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- 2019 नंतर तसेच लगतच्या काळात TCS व्दारे घेण्यात आलेल्या All Direct Recruitment Exams च्या सर्व प्रश्नपत्रिका समाविष्ट
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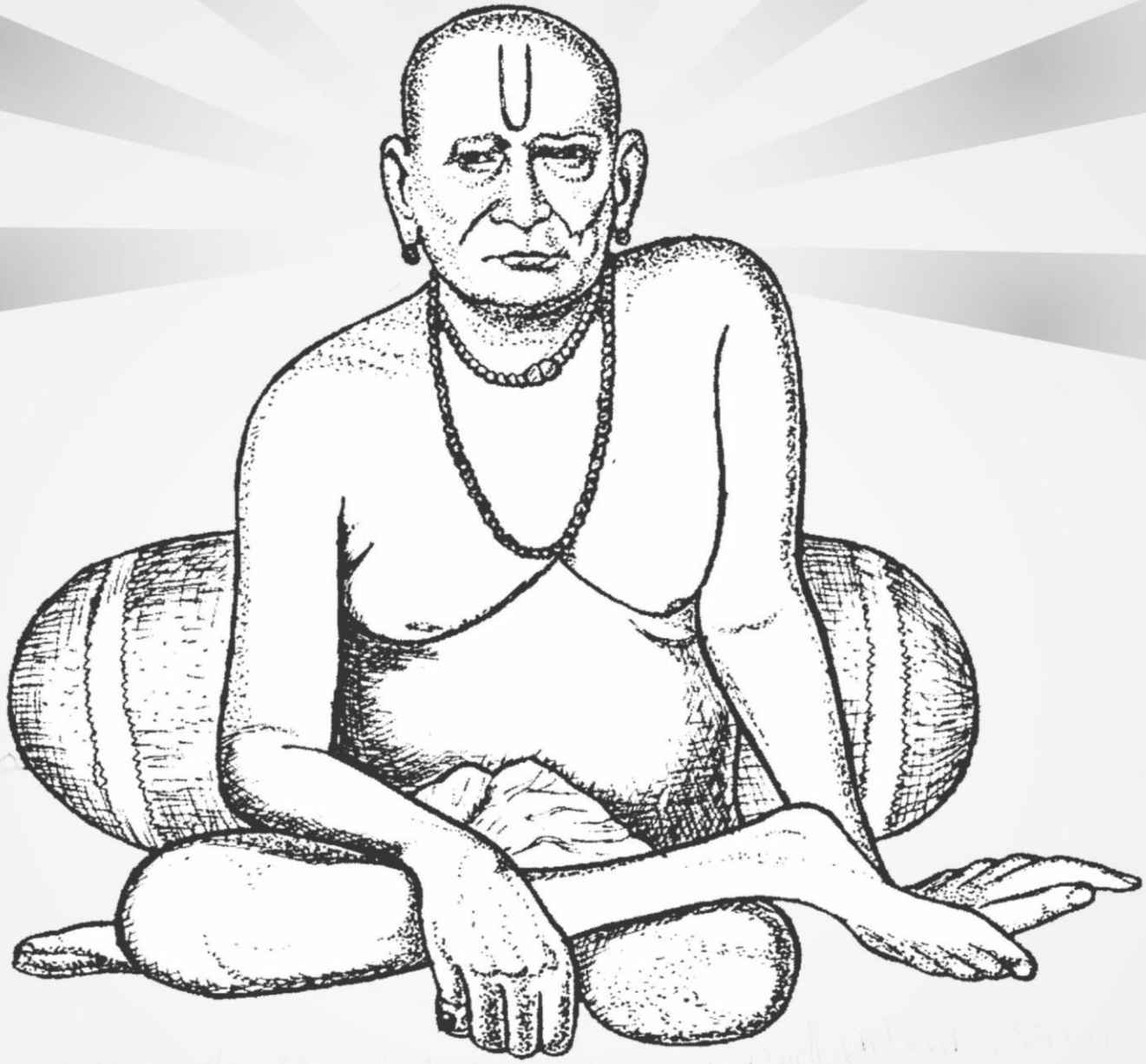

श्रीस्वामी समर्थ...

स्वामींच्या चरणी अर्पण ...

प्रस्तावना

विद्यार्थी मित्रांनो,

स्थापत्य अभियांत्रिकीच्या (Diploma/Degree Civil Engineering) विद्यार्थ्यांसाठी उपयुक्त १२०००+ MCQ's या पुस्तकाची पहिली आवृत्ती आपणांसमोर सादर करताना आम्हाला अत्यंत आनंद होत आहे . या अगोदरच्या इन्फिनिटी प्रकाशनाच्या 6000+ MCQ's व 10000+ MCQ's या पुस्तकांना आपण भरभरून प्रतिसाद दिला याबद्दल आपले सर्वांचे आभार. 2019 नंतर TCS/IBPS या कंपन्या सरळसेवा भरती परीक्षा घेऊ लागल्या आणि या प्रश्नपत्रिकेतील प्रश्नांच्या काठिन्य पातळीचे विश्लेषण केले असता असा ट्रेंड लक्षात आला आहे की पुढील परीक्षांसाठी 2019 च्या अगोदरची प्रश्नपत्रिका, पुस्तके किंवा अभ्यास साहित्य उपयोगात येत नाही. लगतच्या काळात झालेल्या सरळसेवा भरतीच्या प्रश्नपत्रिका बघितल्यास प्रश्नांची काठीण्य पातळी उंचावलेली आहे. IBPS जर परीक्षा घेत असेल तर Non-Technical च्या प्रश्नांची काठीण्य पातळी जास्त असते मुख्यत: Reasoning सारख्या विषयांची. TCS च्या प्रश्नपत्रिकेतील Technical विषयाचे काही प्रश्न Out of Box असतात. हे आमचे निरीक्षण आहेत , या सर्वांचा आढावा घेऊन आम्ही 12000+ पुस्तक सादर करीत आहोत.

हे पुस्तक तुम्हाला कनिष्ठ अभियंता (JE) ,स्थापत्य अभियांत्रिकी सहाय्यक (CEA), रचना सहाय्यक (TPA) तसेच इतर सरळसेवा पदांसाठी व सार्वजनिक बांधकाम विभाग (PWD), जलसंधारण विभाग (WCD), जलसंपदा विभाग (WRD), नगरपरिषद (NP), महानगरपालिका (MNC), जिल्हा परिषद (ZP) व इतर विभागातील पदभरती अभ्यास करण्यासाठी एक उत्तम पर्याय असेल.

या पुस्तकात केंद्रीय तसेच इतर राज्यातील विविध तांत्रिक पदभरती परीक्षेतील प्रश्नांच्या उत्तरांचे अचूक स्पष्टीकरण अनुभवी शिक्षकांनी तयार केलेले आहेत. TCS ने महाराष्ट्रात घेतलेल्या सर्व प्रश्नपत्रिका यामध्ये समाविष्ट आहे तसेच नॉन-टेक्निकलचे सर्व प्रश्न उत्तरे E-Book च्या माध्यमातून आपल्याला उपलब्ध करून देत आहोत, जेणेकरून आपल्या सोयीनुसार आपण केव्हाही आणि कोठेही त्या विषयांचा सराव करू शकणार.

या पुस्तकाची खासियत म्हणजे यामध्ये सर्व प्रश्न हे विषयवार वेगवेगळे केलेले आहेत, ज्यामुळे विद्यार्थ्याला अभ्यासामध्ये एक योग्य दिशा मिळेल आणि Smart study करता येईल.

आम्ही इन्फिनिटी अकॅडमी प्रकाशन विभाग, तांत्रिक विभाग आणि सर्व इन्फिनिटी परिवारांमधील स्टाफ चे आभार मानतो की त्यांनी हे पुस्तक कमी वेळेत पूर्ण केले. हे पुस्तक अचूक बनवण्याचा सर्वतोपरी प्रयत्न आम्ही केलेला आहे तरी जर तुम्हाला यामध्ये काही त्रुटी आढळून आल्या तर खालील दिलेल्या क्रमांकावर आपण संपर्क साधू शकता.

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विदयार्थी मित्रांनो,

12000+ MCQs, या पुस्तकात 2019 नंतर TCS द्वारे घेण्यात आलेल्या 100 हून अधिक प्रश्नपत्रिकांचा समावेश करण्यात आलेला आहे. नजीकच्या काळात TCS द्वारे महाराष्ट्रात घेण्यात आलेल्या परिक्षांचे विश्लेषण केले असता असे लक्षात येते की TCS द्वारे इतर राज्यांमध्ये घेण्यात आलेले प्रश्नांची महाराष्ट्रात घेण्यात आलेल्या परीक्षांमध्ये पुनरावृत्ति करण्यात आलेली आहे. **या पुस्तकात समाविष्ट परिक्षांची सुची खाली नमुद केली आहे.**

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CGPSC AE 2022	Kerala PSC (PWD) Overseer 2023	SSC JE 2022
DDA 2022	Kerala PSC 2023	SSC JE 2023
DDA Surveyor 2023	Kerala PSC Poly. Lect. 2023	TNPSC AE Civil 2022
DFCCIL - 2021	KPTCL AE 2022	TNPSC Draughtsman 2022
DSSSB AE.2024	Lucknow Cant Board AE 2022	TNPSC Surveyor 2022
DSSSB JE 2022	MP Vyapam Sub Engg. 2022	Tripura JE 2023
ESE Pre. 2023	MPPGCL JE 2024	TSPSC ARCH ENGG. 2023
GAIL JE.2023	MPPSC AE 2023	TSPSC Lecturer 2023
GETCO VS JE 2022	MPSC MES 2022	UKPSC JE 2023
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GPSC WSSB EE 2023	NBCC SITE INSPECTOR 2021	UPSC ESIC JE 2023
GSECL JE 2022	NCL Surveyor 2021	UPSSSC 2023
GSSSB Planning Assistant 2024	NHPC JE 2022	WBPSC JE 2023
HPCL JE 2022	NHPC Supervisor 2023	WBPSC Sub Engg. 2022
HPPSC AE 2023	NMDC JO 2022	

Dear students, it is observed that syllabus for upcoming exams is based on various exams conducted by ***TCS and State PSCs*** *such as* ***DSSSB, NBCC JE, ONGC, JKSSB JE, UPPCL AE, MPSC, GPSC etc.*** *It is fruitful to study and recall all technical theories from a short and crisp notes and formulae to boost your confidence to attempt all technical questions.*

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SURVEYING

QUESTIONS

1.1 INTRODUCTION

1. A station is affected by local attraction if _____
A. there is a magnetic dip
B. the magnetic needle deviates from true north
C. the magnetic needle deviates from magnetic north
D. the magnetic needle does not remain stationary
NMC CEA 2025

2. Which of the following units does a representative fraction have?
A. Decimetre
B. It is independent of units.
C. Centimetre
D. Metre
NMC CEA 2025

3. Isogonic lines _____ .
A. form closed circles with the equator at the centre
B. radiate from the North and South magnetic regions and follow irregular paths
C. form closed circles with the North Pole as the centre
D. form closed spheroidal shapes with the equator at the centre
NMC CEA 2025

4. Which of the following helps in detecting local attraction?
A. Difference in the fore bearing and back bearing of a survey line.
B. Difference in the slope between two stations of a survey line.
C. Difference in the true bearing and magnetic bearing of a survey line.
D. Difference in the elevations of the two points of a survey line.
NMC CEA 2025

5 Which of the following can cause local attraction?
I: Magnetic rock below the ground
II: Rails
III: Field book for noting the observations
A. II and III only B. I and II only
C. III only D. II only
NMC CEA 2025

6. In chain surveying, an offset shall be taken _____
A. Whenever the outline of the object changes
B. Whenever the line deviates from a straight line
C. Whenever one chain length is exceeded
D. Whenever the length exceeds 5 m
NMC CEA 2025

7. The principle of 'working from whole to part' is applicable to:
A. both plane and geodetic surveying
B. only plane surveying
C. only traverse surveying
D. only geodetic surveying
NMC CEA 2025

8. Which of the following errors in chaining can be cumulative positive or negative?
A. Erroneous booking
B. Personal mistakes
C. Careless holding and marking
D. Erroneous length of chain
NMC CEA 2025

9. The biggest main survey line is called the _____ line.
A. tie B. check
C. base D. proof
NMC CEA 2025

10. Which of the following variations of magnetic declination is of periodic nature?
A. Annual variation B. Irregular variation
C. Secular variation D. Diurnal variation
NMC CEA 2025

11. The representative fraction for the engineer's scale 1 cm = 50 m is _____.
A. $\frac{1}{50}$ B. $\frac{1}{500}$ C. $\frac{1}{5}$ D. $\frac{1}{5000}$
NMC CEA 2025

12. Which of the following representative fractions represents the scale 2cm = 40 m' ?
A. $\frac{1}{2000}$ B. $\frac{2}{20}$
C. $\frac{2}{2000}$ D. $\frac{1}{20}$
NMC CEA 2025

13. The value of magnetic dip is_____ at the equator and _____ at the magnetic poles.
A. 0° ; 0° B. 0° ; 90°
C. 90°; 90° D. 45°; 45°
NMC CEA 2025

14. During a chaining operation, the follower calls out _____ to give a warning to the leader to stop.
A. Range B. Stop
C. Pin Down D. Chain

NMC CEA 2025

15. If a scale is represented by ' 1 cm = 10 m' then identify the correct statement from the following?

1.1 cm on plan represents 10 m on ground.

B. The above scale is same as 1mm = 10cm

C. Using the above scale, 12 cm on plan represents 1200 cm on ground.

D. The representative fraction for the above scale is $\frac{1}{10}$

NMC CEA 2025

16. Which of the following statements are true with respect to magnetic and true meridian?

Statement I: Magnetic meridian and true meridian are parallel to each other.

Statement II: The location of magnetic meridian at a place is not constant with time.

Statement III: True meridian is also called as astronomic meridian.

A. Statement I only

B. Statements I and II only

C. Statements I and III only

D. Statements II and III only

NMC CEA 2025

17. True meridian is established through _____ and magnetic meridian through _____ .

A. magnetic compass; astronomical observations

B. astronomical observations; astronomical observations

C. magnetic compass; magnetic compass

D. astronomical observations; direction given by magnetic compass

NMC CEA 2025

18. Which of the following is a fundamental principle of surveying?

A. Work should be conducted from whole to part

B. Surveying work should always start from higher elevations

C. The use of compasses is mandatory in all surveys

D. Surveying should always be conducted using total stations

NMC JE 2025

19. What is the best way to set up a back sight for a new survey?

A. Position the total station on the tripod.

B. Use a prism carrier and tribrach on a tripod.

C. Measure the distance to the reference point.

D. Use a small level to find the position.

NMC JE 2025

20. A. Read the following statements related to geodetic surveying and determine whether they true or false.

S1: The type of surveying in which the shape of the earth is taken into account.

S2: All lines lying in the surface are curved lines and the triangles are spherical triangles.

A. Both S1 and S2 are true

B. Both S1 and S2 are false

C. S1 is true and S2 is false

D. S2 is true and S1 is false

WCD 2024

21. The surveys that are carried out to depict the topography of the mountainous terrain, rivers, water bodies, wooded areas, and other cultural details such as roads, railways, townships, etc., are called…….

A. City surveys

B. Cadastral surveys

C. Engineering surveys

D. Topographical surveys

WCD 2024

22. Geodetic surveying is conducted by the Survey of India department and is carried out over an area exceeding..... .

A. 150 km^2 B. 200 km^2

C. 50 km^2 D. 250 km^2

WCD 2024

23. Which of the fo il owing surveys is conducted to measure the elevation n of points on the ground surface and to determine the contour of the land?

A. Mining survey

B. Topographical survey

C. Hydrographical survey

D. Astronomical survey

WCD 2024

24. Which type of survey is primarily used to establish the relative positions of points on the Earth's surface?

A. Engineering survey

B. Hydrographic survey

C. Topographical survey

D. Geodetic survey

WCD 2024

25. What happens to the RF if the size of the drawing is increased while the actual size of the object remains constant?

A.RF becomes zero B.RF decreases

C.RF remains the same D.RF increases

MH TPA 2024

ANSWER KEY

QUE	ANS	QUE	ANS	QUE	ANS	QUE	ANS	QUE	ANS
1	C	21	D	41	C	61	A	81	B
2	B	22	D	42	A	62	D	82	C
3	B	23	B	43	B	63	C	83	B
4	A	24	D	44	B	64	A	84	C
5	B	25	D	45	A	65	B	85	B
6	A	26	D	46	A	66	D	86	B
7	A	27	D	47	C	67	A	87	A
8	D	28	C	48	C	68	C	88	C
9	C	29	B	49	C	69	D	89	C
10	D	30	B	50	D	70	A	90	C
11	D	31	C	51	A	71	C	91	A
12	A	32	A	52	D	72	B	92	D
13	B	33	A	53	C	73	C	93	C
14	B	34	A	54	A	74	D	94	B
15	A	35	A	55	B	75	C	95	C
16	D	36	A	56	D	76	D	96	A
17	D	37	D	57	D	77	A	97	D
18	A	38	D	58	C	78	B	98	C
19	B	39	A	59	B	79	D	99	C
20	A	40	A	60	A	80	B	100	B

EXPLANATIONS

1.1 INTRODUCTION

1. ANSWER :C

A station is affected by local attraction if the magnetic needle deviates from magnetic north.

2. ANSWER :B

A representative fraction is a ratio of two lengths: $\frac{map\ distance}{ground\ distance}$

Both distances are measured in the same units.

The units cancel out.

Therefore, a representative fraction is dimensionless.

3. ANSWER :B

Isogonic lines radiate from the North and South magnetic regions and follow irregular paths.

These lines represent the magnetic declination, which is the angle between magnetic north and true north at a given location.

The Earth's magnetic field is not perfectly aligned with its axis of rotation, causing this declination.

Isogonic lines help navigators and surveyors adjust for this difference when using a magnetic compass.

4. ANSWER :A

The difference in the fore bearing and back bearing of a survey line helps in detecting local attraction.

Local attraction is a phenomenon that affects magnetic compass readings due to local magnetic fields.

Ideally, the difference should be exactly 180 degrees. Any deviation from this indicates the presence of local attraction.

5. ANSWER :B

The correct answer is 2. I and II only. Local attraction, which causes a compass needle to deviate from true magnetic north, can be caused by magnetic rock below the ground and rails. Field books, used for recording observations, are not magnetic and do not cause local attraction.

6. ANSWER :A

Offsets are measured perpendicular (at right angles) from the survey line (chain line) to the object or feature.

This ensures accuracy in locating features relative to the chain line.

Offsets can be perpendicular (normal) or oblique, but the standard practice is to take perpendicular offsets.

7. ANSWER :A

The principle of "working from whole to part" means first estimating the total cost or overall quantities and then breaking them down into individual components.

This approach is typically followed in detailed estimates, where the entire project is considered first, then subdivided.

In contrast, abstracting from parts to whole is used in approximate or preliminary estimates.

8. ANSWER :D

Erroneous booking: This is a recording error, typically random, not cumulative.

Personal mistakes: These can be random and may or may not be cumulative

Careless holding and marking: Usually random and not cumulative.

Erroneous length of chain: This is a systematic error if the chain is longer or shorter than the standard length.

It accumulates positively or negatively over the entire length measured.

9. ANSWER :C

In surveying, the base line is the longest and most important main survey line. It is:

- Laid with great precision.
- Used as a reference for setting out other lines.
- The starting point for triangulation or other types of survey measurements.

10. ANSWER :D

Diurnal variation refers to daily periodic changes in the magnetic declination caused by the Earth's rotation and solar radiation effects.

It is periodic because it repeats every 24 hours.

11. ANSWER :D

Step 1: Convert 50 meters into centimetres (since R.F. is unitless ratio):

$$50m = 50 \times 100 = 5000cm$$

Step 2: the R.F. as a ratio of drawing length to actual length:

$$R.F. = \frac{1cm}{5000cm} = \frac{1}{5000}$$

12. ANSWER :A

Step 1: Convert 40 meters to centimetres:

$$40m = 40 \times 100 = 4000cm$$

Step 2: R.F. as a ratio of drawing length to actual length (both in cm):

ENGINEERING HYDROLOGY

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QUESTIONS

7.1 INTRODUCTION

1. What is the approximate cost of the building if the volume of the building is 500 m³ and the rate per cubic metre is ₹4,000?

A. ₹30,00,000 B. ₹25,00,000
C. ₹20,00,000 D. ₹8,00,000

NMC JE 2025

2. Hydrological cycle is the process of transfer of moisture from the atmosphere to earth in the form of _____.

A. percolation B. precipitation
C. evaporation D. infiltration

NMC JE 2025

3. What does water that reaches the streams shortly after it falls as rain called?

A. Direct runoff
B. Base flow
C. Basin recharge
D. Percolation down to groundwater

NMC JE 2025

4. The chain of various processes through which water passes from one form in order to return to the same form is called _____

A. infiltration B. percolation
C. precipitation D. hydrological cycle

NMC JE 2025

5. Which of the following term describes the movement of water through soil layers and rock formations and reach ground water table?

A. Percolation B. Transpiration
C. Runoff D. Sublimation

WCD 2024

6. Precipitation that infiltrates into the soil and reaches the groundwater is termed:

A. Infiltration B. Interception
C. Surface runoff D. Groundwater recharge

WCD 2024

7. Which of the following non-automatic rain gauges is being used by Indian Meteorological Department?

A. Tipping bucket type rain gauge.
B. Float type rain gauge.
C. Symon's Rain gauge
D. Weighing bucket rain gauge.

DSSSB JE 2022

8. The process where water-soluble parts in the soil such as Calcium Carbonate, are dissolved and washed out from the soil by rainfall or percolating subsurface water is called

A. Leaching B. Hardening
C. Weathering D. Curing

DSSSB JE 2022

9. Consider below statement with respect to runoff characters ties of streams and identity correct answer.
Statement A: The flow characteristics of a stream depends on some of the catchment characteristics such as type of soil, Land use cover, drainage etc.
Statement B - The flow characteristics of a stream is independent of rainfall characters ties.

A. Both statements are correct
B. Both statements are incorrect
C. Statement B is correct and A is incorrect
D. Statement A is correct and B is incorrect

ONGC - 2022

10. What should be the approximate quantity of surface water in moderately wet sand (in percentage by mass)?

A. B.5% B. 1.0%
C. 5% D. 7.5%

DFCCIL - 2021

11. The branch that deals with the study of surface water streams is called:

A. potamology B. streamology
C. hydrology D. limnology

HPCL JE 2022

12. A conventional flow duration curve is a plot between

A. Flow and percentage of time that a particular flow is equalled or exceeded
B. Duration of flooding and ground level elevation
C. Duration of water supply in a city and proportion of area receiving supply exceeding this duration
D. Flow rate and duration of time taken to empty a reservoir at that flow rate

GPSC AE 2022

13. In which of the following studies is hydrology NOT important?

A. Assessment of water resources
B. Study of floods
C. Study of Rainfall characteristics

ANSWER KEY

QUE	ANS	QUE	ANS	QUE	ANS	QUE	ANS	QUE	ANS	QUE	ANS
1	C	21	B	41	A	61	B	81	A	101	A
2	B	22	B	42	C	62	A	82	A	102	D
3	A	23	D	43	D	63	C	83	C	103	B
4	D	24	D	44	C	64	A	84	D	104	C
5	A	25	A	45	C	65	A	85	A	105	D
6	D	26	D	46	B	66	D	86	D	106	B
7	C	27	D	47	B	67	D	87	A	107	D
8	A	28	A	48	D	68	A	88	C	108	A
9	D	29	A	49	C	69	B	89	D	109	C
10	C	30	C	50	D	70	C	90	C	110	A
11	A	31	D	51	A	71	D	91	C	111	A
12	A	32	D	52	C	72	A	92	C	112	C
13	D	33	D	53	B	73	D	93	D	113	C
14	D	34	C	54	C	74	D	94	B	114	A
15	B	35	A	55	B	75	C	95	D	115	B
16	B	36	D	56	D	76	B	96	A	116	A
17	A	37	B	57	C	77	A	97	D	117	B
18	B	38	B	58	C	78	A	98	B	118	A
19	B	39	C	59	A	79	B	99	C	119	B
20	C	40	C	60	A	80	D	100	D	120	D

EXPLANATIONS

7.1 INTRODUCTION

1. ANSWER : C

To find the approximate cost of the building:
Cost = Volume × Rate per cubic metre
Given :
Volume 500 m³
Rate = ₹4,000 per m³
Cost = 500 × 4000 = ₹20,00,000
Answer: 3. ₹20,00,000

2. ANSWER : B

The hydrological cycle is the process of transfer of moisture from the atmosphere to Earth in the form of precipitation. So the correct answer is option 2. Precipitation

3. ANSWER : A

Water that reaches streams shortly after rainfall, without significant delay, is called direct runoff. It includes surface runoff and quick flow through the soil.
Base flow is the sustained flow in streams coming from groundwater.
Basin recharge refers to the process of water infiltrating and replenishing groundwater.
Percolation down to groundwater is water moving deeper into the soil to replenish aquifers.

4. ANSWER : D

The chain of various processes through which water passes from one form to another and back to its original form is called the hydrological cycle or water cycle

5. ANSWER :A

Infiltration: Movement of water into the soil from the earth's surface.
Percolation: Downward movement of water from one soil layer to a lower one.
Runoff: Volume of water that flows out of a catchment through an outlet or river.
Sublimation: Direct transition of a substance from solid to gas without becoming liquid.

6. ANSWER :D

Groundwater Recharge: Process where precipitation infiltrates the soil and replenishes underground water reserves.
Infiltration: Initial entry of water from the surface into the soil; may not always reach the groundwater table.
Interception: Precipitation temporarily held by vegetation (leaves, branches) before reaching the ground.
Surface Runoff: Water that flows over the land due to excess rain or snowmelt; it does not directly recharge groundwater.

7. ANSWER: C

Non-recording type rain gauges:
1) Symon's gauge: This is the non-recording type rain gauge commonly used in India by meteorological department.
Recording type rain gauges:
1) Natural syphon or float type: This type of rain gauge is adopted as a standard recording type rain gauge in India.
2) Weighing bucket type
3) Tipping bucket type

8. ANSWER: A

Leaching-: In it the land is flooded with the adequate depth of water. The alkali salts present in the soil, get dissolved in this water, which percolates down to join the water table or drained away by surface & sub-surface drains. The process is repeated till the salts in the top layer of land are reduced in such a way that some salt resistant crop can be grown. This process is called leaching.

9. ANSWER: D

Statement A is correct because the flow characteristics of stream like how fast the water is moving through cross section and this will be defends on type of soil load use cover drainage density etc.
Statement B is incorrect because flow characteristic like how fast the water is moving through cross section is depends on rainfall characteristic like amount intensity and duration etc.

10. ANSWER: C

As per IS 456:2000 table 10

Type of aggregate	Surface water in % by mass
Very wet sand	7.5
Moderate net sand	5.0
Moist sand	2.5
Moist gravel or unpolished rock	1.25 to 2.5

Coarser the particle the less surface water it will carry

THEORY OF STRUCTURE & STRUCTURAL ANALYSIS

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QUESTIONS

15.1 STABILITY OF STUCTURE

1. What among the following remains constant in a skew frame even after deformation?

A. Joint displacements
B. Support reactions
C. The length of all members
D. The angle between members

NMC JE 2025

2. According to IS 800:2007, the design stress for welds is based on which failure mode?

A. Shear failure
B. Tension failure
C. Bending failure
D. Buckling failure

NMC JE 2025

3. A reinforced concrete slab is classified as a two-way slab when:

A. the slab is simply supported on two opposite edges only
B. the longer span is more than twice the shorter span
C. the ratio of longer span to shorter span is less than 2
D. the slab carries load in only one direction

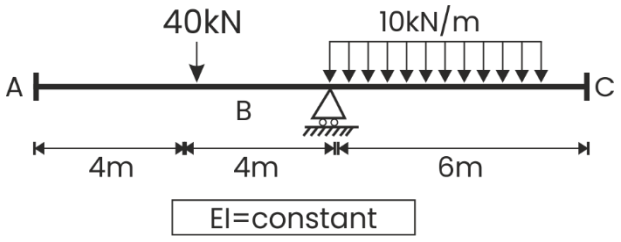
NMC JE 2025

C. As per IS 456: 2000, a reinforced concrete column is classified as a long column when its effective length to least lateral dimension ratio exceeds:

A. 10 B. 15
C.18 D.12

NMC JE 2025

4. The static indeterminacy of the following beam in 2D is……..



A. 3 B. 2
C. 0 D. 1

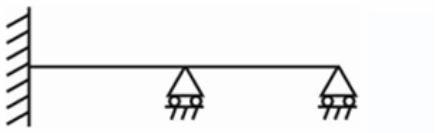
WCD 2024

5. The method of joints is primarily used to analyse :

A. Statically determinate trusses
B. Beams subjected to bending moment
C. Statically indeterminate trusses
D. Frames with rigid joints

WCD 2024

6 What is the value of degree of kinematic indeterminacy of the given beam?



A.4 B.3 C. 2 D.5

LATUR MNC 2024

7 Which type of frame it will be, if it has 5 joints and 6 members?

A. Perfect B. Redundant
C. Efficient D. Deficient

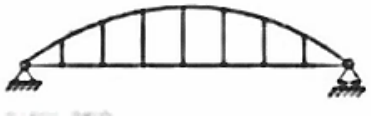
LATUR MNC 2024

8. For a stable and determinate frames, the following equation is valid

A. m < 2j-3 B. m=3j-4
C. m=2j-3 D. m>2j-3

DSSSB JE 2022

9. Determine the degree of static indeterminacy of the bow-string girder as shown in the given figure. Assume all joints to be rigid



A. 16 B. 24
C. 21 D. 0

DFCCIL-2021

10. The equation for degree of static indeterminacy=(m+r)-3) is true for which of the following frames, where m is the number of unknown member forces, r is unknown reaction components and j is the number of joints?

A. Rigid jointed space frame
B. Pin jointed plane frame
C. Rigid jointed plane frame
D. Pin jointed space frame

DFCCIL-2021

11. Propped cantilevers have-----degree(s) of indeterminacy.

A. two B. zero
C. three D. one

DFCCIL-2021

ANSWER KEY

QUE	ANS	QUE	ANS	QUE	ANS	QUE	ANS	QUE	ANS
1	D	21	C	41	B	61	B	81	B
2	A	22	D	42	A	62	D	82	C
3	C	23	B	43	B	63	A	83	B
4	A	24	B	44	A	64	A	84	C
5	A	25	A	45	A	65	C	85	B
6	A	26	B	46	B	66	A	86	D
7	D	27	B	47	A	67	A	87	C
8	C	28	A	48	D	68	B	88	D
9	B	29	A	49	C	69	A	89	A
10	D	30	B	50	D	70	D	90	C
11	D	31	C	51	B	71	A	91	B
12	C	32	C	52	A	72	A	92	A
13	C	33	A	53	C	73	B	93	C
14	C	34	A	54	B	74	A	94	B
15	C	35	A	55	B	75	B	95	D
16	C	36	D	56	B	76	B	96	C
17	B	37	B	57	B	77	B	97	B
18	A	38	D	58	A	78	D	98	D
19	D	39	B	59	C	79	B	99	B
20	D	40	C	60	B	80	A	100	D

EXPLANATIONS

15.1 STABILITY OF STRUCTURE.

1. ANSWER : D

In a skew frame, even after deformation (due to loads), the lengths of the individual members remain constant assuming:
The members are rigid (i.e., inextensible).
Deformation occurs due to joint displacement or rotation, not elongation of members.
This is a common assumption in structural analysis for rigid frames, especially in methods like Moment Distribution or Slope-Deflection.

2. ANSWER : A

According to IS 800:2007 (General Construction in Steel - Code of Practice), the design of welds is primarily based on shear strength, especially for fillet welds, which are the most common type used in structural steel connections.
Fillet welds are subjected to shear stresses along the throat of the weld.
The code specifies the design shear strength of weld metal, considering partial safety factors.
Hence, shear failure is the governing mode for the design of welds under IS 800:2007.

3. ANSWER : C

A reinforced concrete slab is classified as a two-way slab when:
The ratio of the longer span to the shorter span is less than 2.
This means the slab will bend in both directions, and reinforcement is provided in both directions to resist bending moments.

4. ANSWER :A

Total external reactions = 5 $[M_A, V_A, V_B, V_C, M_C]$
Available equilibrium equations = $2[\Sigma M = 0, \Sigma = Fy = 0]$
∴Ds=5−2 = 3

5. ANSWER :A

The method of joints is a structural analysis technique used to determine the forces in each member of a truss. It assumes that all members are connected by frictionless pins and that the truss is statically determinate.

6. ANSWER:A

Kinematic indeterminacy=
It is the total number of possible degrees of freedom of all the joints.

Dk_i=3J-r^{th} (For beam & portal Frame).
when,
r= No. of unknown Reaction
h= No. of plastic hinges.
J= No of joints.
3×3-5+0
16-5=1

7. ANSWER:D

Deficient frame: A frame is having less number of members than required for perfect frame.
m<2j-3

8.ANSWER: C

9. ANSWER: B

D_s = 3m + r - 35
m = 23, r = 3 , j = 16
= 69 + 3 - 48 = 24
Or
D_s= R − Ee+3 (Close loop)
= 3 − 3 + 3 (8)
= 24

10. ANSWER: D

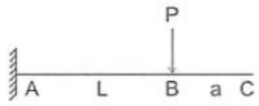
Frame	Formula
Rigid jointed Space frame	6m + r − 6J
Pin jointed Plane frame	m + r − 2J
Rigid jointed plane frame	m + r − 2J
Pin jointed spaced frame	m + r - 2J

11. ANSWER: D

D_s = Reaction - EE
= 4 − 3 = 1

12. ANSWER: C

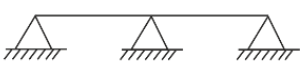
Deflection and slope in a cantilever beam due to point load.



Deflection at point $(\Delta_B) = \frac{PL^3}{3EI}$
Slop at point B $(\Delta_B) = \frac{PL^2}{2EI}$ = Slop at point C (θ_c)
Deflection at point $(\Delta_c) = \Delta_B + \theta_B \times a$

13. ANSWER :C


Fixed Beam


Continuous Beam

$D_S = 5 - 3 = 2$

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