్ అనంతరం ప్రశ్న పత్రాన్ని అభ్యర్థులు తమ వెంట తీసుకొని వెళ్ళవచ్చు.

18. ఒక అభ్యర్థి క్రింది ఏ చర్యలకు పాల్పడినను అతని సమాధాన పత్రం మూల్యాంకనం చేయబడదు.

i. OMR సమాధాన పత్రం పై హాల్ టికెట్ నంబర్ ను దానికి కేటాయించిన స్థలంలో కాక ఏ ఇతర స్థలంలో రాసినను,

ii. వర్క్ గది ఏమాత్రం సంబంధం లేని విషయం ఉదా : మత సంబంధ చిహ్నాలు, పదాలు, ప్రార్థనలు లేదా ఏ ఇతర సమాచారాన్ని జవాబు పత్రం పై రాసినట్లయితే,

iii. వర్క్ గది నింపటానికి బ్లూ/బ్లాక్ బాల్ పాయింట్ పెన్ నులను కాక ఏ ఇతర పెన్ నులను ఉపయోగించినను,

iv. ప్రశ్న బుక్ నెంబర్ లేదా హాల్ టికెట్ నంబర్ ను బట్టింగ్ చేయటం మరచిపోయినను లేదా ప్రశ్న బుక్ నెంబర్ నింపే సమయంలో ఒక వరుసలోని ఒకటి కన్నా ఎక్కువ జిడ్డుకాలను నింపినను. అభ్యర్థి తనకు కేటాయించిన హాల్ టికెట్ నంబర్ కాక ఇతర హాల్ టికెట్ నంబర్ ను కాని బట్టింగ్ చేసినచో,

v. సమాధాన పత్రం పై వర్క్ గదిని తప్పుగా/అసంపూర్ణంగా నింపినచో లేక ✓ లేదా ✗ వంటి గుర్తులను వర్క్ గదిలో గీసినచో,

vi. సమాధాన పత్రంలో తెల్ల సిరా (వైట్ నర్)ను ఉపయోగించినచో,

vii. సమాధాన పత్రం పై వర్క్ గదిని చాక్ పీస్ పొడర్ తో రుద్దటం, షేడ్ తో గీయటం వంటి చర్యలకు పాల్పడినట్లయితే,

viii. ఏ విధమైన మారే ప్రాక్టీస్ పద్ధతులను అవలంబించినను,

19. పై ఏ కారణంవల్లనైనా అభ్యర్థుల యొక్క సమాధాన పత్రాలు మూల్యాంకనం చేయబడకపోయినా లేదా వారి అభ్యర్థిత్వం రద్దు చేయబడినా, ఈ విషయంలో కమిషన్ తో ఏ విధమైన ఉత్తర ప్రత్యుత్తరములకు అనుమతించబడదు.

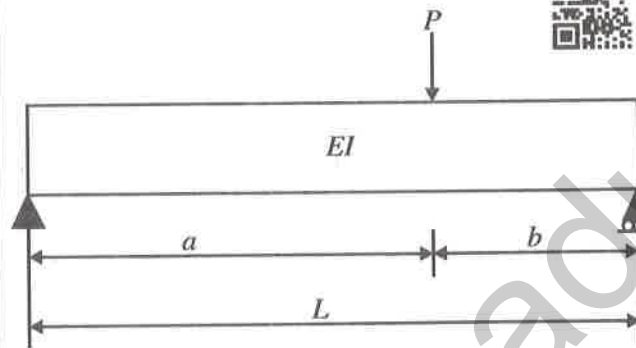
20. వర్క్ గది హాల్ టికెట్ అందరి అభ్యర్థుల OMR సమాధాన పత్రాల యొక్క డిజిటల్ కాపీలు, ఇమేజ్ స్కానింగ్ అయిన తర్వాత కమిషన్ వెబ్ సైట్ లో అందుబాటులో ఉంచబడును.



- What is the correct decreasing order of the following materials with respect to their Poisson's ratio ?
 A. Copper
 B. Steel
 C. Tungsten
 (1) A, B, C
 (2) B, C, A
 (3) A, C, B
 (4) C, B, A
- Which of the following is **NOT** a canal head work ?
 (1) Weir
 (2) Barrage
 (3) Aqueduct
 (4) Head regulator
- Identify the secondary air pollutant out of the following
 (1) Carbon monoxide
 (2) Sulphuric acid
 (3) SO₂
 (4) SPM
- The settling velocity of a particle in a sedimentation tank depends on
 (1) Depth of tank
 (2) Both depth and surface area of tank
 (3) Surface area of tank
 (4) Material used for construction of tank



- What is the relationship between Poisson's ratio and axial strain ?
 (1) Poisson's ratio is inversely proportional to axial strain.
 (2) Poisson's ratio is inversely proportional to the squared of axial strain.
 (3) Poisson's ratio is directly proportional to axial strain.
 (4) Poisson's ratio is directly proportional to the squared of the axial strain.
- What is the governing differential equation for deflection (y) of any one segment of the given beam ? x is any length measured from the left hand support ?



$$(1) \frac{d^2 y}{dx^2} = \frac{1}{EI} \left[Px^2 \left(\frac{b}{L} - 1 \right) + Pa \right]$$

$$(2) \frac{d^2 y}{dx^2} = \frac{1}{EI} \left[\frac{Pb(L-x)^2}{L} \right]$$

$$(3) \frac{d^2 y}{dx^2} = \frac{1}{EI} \left[Px \left(\frac{b}{L} - 1 \right) + Pa \right]$$

$$(4) \frac{d^2 y}{dx^2} = \frac{1}{EI} \left[\frac{Pa(L-x)^2}{L} \right]$$



- What is SSD in highway engineering ?
 (1) Slow Sight Distance
 (2) Stopping Skid Distance
 (3) Stopping Signal Distance
 (4) Stopping Sight Distance
- The viscosity of a gas
 (1) decreases with increase in temperature
 (2) is independent of temperature
 (3) increases with increase in temperature
 (4) is independent of pressure for very high pressure intensities
- The length of Surveyor's chain is
 (1) 100 ft
 (2) 66 ft
 (3) 33 ft
 (4) 50 ft
- Increase in the volume of sand due to increase in moisture content is known as
 (1) Bulging of sand
 (2) Shrinkage of sand
 (3) Bulking of sand
 (4) Water absorption of sand



- Artificial stone is also known as :
 (1) Ashlar stone
 (2) Igneous stone
 (3) Plastic stone
 (4) Casted stone
- For a two-dimensional generalized system, how many equilibrium equations are available ?
 (1) 1
 (2) 3
 (3) 2
 (4) 4
- The hydraulic mean depth or the hydraulic radius is the ratio of
 (1) Area of flow to wetted perimeter
 (2) Velocity of flow to area of flow
 (3) Wetted perimeter to diameter of the pipe
 (4) Wetted perimeter to area of flow
- The maximum permissible limit for fluoride in drinking water is
 (1) 0.1 mg/liter
 (2) 5 mg/liter
 (3) 1.5 mg/liter
 (4) 10 mg/liter


 $h = \frac{A}{P}$



15. Match the following according to IS 456:2000

- A. Minimum nominal cover for a square column of size 175 mm with 10 mm diameter bar 1. 20 mm
- B. Minimum nominal cover for a simply supported beam under fire resistance value of 0.5 2. 40 mm
- C. Minimum nominal cover for M40 concrete in severe exposure condition 3. 25 mm
- D. Minimum nominal cover for footing using M50 concrete 4. 50 mm

Choose the correct option

- (1) A-3, B-2, C-1, D-4
(2) A-3, B-1, C-2, D-4
(3) A-2, B-1, C-4, D-3
(4) A-2, B-3, C-4, D-1

16. For a long pipe carrying liquid from one reservoir to another, at the exit section of the pipe, the energy grade line will

- (1) meet the liquid substance
(2) lie at a distance ($v^2/4g$) below the liquid surface
(3) lie at a distance ($v^2/2g$) above the liquid surface
(4) lie at a distance ($v^2/2g$) below the liquid surface

17. Settling velocity of a spherical body is expressed by _____

- (1) Reynolds law
(2) Stokes law
(3) Newton's law
(4) Darcey's law

18. Nominal mix proportion equivalent to M20 grade of concrete is

- (1) 1:1½:3
(2) 1:1:2
(3) 1:3:6
(4) 1:4:8



19. The required slope correction for a chain having a length of 'L' along a slope of θ is

- (1) $2L\cos^2(\theta/2)$
(2) $L\sin^2(\theta/2)$
(3) $L\cos^2(\theta/2)$
(4) $2L\sin^2(\theta/2)$

20. Consider the following statements.

- A. Spirit varnish is also called French varnish and used for furniture.
B. Oil varnishes use linseed oil as solvent.

Choose the correct option

- (1) Statement B is true, and A is false
(2) Both A and B are false
(3) Statement B is false, and A is true
(4) Both A and B are true

21. Which of the following compound contributes to strength development of cement concrete after 28 days ?

- (1) Dicalcium silicate
(2) Tricalcium aluminate
(3) Tetracalcium alumino-ferrite
(4) Tricalcium silicate

22. The expression for the length of tangent for simple circular curve is given by _____, where R is radius, α is deflection angle.

- (1) $R \tan \alpha/2$
(2) $2R \tan \alpha/2$
(3) $2R \sin \alpha/2$
(4) $R \sin \alpha/2$

23. Temporary hardness caused due to presence of

- (1) Nitrates
(2) Sulphates
(3) Carbonates
(4) Chlorides

24. Which of the following expressions is required to calculate the strength of shear reinforcement for single bar or single group of parallel bars, all bent-up at the same cross section ? The characteristic strength and the cross-sectional area of the bent-up bars are given by f_y and A_{sv} , respectively. The angle between the bent-up bar and the axis of the member is given by α .

- (1) $0.87 f_y A_{sv} \sin \alpha$
(2) $0.87 f_y A_{sv} (\sin \alpha + \cos \alpha)$
(3) $0.87 f_y A_{sv} \cos \alpha$
(4) $0.87 f_y A_{sv} \tan \alpha$



25. Which of the following statements is/are **INCORRECT** according to IS 456:2000 ?

In the following statements f_{ck} , f_y , and x_u are the characteristic compressive strength of concrete, characteristic strength of steel, and the depth of neutral axis respectively.

- A. The area of stress block in compression of a concrete structure in flexure is $0.36 f_{ck} x_u$.
- B. For the design, the compressive strength of a concrete structure is $\frac{f_{ck}}{1.15}$.
- C. The maximum strain in tensile reinforcement at failure shall not be less than $\frac{f_y}{1.15}$.
- D. The partial safety factor for the design compressive strength of concrete is 1.5.

Choose the correct option

- (1) A and D
- (2) A and C
- (3) B and D
- (4) B and C



26. Grain size classification also called as

- (1) IS classification
- (2) Textural classification
- (3) Unified soil classification
- (4) International classification



27. _____ is the number of vehicles occupying a unit length of a lane of roadway at given instant.

- (1) Basic Capacity
- (2) Traffic Density
- (3) Traffic Capacity
- (4) Traffic Volume



28. A square lamina (each side equal to 2 m) is submerged vertically in water such that the upper edge of the lamina is at a depth of 0.5 m from the free surface. What will be the depth (in m) of the centre of pressure ?

- (1) 23/18
- (2) 25/18
- (3) 29/18
- (4) 31/18



29. Which one of the following is **NOT** a sewer appurtenance ?

- (1) Flushing Tank
- (2) Manhole
- (3) Septic Tank
- (4) Grease and Oil trap



30. Which of the following is example for sub-surface source of water ?

- (1) Ponds
- (2) Ocean
- (3) River
- (4) Springs



31. A surveyor measured the distance between two points marked on the plan to a scale of 1 cm = 1 m (RF=1:100) and found it to be 40 m. Later he detected that he used the wrong scale of 1:50. Determine the correct length in meters.

- (1) 100
- (2) 80
- (3) 90
- (4) 70

32. What is the effective throat thickness of fillet weld size 6 mm if the angle between fusion

faces is 110° ?

- (1) 4.20 mm
- (2) 3.30 mm
- (3) 3.90 mm
- (4) 3.60 mm



33. The three lenses in a signal face from top at

Indian traffic junction are

- (1) Blue, Green, Red
- (2) Green, Amber, Red
- (3) Red, Blue, Green
- (4) Red, Amber, Green



34. Total suspended solids in a strong sewage in PPM

- (1) 200
- (2) 350
- (3) 100
- (4) 500



35. Examine the correctness of following statements.

- A. In whole circle bearing system, the bearing of a line varies from zero to 90 degrees
- B. The angle of dip at the equator is zero degree
- C. French cross staff is used to set out angles of either 45 or 90 degrees
- D. In quadrantal bearing system, the bearing of a line varies from zero to 360 degrees

Choose the correct option

- (1) Only B is correct
- (2) A and D are correct
- (3) Only D is correct
- (4) B and C are correct

36. Which type of precipitation is responsible for most of the heavy rains in India ?

- (1) Convective precipitation
- (2) Cyclonic precipitation
- (3) Orographic precipitation
- (4) Oceanic precipitation

37. An open tank contains 1m deep water with 50 cm depth of oil of specific gravity 0.8 above it. The intensity of pressure at the bottom of tank will be

- (1) 4 kN/m²
- (2) 12 kN/m²
- (3) 10 kN/m²
- (4) 14 kN/m²

38. Two points A and B located on a map has the following coordinates.

	Point A	Point B
Latitude	+50m	+30m
Departure	-30m	+40m

The length of AB in metres is

- (1) 22.4
- (2) 72.8
- (3) 80.6
- (4) 69.4

39. Which method is used for balancing the traverse when angular and linear measurements are equally precise ?

- (1) Transit rule
- (2) Sine rule
- (3) Simpson's rule
- (4) Bowditch rule



40. Which of the following statements is/are correct while designing a tension member ?

- A. The design strength of a plate in rupture requires gross effective area of the plate.
- B. The design strength of a plate in rupture requires net effective area of the plate.
- C. The design strength of a single angle in rupture requires gross area of the outstanding leg.
- D. The design strength of a single angle in rupture requires net area of the outstanding leg.

Choose the correct option

- (1) A and C
- (2) B and D
- (3) B and C
- (4) A and D

41. Match the number of reaction forces for the following connections.

- A. Free end 1. 0
- B. Fixed support 2. 1
- C. Hinged 3. 2
- D. Roller 4. 3

Choose the correct option

- (1) A-1, B-2, C-3, D-4
- (2) A-1, B-3, C-2, D-3
- (3) A-1, B-3, C-4, D-2
- (4) A-1, B-4, C-3, D-2

42. Which of the following is **NOT** a property of good sand ?

- (1) Good sand should be chemically inert
- (2) It should not contain any organic matter
- (3) It should be clean
- (4) It must contain salts that can attract moisture from the atmosphere

43. Lacings in compression members shall be designed to resist

- (1) Tensile force
- (2) Transverse shear
- (3) Compressive force
- (4) Bending

44. Which of the following is used as coagulant in treatment of water ?

- (1) $Al_2(SO_4)_3 \cdot 18H_2O$
- (2) $Al_2(SO_4)_3 \cdot 18H_2O$
- (3) $Al_2SO_4 \cdot 8H_2O$
- (4) $Al_2(SO_4)_3 \cdot 8H_2O$

45. Porosity of soil mass is defined as the ratio between

- (1) Volume of voids to volume of solids
- (2) Volume of voids to total volume of soil mass
- (3) Volume of soil mass to total volume of voids
- (4) Volume of solids to volume of voids



46. A graph showing variations of discharge with time a particular point of stream is called as

- (1) Hyetograph
- (2) Hygrograph
- (3) Hydrograph
- (4) Isohyet



47. The most commonly used transition curve in Indian highways is

- (1) Simple circular curve
- (2) Spiral curve
- (3) Compound curve
- (4) Parabolic curve



48. Which of the following statements is/are correct ?

- A. The stiffness of an axially loaded prismatic bar is inversely proportional to the length of the bar.
- B. The stiffness of an axially loaded prismatic bar is inversely proportional to the cross-sectional area of the bar.
- C. The flexibility of an axially loaded prismatic bar is inversely proportional to the length of the bar.
- D. The flexibility of an axially loaded prismatic bar is inversely proportional to the cross-sectional area of the bar.

Choose the correct option

- (1) A and C
- (2) B and D
- (3) B and C
- (4) A and D

49. Identify the correct relation among coefficient of discharge (C_d), co-efficient of velocity (C_v) and co-efficient of contraction (C_c).

- (1) $C_v = C_d * C_c$
- (2) $C_d = C_c * C_v$
- (3) $C_c = C_v + C_d$
- (4) $C_d = C_c + C_v$



50. The compressive strength of a second class brick is

- (1) 12 N/mm²
- (2) 7.0 N/mm²
- (3) 10.5 N/mm²
- (4) 4.0 N/mm²

51. A pitot tube is an instrument for measuring

- (1) pressure of flow
- (2) velocity of flow
- (3) discharge of fluid
- (4) total energy



52. Total station only measures

- (1) Vertical angles only
- (2) Slope distances only
- (3) Horizontal angles only
- (4) Horizontal, and vertical angles and slope distances



53. First class bricks are used for

- (1) Brick ballast in R.C.C.
- (2) Low height walls and soak pit walls
- (3) Boundary walls
- (4) Pavements and Load bearing walls

54. Septic tank is a

- A. Settling tank
- B. Digestion tank
- C. Aeration tank

The correct answer is

- (1) Only A
- (2) A and C
- (3) A and B
- (4) Only C

55. The unit of payment of cement concrete in lintels is

- (1) kilograms
- (2) square metre
- (3) cubic metre
- (4) tonne



56. Which of the following statements is/are correct ?

- A. The rate of change of shear force at any point along the axis of a beam is represented by the load intensity at that point.
- B. The rate of change of bending moment at any point along the axis of a beam is represented by the load intensity at that point.
- C. The second order derivative of bending moment at any point along the axis of a beam is represented by the load intensity at that point.
- D. The rate of change of shear force at any point along the axis of a beam is not represented by the load intensity at that point.



Choose the correct option

- (1) B and D
- (2) A and B
- (3) A and C
- (4) C and D

57. Consider the following statements

- A. Ashlar masonry uses dressed and faced stones cut into proper dimensions.
 B. Rubble masonry consists of square and rectangular stones that are roughly dressed.

Choose the correct option

- (1) Statement B is true, and A is false
 (2) Both A and B are false
 (3) Statement B is false, and A is true
 (4) Both A and B are true

58. Specific gravity of solids is the ratio of

- (1) Unit weight of solids to unit weight of water
 (2) Unit weight of water to Bulk unit weight of soil
 (3) Bulk unit weight of soil to unit weight of water
 (4) Unit weight of solids to Bulk unit weight of soil

59. What is the maximum bending moment of a simply supported beam of length L loaded with a uniformly distributed load w per unit length over one half of the span?

- (1) $\frac{wL^2}{8}$
 (2) $\frac{9wL^2}{64}$
 (3) $\frac{3wL^2}{128}$
 (4) $\frac{9wL^2}{128}$

60. Which of the following statements is/are correct for the analysis of a plane truss?

- A. The number of equilibrium equations is 2 for method of joints.
 B. It is possible to find more than two unknown forces at a joint by the method of joints.
 C. The number of possible equilibrium equation is 2 for method of section.
 D. It is possible to find more than two unknown forces at a joint by the method of section.

Choose the correct option

- (1) A and C
 (2) B and D
 (3) A and D
 (4) B and C

61. If the formation level of a highway has a uniform gradient for a particular length, and the ground is also having a longitudinal slope, the earthwork **CANNOT** be calculated by

- (1) Mid-section formula
 (2) Prismoidal formula
 (3) Trapezoidal formula
 (4) Centre line method

62. For a cantilever beam of length L with a clockwise moment M at its free end, the maximum bending moment will occur at:

- (1) Fixed support only
 (2) At the centre only
 (3) Free end only
 (4) Throughout the span L

63. If ' ν ' is the Poisson's ratio of material, what is the relationship between modulus of elasticity (E) and shear modulus of elasticity (G)?

- (1) $G = \frac{2E}{1 + \nu}$
 (2) $2G = \frac{E}{2(1 + \nu)}$
 (3) $G = \frac{E}{1 + \nu}$
 (4) $2G = \frac{E}{1 + \nu}$

64. The barometer is used to measure

- (1) Velocity of liquid
 (2) Pressure in pipes and channels
 (3) Atmospheric pressure
 (4) Difference of pressure between two points in a pipe

65. Before application, bricks are soaked in water

- (1) to prevent absorption of moisture from mortar by bricks
 (2) to reduce air content
 (3) to reduce efflorescence
 (4) to remove attached dust particles

66. Which water distribution system is more suitable for cities well planned roads?

- (1) Radial system
 (2) Grid iron system
 (3) Ring system
 (4) Dead end system

67. Identify the correct chezy's formula for velocity, where C -chezy's constant, m -Hydraulic mean depth, i -uniform bed slope.

- (1) $V = m(Ci)^{0.5}$
 (2) $V = i(mC)^{0.5}$
 (3) $V = C(mi)^{0.5}$
 (4) $V = C(mi)^{1.5}$

68. Inner dimension of a room are 5×4 m with 40 cm wall thickness, The central line length will be :

- (1) 21.8 m
(2) 20.0 m
(3) 19.6 m
(4) 21.4 m

69. The whole circle bearing of P and Q are $24^\circ 30'$ and $327^\circ 24'$ respectively. Then which of the following statements about the quadrantal bearing is/are correct ?

- A. The quadrantal bearing of P is $N 24^\circ 30' E$
B. The quadrantal bearing of P is $S 24^\circ 30' W$
C. The quadrantal bearing of Q is $N 32^\circ 36' E$
D. The quadrantal bearing of Q is $S 32^\circ 36' E$

Choose the correct option

- (1) A and C
(2) A and D
(3) B and D
(4) B and C

70. Slope or vertical alignment correction is

- (1) Additive
(2) Multiplicative
(3) Subtractive
(4) Additive and subtractive

71. Under which group the Residential buildings fall, as per NBC ?

- (1) Group D
(2) Group A
(3) Group C
(4) Group B

72. Arrange the following steps of production of cement in chronological order :

- A. blending the materials in the correct proportions
B. grinding the clinker and gypsum
C. crushing and grinding the raw materials
D. burning the prepared mix in a kiln

- (1) A, D, B, C
(2) A, B, C, D
(3) C, A, D, B
(4) A, C, D, B

73. What is the condition of pure bending for a beam with bending moment M ? The length of the beam is measured in x -direction and y is the deflection of the beam at any point.

- (1) $\frac{d^2 M}{dx^2} = 0$
(2) $\frac{dM}{dx} = 0$
(3) $\frac{d^2 y}{dx^2} = 0$
(4) $\frac{d^4 y}{dx^4} = 0$

74. If Duty is 1500 hec/cumec and base period of 150 days for an irrigated crop, the delta of the crop will be:

- (1) 86.4 cm
(2) 86.4 mm
(3) 864 cm
(4) 0.864 mm

75. A horizontal curve is to be designed in a region with a limited space. In this condition which of the followings is/are correct to decrease the radius of the curve ?

- A. Increase the super elevation
B. Decrease the super elevation
C. Increase the design speed
D. Decrease the design speed

Choose the correct option

- (1) A and C
(2) A and D
(3) B and C
(4) B and D

76. Match the following instruments with their usage.

Instrument	Usage
A. Tellurometer	1. Slope
B. Clinometre	2. Vertical angles
C. Pantagraph	3. Distance
D. Theodolite	4. To set perpendiculars
E. Prism square	5. Reproduce Maps

Choose the correct option

- (1) A-4, B-3, C-1, D-2, E-5
(2) A-1, B-4, C-2, D-3, E-5
(3) A-3, B-1, C-5, D-2, E-4
(4) A-3, B-5, C-4, D-2, E-1

77. The treatment of water with bleaching powder is known as

- (1) Pre-chlorination
(2) De-chlorination
(3) Super chlorination
(4) Hypo-chlorination

78. The art and science of collecting information about an object or an area without being the direct contact is called

- (1) Chain survey
(2) Levelling survey
(3) Compass survey
(4) Remote sensing survey



79. Which of the following are factors affecting runoff ?

- A. Intensity of rainfall
- B. Topography of catchment
- C. Wind velocity and direction
- D. Soil characteristics

Choose the correct option

- (1) B, C & D
- (2) A, B & D
- (3) A, C & D
- (4) A & B



80. Match the following statements with respect to a beam.

- | | |
|------------------------|--------------------------------------------------------------------|
| A. Hooke's law | 1. Vary linearly with bending moment. |
| B. Uniaxial stress | 2. Linear elastic material. |
| C. Curvature of a beam | 3. Depends on the perpendicular distance from the neutral surface. |
| D. Bending stress | 4. Vary inversely with moment of inertia |

Choose the correct option

- (1) A-1, B-2, C-3, D-4
- (2) A-2, B-3, C-1, D-4
- (3) A-4, B-1, C-3, D-2
- (4) A-4, B-2, C-3, D-1



81. As per IS 456:2000, what is the maximum strain in concrete at the outmost compression fibre in bending ?

- (1) 0.0030
- (2) 0.0020
- (3) 0.0015
- (4) 0.0035



82. The solidification of molten magma on the surface of earth, forms

- (1) sedimentary rock
- (2) metamorphic rock
- (3) granite
- (4) igneous rock



83. Match the following statements for a beam in pure bending.

- | | |
|---------------------------------------------------|------------------------------------------------------|
| A. Strains in beam in pure bending. | 1. Deformation takes place in an identical manner. |
| B. Longitudinal elements in beam in pure bending. | 2. Uniaxial stress. |
| C. Positive curvature in beam in pure bending. | 3. Vary linearly with distance from neutral surface. |
| D. All elements of a beam in pure bending. | 4. Shortening in longitudinal direction. |

Choose the correct option

- (1) A-4, B-1, C-2, D-3
- (2) A-1, B-2, C-3, D-4
- (3) A-3, B-2, C-4, D-1
- (4) A-2, B-4, C-1, D-3



84. The correct relation between Theoretical Oxygen Demand (TOD), Biochemical Oxygen Demand (BOD) and Chemical Oxygen Demand (COD) is given by

- (1) TOD > BOD > COD
- (2) BOD > COD > TOD
- (3) TOD > COD > BOD
- (4) COD > BOD > TOD



85. The minimum camber provided in Earthen road is

- (1) 1 in 50 to 1 in 60
- (2) 1 in 40 to 1 in 50
- (3) 1 in 33 to 1 in 40
- (4) 1 in 25 to 1 in 33



86. Anallatic lens is associated with

- (1) Tachometry survey
- (2) Chain survey
- (3) Compass survey
- (4) Theodolite survey

87. The stress and strain of a bar with a modulus of elasticity E in axial tension are found as σ and ϵ , respectively. What is the strain energy density of the bar ?

- (1) $\frac{\sigma^2 E}{2}$
- (2) $\frac{\epsilon E}{2}$
- (3) $\frac{\epsilon^2 E}{2}$
- (4) $\frac{\sigma E}{2}$



88. The magnitude of super-elevation depends on

- A. Speed of vehicle
- B. Radius of curve
- C. Road capacity
- D. Density of traffic

Choose the correct option

- (1) A and D
- (2) B and C
- (3) C and D
- (4) A and B



89. What is the intermediate sight distance if the SSD is 100m ?

- (1) 150
- (2) 200
- (3) 100
- (4) 500



90. In the flexible pavements, the Base course will be

- (1) Between subgrade and sub base course
- (2) Above wearing course
- ~~(3)~~ Between sub base and wearing course
- (4) Below sub base course

91. Which of the following is non-recording type of raingauge ?

- (1) Tipping bucket raingauge
- ~~(2)~~ Simon's raingauge
- (3) Siphon's raingauge
- (4) Weighing bucket type raingauge

92. The amount of coagulant needed for coagulation of water increases with

- A. Increase in turbidity of water
- B. Decrease in turbidity of water
- C. Increase in temperature of water
- D. Decrease in temperature of water

The correct answer is

- (1) A and B
- (2) B and C
- ~~(3)~~ A and D
- (4) B and D



93. Which of the following statements is/are correct ?

- A. The forces are represented by the directions only in the polygon law of forces.
- B. In the triangular law of forces, the resultant force is shown in the same order as the applied forces.
- C. In the parallelogram law of forces, the forces are acting simultaneously on a body.
- D. In the triangular law of forces, the resultant force is shown in the reverse order of the applied forces.

- (1) A and B
- (2) A and C
- ~~(3)~~ C and D
- (4) B and D



94. If the dynamic viscosity of a fluid is 0.5 poise and specific gravity is 0.5, then the kinematic viscosity of that fluid in stokes is

- (1) 0.25
- ~~(2)~~ 1.0
- (3) 0.50
- (4) 1.5



95. Match the following :

- | | |
|-------------------|------------------------------------------------------------------------------------------------------------------|
| A. Quick lime | 1. high calcium oxide content, sets and hardens by the absorption of CO ₂ from atmosphere |
| B. Fat lime | 2. lime obtained after the calcination of limestone |
| C. Hydrated lime | 3. contains small quantities of silica, alumina, iron oxide in chemical combination with calcium oxide component |
| D. Hydraulic lime | 4. lime obtained by sprinkling water to quick lime |

Choose the correct option

- ~~(1)~~ A-2, B-3, C-4, D-1
- (2) A-2, B-1, C-4, D-3
- (3) A-2, B-4, C-3, D-1
- (4) A-1, B-2, C-4, D-3



96. The ratio of BOD to COD is

- (1) Greater than 1
- (2) Always Greater than 7
- ~~(3)~~ Between 2 to 7
- (4) Always less than or equal to 1



97. Water content of soil mass is defined as

- (1) Ratio of weight of solids to the weight of water
- (2) Ratio of volume of voids to volume of water in voids
- (3) Ratio of volume of water in voids to volume of voids
- ~~(4)~~ Ratio of weight of water to the weight of solids

$$w = \frac{W_w}{W_s}$$

98. Consider the following statements

- A. At high temperature plastic materials exhibits good stiffness, whereas at low temperature their hardness and strength increases.
- B. Plastic materials can be made ductile through blending process of fabrication.



Choose the correct option

- (1) Statement B is true, and A is false
- (2) Both A and B are false
- ~~(3)~~ Statement B is false, and A is true
- (4) Both A and B are true



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99. Plinth area estimate is _____ as compared to the cubic rate estimate.

- (1) equally accurate
- (2) most accurate
- (3) less accurate
- (4) similar



100. The pathogens can be killed by

- (1) Nitrification
- (2) Oxidation
- (3) Chlorination
- (4) Sedimentation

101. A short square column of sides 300 mm is reinforced with 4 numbers of 20 mm diameter bars. What is the ultimate load carrying capacity of the column considering minimum eccentricity less than 0.05 times the lateral dimensions ? Use M20 and Fe 415 as the grades of concrete and steel, respectively.

- (1) 20 cm
- (2) 21.10 cm
- (3) 20 mm
- (4) 21.30 mm



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102. A flow in which the quantity of liquid flowing per second is not constant is called

- (1) Streamline flow
- (2) Steady flow
- (3) Turbulent flow
- (4) Unsteady flow

103. The hydraulic mean depth for a circular pipe of diameter (d), when running full, is

- (1) $d/6$
- (2) $d/2$
- (3) $d/4$
- (4) d



104. Match the following for a steel structure in limit state of serviceability.

- | | |
|--------------------|-------------------------------------------------------------------------------------------------------------|
| A. Deflection | 1. Function of mass and Geometry |
| B. Fire resistance | 2. Unusually flexible structures (Height to effective width of lateral load resisting system exceeding 5:1) |
| C. Durability | 3. Elastic analysis |
| D. Vibration | 4. Environment and Degree of exposure |

Choose the correct option

- (1) A-2, B-1, C-3, D-4
- (2) A-4, B-3, C-2, D-1
- (3) A-1, B-2, C-3, D-4
- (4) A-3, B-1, C-4, D-2



105. Write the relationship between Water content(w), Void ratio(e), Specific gravity(G) and degree of saturation(S)

- (1) $e = wG/S$
- (2) $e = S/wG$
- (3) $w = G/eS$
- (4) $w = S/eG$



106. The dissolved oxygen level in natural unpolluted waters at normal temperature is found to be of the order of

- (1) 1 mg/liter
- (2) 100 mg/liter
- (3) 10 mg/liter
- (4) 1000 mg/liter

107. Non silting and non scouring velocity is known as

- (1) Chezy's velocity
- (2) average velocity
- (3) standard velocity
- (4) critical velocity



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108. A cross regulator helps in

- (1) increasing supply in the parent channel
- (2) decreasing water depth in the parent channel
- (3) increasing supply in the offtake channel
- (4) effective removal of silt



109. For a rectangular channel (width b and depth of flow d) to be most economical, the hydraulic mean depth should be

- (1) $b/3$
- (2) $b/2$
- (3) $d/3$
- (4) $d/2$



110. Which statements is/are correct with respect to the minimum reinforcement requirement for designing a slab ?

- A. 0.15% of the total cross-sectional area for mild steel bars.
- B. 0.12% of the effective cross-sectional area for HYSD bars.
- C. 0.15% of the effective cross-sectional area for mild steel bars.
- D. 0.12% of total cross-sectional area for HYSD bars.

Choose the correct option

- (1) A and B
- (2) A and D
- (3) B and C
- (4) C and D

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P.T.O.



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111. A column pinned supports with length L has the radius of gyration r . The modulus of elasticity is E . The critical stress of the simply supported column due to the Euler critical load can be given by :

(1) $\frac{\pi^2 E r^2}{2L^2}$

(2) $\frac{\pi^2 E r^2}{L^2}$

(3) $\frac{4\pi^2 E r^2}{L^2}$

(4) $\frac{2.046\pi^2 E r^2}{L^2}$

112. Match the following defects in timber with their description :

- | | |
|-----------------|---------------------------------------------------------------------------|
| A. Heart shakes | 1. develop between annual rings and separate them partly |
| B. Ring shakes | 2. spread from pith to sapwood following the directions of medullary rays |
| C. Star shakes | 3. completely separate the annual rings |
| D. Cup shakes | 4. outside of timber from bark to the sapwood |

Choose the correct option

- (1) A-2, B-3, C-4, D-1
 (2) A-1, B-2, C-3, D-4
 (3) A-2, B-4, C-3, D-1
 (4) A-1, B-2, C-4, D-3

113. A simply supported beam of clear span 4 m carries a uniformly distributed load of 25 kN/m. The cross section of the beam is 250 mm × 450 mm. The beam is resting on 300 mm thick brick walls running perpendicular to the axis of the beam. The effective depth of the beam is 420 mm. What is the effective span of the beam ?

(1) 4.25 m

(2) 4.42 m

(3) 4.30 m

(4) 4.45 m

114. Consider the following statements.

- A. Plain Cement Concrete is very weak in tension.
 B. Steel is very weak in Compression.

Identify the correct statement

- (1) Statement B is true, and A is false
 (2) Both A and B are false
 (3) Statement B is false, and A is true
 (4) Both A and B are true



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115. Which of the following statements are correct for the bending strength of a laterally supported steel beam ?

- A. Bending strength requires elastic section modulus of the cross section for plastic and compact sections.
 B. Bending strength requires plastic section modulus of the cross section for plastic and compact sections.
 C. Bending strength requires ultimate stress of the material.
 D. Bending strength requires yield stress of the material.

(1) A and C

(2) B and C

(3) A and D

(4) B and D

116. Pascal-second is the unit of

- (1) pressure
 (2) dynamic viscosity
 (3) kinematic viscosity
 (4) surface tension

117. The number of vehicles crossing a section of road per unit time at any selected period is

- (1) Traffic volume
 (2) Design capacity
 (3) Traffic density
 (4) Basic capacity

118. Consider the following statements

- A. English bond consist of a header and stretcher alternatively arranged in each course.
 B. Flemish bond consist of alternate courses of header and stretcher.

Choose the correct option

- (1) Statement B is true, and A is false
 (2) Both A and B are false
 (3) Statement B is false, and A is true
 (4) Both A and B are true

119. From the following estimates which estimate will NOT give cost ?

- (1) Detailed estimate
 (2) Cubic rate method of estimate
 (3) Abstract estimate
 (4) Plinth area method of estimate




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120. _____ demarcates the boundary between shoulders and the pavement.

- (1) Drop 
- (2) Drain
- (3) Kerb
- (4) Wearing coat

121. Which of the following is example for sub surface irrigation ?

- (1) Drip irrigation 
- (2) Flow irrigation
- (3) Sprinkler irrigation
- (4) Furrow irrigation


122. What is the magnitude of coefficient of thermal expansion for the Cement Concrete ?

- (1) $18 \times 10^{-6}/^{\circ}\text{C}$ to $20 \times 10^{-6}/^{\circ}\text{C}$
- (2) $12 \times 10^{-6}/^{\circ}\text{C}$ to $14 \times 10^{-6}/^{\circ}\text{C}$
- (3) $6 \times 10^{-6}/^{\circ}\text{C}$ to $8 \times 10^{-6}/^{\circ}\text{C}$
- (4) $8 \times 10^{-6}/^{\circ}\text{C}$ to $10 \times 10^{-6}/^{\circ}\text{C}$


123. Which of the following cannot be the value of absolute pressure of a fluid at any point?

- (1) 0
- (2) -10 bar
- (3) 13 bar
- (4) 2 bar

124. The shape of the STOP signs according to IRC : 67-2001 is

- (1) Rectangular
- (2) Circular 
- (3) Octagonal
- (4) Triangular

125. The percentage of steel to be assumed, for its estimation, in the absence of detailed drawings, for Column :


- (1) 1.0 to 6.0% 
- (2) 7.0 to 10.0%
- (3) 6.0 to 8.0%
- (4) 10.0 to 15.0%

126. As per IS 800:2007, what is the partial safety factor for welds in field fabrication process ?

- (1) 1.20
- (2) 1.25
- (3) 1.10
- (4) 1.50




127. Theodolite is used for measuring

- (1) Horizontal angles only
- (2) Horizontal and vertical angles
- (3) Vertical angles only 
- (4) Linear measurements

128. In long and short wall method of estimation, the length of long wall is the centre to centre distance between the walls and


- (1) breadth of the wall on each side
- (2) one fourth breadth of wall on each side
- (3) half breadth of wall on each side
- (4) one third breadth of wall on each side

129. The disease Dysentery is caused due to the presence of organism in water


- (1) Salmonella typhi 
- (2) Vibrio cholerae
- (3) Entamoeba histolytica
- (4) Virus

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130. Le-Chatelier apparatus is used for measuring

- (1) Fineness of cement 
- (2) Soundness of cement
- (3) Pores in the brick
- (4) Specific gravity of cement

131. In steady flow through a pipe the density, velocity and area of a section are 3 kg/m^3 , 8 m/s and 0.5 m^2 respectively. The velocity at another section having area of 1 m^2 and density of 4 kg/m^3 will be

- (1) 2 m/s 
- (2) 4 m/s
- (3) 3 m/s
- (4) 1 m/s

132. Heavy mortars have a bulk density equal to or greater than _____

- (1) 500 kg/m^3
- (2) 1500 kg/m^3
- (3) 1000 kg/m^3
- (4) 2500 kg/m^3

133. The coefficient of discharge venturimetre, lies between

- (1) 0.3 to 0.45
(2) 0.75 to 0.95
(3) 0.50 to 0.75
(4) 0.95 to 1.0

134. Lap length for the bars in flexural tension shall be

- (1) L_d (Development length)
(2) Greater of L_d or 30 times diameter of bar
(3) Greater of $2L_d$ or 30 times diameter of bar
(4) Least of L_d or 30 times diameter of bar

135. A syphon aqueduct is provided when

- (1) the canal bed level is well below the flood level of the drain
(2) the drain bed level is well below FSL of the canal
(3) the canal bed level lies between the bed level and HFL of the drain
(4) the canal bed level lies above the bed level and HFL of the drain

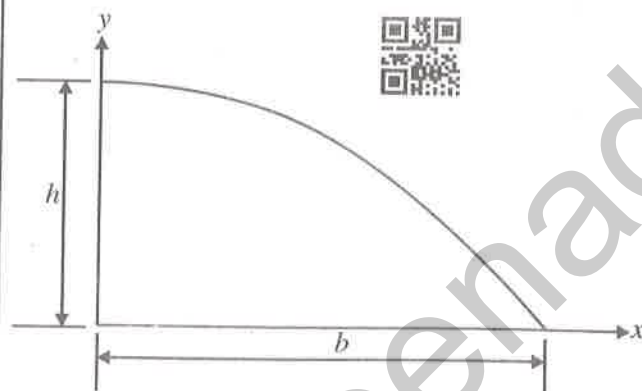
136. Consider the following statements

- A. Raft is spread across the entire area of the building to support heavy structural loads from columns and walls.
B. Mat foundation is used to transfer heavy loads from the structure to a hard rock strata much deep below the ground level.

Choose the correct option

- (1) Statement B is true, and A is false
(2) Both A and B are false
(3) Statement B is false, and A is true
(4) Both A and B are true

137. What is the moment of inertia in y -direction of the parabola as shown in the figure with respect to its centroid ?



- (1) $\frac{2hb^3}{15}$
(2) $\frac{19hb^3}{480}$
(3) $\frac{8hb^3}{175}$
(4) $\frac{9hb^3}{280}$

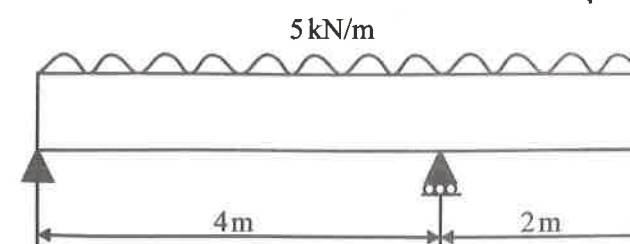
138. Consider two forces in a cartesian x - y coordinate system. Match the following for the forces :

- | | |
|-----------------------------------|-----------------------------------------------------------------------------|
| A. Collinear forces | 1. The forces are meeting at the origin of the x - y coordinate system. |
| B. Coplanar forces | 2. Both forces are acting on the xy plane but, do not meet at a point. |
| C. Concurrent forces | 3. Both forces are acting on the xy plane. |
| D. Coplanar non-concurrent forces | 4. Both forces are acting along the same line on the xy plane. |

Choose the correct option

- (1) A-3, B-4, C-1, D-2
(2) A-4, B-3, C-1, D-2
(3) A-1, B-2, C-4, D-3
(4) A-4, B-3, C-2, D-1

139. What is the maximum bending stress for the beam as shown in the figure ? The beam has rectangular cross-sectional area of $200 \text{ mm} \times 400 \text{ mm}$.



- (1) $1.57 \times 10^6 \text{ N/m}^2$
(2) $1.05 \times 10^6 \text{ N/m}^2$
(3) $1.87 \times 10^6 \text{ N/m}^2$
(4) $0.87 \times 10^6 \text{ N/m}^2$

140. When is the fluid called laminar?

- (1) Low viscosity
(2) Reynolds number is greater than 2000
(3) The density of the fluid is high
(4) Reynolds number is less than 2000

141. Arrange the steps of preparation of brick earth in chronological order :

- A. unsoiling
B. cleaning
C. digging
D. blending
E. weathering
F. tempering

- (1) A, B, C, D, E, F
(2) A, F, B, E, D, C
(3) A, C, B, E, D, F
(4) A, C, B, D, E, F

Handwritten notes: A, B, C, D, E, F, AFBEDC, AFBEDC

142. What is the correct increasing order of unknown reactions for the following beams with vertical loadings unless specified ?

- ☒ A. Propped cantilever beam
☐ B. Cantilever beam
☐ C. Beam with fixed at both ends under inclined loading
☐ D. Beam with fixed at both ends

- (1) A, B, D, C
 (2) B, A, D, C
 (3) C, A, B, D
 (4) A, B, C, D

143. Match the following statements for the critical buckling load of a column of length L with modulus of elasticity E , and moment of inertia I .

- A. Column with pinned joints at both end. 1. $\frac{20.19EI}{L^2}$
 B. Column with fixed at both ends. 2. $\frac{4\pi^2 EI}{L^2}$
 C. Column with fixed at one end and pinned at another end. 3. $\frac{\pi^2 EI}{4L^2}$
 D. Column with fixed at one end and free at another end. 4. $\frac{\pi^2 EI}{L^2}$

Choose the correct option

- ☒ (1) A-1, B-2, C-3, D-4
 (2) A-3, B-2, C-1, D-4
 (3) A-4, B-2, C-1, D-3
 (4) A-2, B-3, C-4, D-1

144. Hardness of water is measured by following method

- ☒ (1) EDTA method
 (2) NTU method
 (3) ETDA method
 (4) TH method

145. As per IS classification, the size of clayey soils is

- ☒ (1) Less than 0.02 mm
 (2) More than 0.002 mm
 (3) Less than 0.2 mm
☒ (4) Less than 0.002 mm

146. Arrange in the correct sequence of temporary adjustments given below.

- A. Levelling
☒ B. Centering
 C. Elimination of Parallax
 D. Setting

- (1) A-C-D-B
☒ (2) B-A-C-D
 (3) D-B-A-C
 (4) C-D-B-A

147. Which of the following is not a pozzolanic material ?

- (1) Fly ash
☒ (2) Cinder
 (3) Silica fume
☒ (4) Slag

148. The type of glass that consists of fine but solid rods of glass is known as :

- (1) Laminated glass
 (2) Heat resistant glass
☒ (3) Fibre glass
 (4) Float glass

149. The maximum effective slenderness ratio value of a tension member in which a reversal of direct stress occurs due to loads other than wind or seismic forces, is

- (1) 350
☒ (2) 180
 (3) 400
☒ (4) 250

150. The Maximum area of reinforcement for the RCC Beam according to IS 456:2000.

- (1) 0.12% of effective cross sectional area for HYSD bars
☒ (2) 0.8% gross cross sectional area for HYSD bars
 (3) 4% of gross cross sectional area for HYSD bars
 (4) 6% gross cross sectional area for HYSD bars

TSPSC-AE(CIVIL) KEY

Paper code:22161

Q.NO	KEY	Q.NO	KEY	Q.NO	KEY	Q.NO	KEY	Q.NO	KEY	Q.NO	KEY	Q.NO	KEY	Q.NO	KEY
1	1	21	4	41	4	61	4	81	4	101	*	121	1	141	
2	3	22	2	42	4	62	4	82	4	102	4	122	4	142	2
3	2	23	3	43	2	63	1	83	*	103	3	123	3	143	
4	3	24	1	44	1	64	3	84	3	104	4	124	3	144	1
5	1	25	4	45	2	65	1	85	4	105	1	125	1	145	
6	3	26	1	46	3	66	2	86	1	106	3	126	4	146	3
7	4	27	2	47	2	67	3	87	3	107	4	127	2	147	
8	3	28	4	48	4	68	3	88	4	108	1	128	1	148	
9	2	29	3	49	2	69	1	89	2	109	2	129		149	
10	3	30	4	50	2	70	3	90	3	110	2	130	2	150	
11	4	31	2	51	2	71	2	91	2	111	2	131	3		
12	2	32	2	52	4	72	3	92	3	112	1	132			
13	1	33	4	53	4	73	2	93	3	113	3	133	4		
14	3	34	4	54	1	74	1	94	2	114	3	134			
15	2	35	4	55	3	75	2	95	4	115	4	135	3		
16	3	36	3	56	3	76	3	96	4	116	2	136			
17	2	37	4	57	4	77	1	97	4	117	1	137	1		
18	1	38	2	58	1	78	4	98	1	118	1	138	2		
19	4	39	4	59	4	79	2	99	3	119	1	139	3		
20	4	40	3	60	3	80	2	100	3	120	3	140	4		