

TN TRB AP

**Previous Year Paper
(Civil Engineering)
05 Apr, 2025**

**The recruitment of 'ASSISTANT
PROFESSORS', 'ASSISTANT LIBRARIANS'
and 'ASSISTANT DIRECTORS PHYSICAL
EDUCATION' in various disciplines for the
University Colleges of Engineering Regional
Campuses of Anna University, Chennai**

**[Advertisement No.001/RC/UCE&RC/2023,
dated: 24.11.2023, 25.11-2023]**

Master Question Paper

Module Name : Civil Engineering

Exam Date : 05-Apr-2025 Batch : 14:00-17:30

Sr. No.	Civil Engineering
PAPER I	
1	பூத்தொடுத்தல் – என்பது எவ்வகை புணர்ச்சி ? A : குற்றியலுகரப் புணர்ச்சி B : குற்றியலிகரப் புணர்ச்சி C : உயிரீறு புணர்ச்சி -(Correct Option) D : மெய்யீற்றுப் புணர்ச்சி
2	ஆண்பாற் பிள்ளைத் தமிழுக்குப் – பொருந்தாத பருவத்தைத் தேர்வு செய்க. A : சிற்றில் B : சிறுபறை C : அம்மானை -(Correct Option) D : சிறுதேர்
3	இலக்கணக் குறிப்பு தருக. “நெடுந்திரை” A : வினைத் தொகை B : உம்மைத் தொகை

	C : பண்புத் தொகை -(Correct Option) D : உவமைத் தொகை
4	“பயில்தொழில்” என்ற சொல்லுக்கு இலக்கணக் குறிப்பு தருக. A : எண்ணும்மை B : உரிச்சொற்றொடர் C : வினைத் தொகை -(Correct Option) D : பண்புத் தொகை
5	சந்திப்பிழை இல்லாத தொடரைக் கண்டறிக. A : அறிவு தேடலில் உடல், உள்ளத் தடைகளைத் தகர்த்த மாமேதை ஸ்டீபன் ஹாக்கிங் B : அறிவுத் தேடலில் உடல், உள்ள தடைகளைத் தகர்த்த மாமேதை ஸ்டீபன் ஹாக்கிங் C : அறிவுத் தேடலில் உடல், உள்ளத் தடைகளைத் தகர்த்த மாமேதை ஸ்டீபன் ஹாக்கிங். -(Correct Option) D : அறிவுத் தேடலில் உடல், உள்ளத் தடைகளைத் தகர்த்த மாமேதை ஸ்டீபன் ஹாக்கிங்.
6	பனியொடு – பொருத்தமான புணர்ச்சி விதியைக் கண்டறிக. A : ‘உயிர்வரின் உக்குறள் மெய்விட்டோடும், உடல்மேல் உயிர் வந்தொன்றுவதியல்பே.’ B : “இஈஐ வழி யவ்வும், உடல் மேல் உயிர் வந்தொன்றுவதியல்பே” -(Correct Option) C : “இனமிகல், தனிக்குறில் முன் ஒற்று உயிர் வரின் இரட்டும்” D : “ஈறுபோதல், தன்னொற்றிரட்டல்.”

7	A : (1)-(ஈ), (2)-(ஆ), (3)-(இ), (4)-(அ) B : (1)-(இ), (2)-(ஈ), (3)-(ஆ), (4)-(அ) C : (1)-(ஆ), (2)-(ஈ), (3)-(அ), (4)-(இ) -(Correct Option) D : (1)-(ஆ), (2)-(அ), (3)-(ஈ), (4)-(இ)
8	“என் அப்பன் வந்தான்” என்று மாட்டைப் பார்த்துக் கூறுவது எவ்வகை வழுவமைதி? A : பால் வழுவமைதி B : மரபு வழுவமைதி C : இட வழுவமைதி D : திணை வழுவமைதி -(Correct Option)
9	“கத்துங் குயிலோசை – சற்றேவந்து காதிற் படவேணும் – என்ற பாரதியார் பாடலில் அமைந்துள்ள வழுவமைதி எது ? A : கால வழுவமைதி B : மரபு வழுவமைதி -(Correct Option) C : பால் வழுவமைதி D : திணை வழுவமைதி
10	“உயிர்வரின் உக்குறள் மெய்விட்டோடும் உடல்மேல் உயிர்வந்தொன்றுவதியல்பே” – இவ்விதிகளால் புணர்க்கப்படும் சொல் யாது ? A : கீழிருக்கும் B : ஈர்ப்பெல்லை -(Correct Option)

	C : தசையசைவு D : பழங்கவிதை
11	நெடுந்தேர், பெய்மழை-இலக்கணக் குறிப்பைத் தேர்ந்தெடுக்கவும் : A : பண்புத் தொகை, உவமைத் தொகை B : வினைத் தொகை, உம்மைத் தொகை C : இருபெயரொட்டுப் பண்புத் தொகை, வினைத் தொகை D : பண்புத் தொகை, வினைத் தொகை -(Correct Option)
12	கீழ்க்கண்டவற்றுள் சரியான கூற்றைத் தெரிவு செய்க. (அ) இதழியலில், செயற்கை நுண்ணறிவு குறிப்பிடத்தகுந்த மாறுதல்களைச் செய்து வருகிறது. (ஆ) செயற்கை நுண்ணறிவு பொதிந்த இயந்திரங்களுக்கு ஓய்வு தேவை. (இ) மனிதனால் முடியும் செயல்களையும் அவன் கடினம் என்று கருதும் செயல்களையும் செய்யக்கூடியது செயற்கை நுண்ணறிவு (ஈ) செயற்கை நுண்ணறிவின் மிகுதியான வளர்ச்சியால் தரவு அறிவியலாளர்கள் தேவைப்படமாட்டார்கள். A : (அ), (ஆ) சரி, (இ), (ஈ) தவறு B : (அ), (இ) சரி, (ஆ), (ஈ) தவறு -(Correct Option) C : (அ), (ஈ) சரி, (அ), (இ) தவறு D : (அ), (ஈ) சரி, (ஆ), (இ) தவறு
13	வாளால் அறுத்துச் சுடினும் மருத்துவன் பால் மாளாத காதல் நோயாளன் போல் – இப்பாடலில் அறிவியலை வாழ்வியலோடு இணைத்துப் பாடியவர் : A : பெரியாழ்வார் B : ஆண்டாள் C : குலசேகராழ்வார் -(Correct Option)

	D : நம்மாழ்வார்
14	உயர்திணைக்குரிய பால் பகுப்புகள் எத்தனை ? A : இரண்டு B : நான்கு C : ஐந்து D : மூன்று -(Correct Option)
15	சரியான மயங்கொலித் தொடரைக் கண்டறிக. (அ) இதழியலில், செயற்கை நுண்ணறிவு குறிப்பிடத்தகுந்த மாருதல்களைச் செய்து வருகிறது. (ஆ) இதழியலில், செயற்கை நுண்ணறிவு குறிப்பிடத்தகுந்த மாருதல்களைக் செய்துவருகிறது. (இ) இதழியலில், செயற்கை நுண்ணறிவு குறிப்பிடத்தகுந்த மாருதல்களைச் செய்து வருகிறது (ஈ) இதழியலில், செயற்கை நுண்ணறிவு குறிப்பிடத்தகுந்த மாறுதல்களைச் செய்துவருகிறது. A : (ஈ) -(Correct Option) B : (இ) C : (ஆ) D : (அ)
16	புறா, யானை, மலை, பசுக்கள் முறையே எவ்வகைப் பாலினைக் குறிக்கும் : A : உயர்திணை பன்மை, அஃறிணை பலவின்பால் B : அஃறிணை பலவின்பால், அஃறிணை ஒன்றன்பால் C : உயர்திணை ஒன்றன்பால், அஃறிணை ஒன்றன்பால் D : அஃறிணை ஒன்றன்பால், அஃறிணை பலவின்பால் -(Correct Option)
17	‘பனியொடு’ என்ற சொல்லிற்கான புணர்ச்சி விதியைக் கண்டறிக.

	A : உயிரீற்றுப் புணர்ச்சி B : பண்புப்பெயர் புணர்ச்சி C : உடம்படு மெய்ப்புணர்ச்சி -(Correct Option) D : பூப் பெயர் புணர்ச்சி
18	“மாளாத காதல் நோயாளன் போல் மாயத்தால் மீளாத் துயர்தரினும் வித்துவக் கோட்டம்மா! நீ” –இவ்வடிகளில் பயின்று வரும் நயங்களை எழுதுக. A : அடிமோனை, இயைபு, முரண் B : சீர் மோனை, முரண், சீரெதுகை C : சீர்மோனை, அடியெதுகை -(Correct Option) D : அடிமோனை, அடியெதுகை
19	‘செந்தீ’ – சொல்லுக்குரிய பொருளும் இலக்கணக் குறிப்பும் தருக. A : நெருப்புக் கோலாம், வினைமுற்று B : செம்மையான பேரண்டம், வினைத்தொகை C : நெருப்புப் பந்து, பண்புத் தொகை -(Correct Option) D : நெருப்புச் சுடர், வினையெச்சம்
20	‘ஆர்தருபு’ என்ற சொல்லின் பொருள் : A : வெள்ளத்தில் மூழ்கிக் கிடந்த -(Correct Option) B : மண்ணுக்குள் மூழ்கிக் கிடந்த C : வெள்ளத்தில் செறிந்து திரண்ட D : வெள்ளத்தில் திரண்ட

21	‘பாய்ச்சல்’ என்னும் சிறுகதை இடம்பெற்றுள்ள சிறுகதைத் தொகுப்பைக் கண்டறிக. A : சாயாவனம் B : விசாரணை கமிஷன் C : தக்கையின் மீது நான்கு கண்கள் -(Correct Option) D : இவற்றில் ஏதும் இல்லை
22	பின்வரும் தொகை நிலைத் தொடரை விரித்தெழுதுக : ‘கால தூதர்.’ A : காலனின் தூதன் B : காலனுக்குத் தூதன் -(Correct Option) C : காலனது தூதன் D : காலனாகிய தூதன்
23	‘நாட்டார் கலைகள்’ எனும் நூலின் ஆசிரியர் : A : வல்லிக் கண்ணன் B : க.த. திருநாவுக்கரசர் C : சா. கந்தசாமி D : சு.கா. பெருமாள் -(Correct Option)
24	தனித் தமிழை இனங்கண்டறிக : A : சாந்தம் B : மரணம் C : மனம் D : அகம் -(Correct Option)

25	“பண்டி” என்ற சொல்லின் பொருள் யாது ? A : தலையுச்சி B : கழுத்து C : மார்பு D : வயிறு -(Correct Option)
26	“வறுமை” – என்ற சொல்லுக்கு எதிர்ச்சொல் தருக. A : பெருமை B : திண்மை C : வளமை -(Correct Option) D : சிறுமை
27	“கொடுத்தார்” என்ற சொல்லின் வேர்ச்சொல் தருக. A : கொடு -(Correct Option) B : கொடுத்தல் C : கொடுத்த D : கொடுத்து
28	“அகழ்தல்” – இலக்கணக் குறிப்பு தருக. A : வினைத்தொகை B : உரிச்சொற்றொடர் C : பண்புத்தொகை D : தொழிற்பெயர் -(Correct Option)

29	“புரவி” – என்ற சொல்லுக்கு உரிய விலங்கு பெயரை எழுதுக. A : மான் B : புலி C : கரடி D : குதிரை -(Correct Option)
30	செய்க பொருளைச் செறுநர் செருக்கறுக்கும் எஃகதனிற் கூரிய தில். –இக்குறட்பாவில் செறுநர் என்ற சொல் குறிக்கும் மனிதர் யார் ? A : நண்பர் B : பகைவர் -(Correct Option) C : உறவினர் D : அரசர்
PAPER II	
31	If the system of equations $-2x + y + z = a$ $x - 2y + z = b$ $x + y - 2z = c$ has no solution then, A : $a = 1, b = -1, c = 0$ B : $a = 0, b = +1, c = -1$ C : $a = 0, b = -1, c = 1$ D : $a = 0, b = 1, c = 1$ -(Correct Option)
32	Let A be a Skew-Hermitian matrix, then A : i A must be Hermitian and its characteristic roots must be real B : i A must be Hermitian and its characteristic roots are either zero or purely imaginary -(Correct Option)

C : i A must be Skew-Hermitian and its characteristic roots must be real

D : i A must be Skew-Hermitian and its characteristic roots are either zero or purely imaginary.

33

Let $A = \begin{bmatrix} 2 & 0 & 5 \\ 1 & 2 & 3 \\ -1 & 5 & 1 \end{bmatrix}$ The system of equations $AX=Y$ has a solution.

A
: Only for $Y = \begin{pmatrix} a \\ 0 \\ 0 \end{pmatrix}, a \in \mathbf{R}$

B
: Only for $Y = \begin{pmatrix} 0 \\ a \\ 0 \end{pmatrix}, a \in \mathbf{R}$

C
: Only for $Y = \begin{pmatrix} 1 \\ 2 \\ a \end{pmatrix}, a \in \mathbf{R}$

D
: For all $Y \in \mathbf{R}^3$ – (Correct Option)

34

Let $A = \begin{bmatrix} \alpha & 1 & 1 \\ 1 & \beta & 1 \\ 1 & 1 & \gamma \end{bmatrix}$, $\alpha\beta\gamma=1$, $\alpha, \beta, \gamma \in \mathbf{R}$. If $X = \begin{pmatrix} x_1 \\ x_2 \\ x_3 \end{pmatrix} \in \mathbf{R}^3$, $AX=0$ has infinitely many solutions

if trace (A) is :

A : 1

B : 2

C : 3 –(Correct Option)

D : 4

35

Consider $f(x) = x(x-1)(x-2)$ on $\left[0, \frac{1}{2}\right]$. If there exists a point $C \in \left(0, \frac{1}{2}\right)$ satisfying

mean value theorem, then the value of C is :

A
: $\frac{6-\sqrt{21}}{9}$

	B : C $\frac{6-\sqrt{21}}{7}$: D $\frac{6-\sqrt{21}}{6}$ – (Correct Option) :
36	The area of the surface cut from the bottom of the paraboloid $x^2+y^2-z=0$ by the plane $z=4$ is : A $\frac{\pi}{2} (5\sqrt{5}+1)$: B $\frac{\pi}{2} (5\sqrt{5}-1)$: C $\frac{\pi}{6} (17\sqrt{17}-1)$ – (Correct Option) : D $\frac{\pi}{3} (17\sqrt{17}+1)$:
37	If a vector field is given by $\vec{F}=(\sin y)\vec{i}+x(1+\cos y)\vec{j}$, then the value of the line integral of $\vec{F}$ over a circular path $x^2+y^2=1$ is : A : 0 B : π –(Correct Option) C : $\pi (\pi + 1)$ D : $\pi (\pi - 1)$
38	The solution of $x^2y''-2y=0$ is : A $\frac{1}{x}+x$: B $x+x^2$:

C
: – (Correct Option)

D
: $x + x^3$

39 If x , $x + e^x$ and $1 + x + e^x$ are solutions of second order linear differential equation with non-homogeneous term $Q(x)$, then $Q(x)$ is equal to

A : 1

B : 2

C : -2

D : -1 – (Correct Option)

40 If $y(x)$ is the solution of $y'' - 2y' + 1 = 0$ with $y(0) = 3$, $y'(0) = 4$ then $y(1) =$.

A : $3 + e$

B : $4 + e$

C : $1 + 3e$

D : $4e$ – (Correct Option)

41 Consider $u_t = u_{xx}$, $0 < x < \pi$, $t > 0$

$$u(x, 0) = \sin x + \sin 2x, \quad 0 \leq x \leq \pi$$

$$u(0, t) = u(\pi, t) = 0, \quad t > 0$$

then which of the following statement is true?

A
: $e^t u(x, t)$ is bounded – (Correct Option)

B
: $e^{2t} u(x, t)$ is bounded

C
:

D
: $e^{4t} u(x, t) \rightarrow 0$ as $t \rightarrow \infty \forall x \in (0, \pi)$

Question Dropped

42

The solution of $u_t = u_{xx}$, $0 < x < l$, $t > 0$

subject to $u_x(0, t) = 0 = u_x(l, t)$, $t > 0$

is given by :

A
: $\sum_{n=0}^{\infty} a_n \cos\left(\frac{n\pi x}{l}\right) e^{-\left(\frac{n\pi}{l}\right)^2 t}$, a_n are constants

B
: $\sum_{n=0}^{\infty} a_n \cos\left(\frac{n\pi x}{l}\right) e^{-\left(\frac{n\pi}{l}\right)^2 t}$, a_n are constants

C
: $\sum_{n=0}^{\infty} a_n \sin\left(\frac{n\pi x}{l}\right) e^{-\left(\frac{n\pi}{l}\right)^2 t}$, a_n are constants

D
: $\sum_{n=0}^{\infty} a_n \sin\left(\frac{n\pi x}{l}\right) e^{-\frac{n\pi}{l} t}$, a_n are constants

43

The coefficient of $\cos x$ in the Fourier series expansion of $f(x) = e^{-x}$ in $0 < x < 2\pi$ is :

A
: $\frac{1 + e^{-\pi}}{\pi}$

B
: $\frac{1 - e^{-\pi}}{\pi}$

C
: $\frac{1 + e^{-2\pi}}{2\pi}$

D
: $\frac{1 - e^{-2\pi}}{2\pi}$ – (Correct Option)

44

A
: $y_{n+1} = y_n + \frac{1}{4} [K_1 + 2K_2 + 3K_3 + K_4]$

B
: $y_{n+1} = y_n + \frac{1}{2} [K_1 + 3K_2 + 3K_3 + K_4]$

C
: $y_{n+1} = y_n + \frac{1}{3} [K_1 + 4K_2 + 4K_3 + K_4]$

D
: $y_{n+1} = y_n + \frac{1}{6} [K_1 + 2K_2 + 2K_3 + K_4]$ – (Correct Option)

45

Consider the iteration $x_{n+1} = \frac{x_n}{2} + \frac{1}{x_n}$, $n \geq 0$ for given $x_0 \neq 0$. Then which of the following is true ?

A
: x_n converges to $\sqrt{2}$ with rate of convergence 4

B
: x_n converges to $\sqrt{2}$ with rate of convergence 3

C
: x_n converges to $\sqrt{2}$ with rate of convergence 2 – (Correct Option)

D
: x_n converges to $\sqrt{2}$ with rate of convergence 1

Question Dropped

46

Let X be a discrete random variable with probability distribution $p(i) = \frac{1}{9}$, $i = 1, 2, 3, \dots, 9$.

Variance of X is :

A $\frac{1}{9}$

B : 9

C : 10

D
:

47

A fair coin is tossed for 5 times. It is observed that the total number of heads obtained is atleast 3. What is the probability that the number of heads obtained is a non-zero even number ?

A $\frac{5}{8}$
:

B $\frac{5}{16}$ – (Correct Option)
:

C $\frac{5}{32}$
:

D $\frac{5}{64}$
:

48

Let X be a random variable with Mean 5 and Variance 2. Then, what is the value of $E(2x^2 + 5)$?

A : 55

B : 57

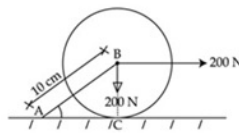
C : 59 –(Correct Option)

D : 61

Question Dropped

49

A circular roller of radius 5 cm and weight 200 N rests on a smooth horizontal surface and is held in position by an inclined bar AB of length 10 cm as shown in figure. A horizontal force of 200 N is acting at B. Find the tension in the Bar AB and vertical reaction at C.



A : 230.94 N and 400 N

B : 400 N and 500 N

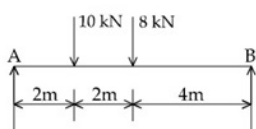
C : 230.94 N and 215.47 N

D : 400 N and 300 N

50

Find the reactions at A and B for the beam subjected to loading as shown in Figure.

The reactions at A and B are



A : 10 kN and 8 kN

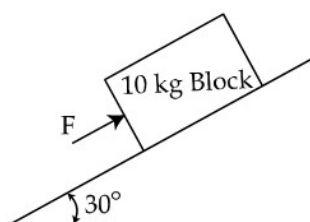
B : 23 kN and 13 kN

C : 5.75 kN and 3.25 kN

D : 11.5 kN and 6.5 kN **-(Correct Option)**

51

The minimum force 'F' required to maintain the block in equilibrium is :



A : 10 N

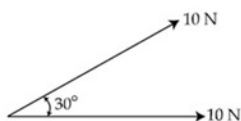
B : 10.5 N

C : 20.5 N

D : 49.5 N **-(Correct Option)**

52

The magnitude of resultant by Parallelogram law of the two concurrent, coplanar forces as shown in figure is



A : $\sqrt{200 + 100\sqrt{3}}$ N **-(Correct Option)**

B : $\sqrt{100 + 50\sqrt{3}}$ N

C : 20 N

D
:

53 A hollow shaft of external and internal diameter of 80 mm and 50 mm is required to transmit torque from one end to the other. If the allowable shear stress is 45 MPN, the safe torque that the shaft can transmit is

A : 3.83 N - m

B : 1.83 KN - m

C : 2.38 N - m

D : 3.83 KN - m -(Correct Option)

54 The Euler load for a column with one end fixed and the other end pinned is given by

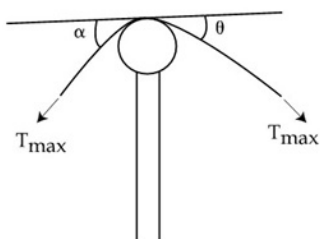
A $\frac{\pi^2 EI}{4L^2}$
:

B $\frac{\pi^2 EI}{L^2}$
:

C $\frac{2\pi^2 EI}{L^2}$
: -(Correct Option)

D $\frac{4\pi^2 EI}{L^2}$
:

55 If the bridge cable is on pulley, the vertical force on tower is :



A $T_{\max} (\cos \alpha + \cos \beta)$
:

B $T_{\max} (\cos \alpha + \sin \theta)$
:

C
:

D : $T_{\max} (\sin \alpha + \sin \theta)$ – (Correct Option)

56 In arches, load is transferred by

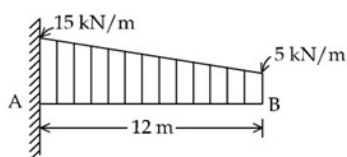
A : Bending moment and Axial forces alone

B : Bending moment, shear and Axial forces –(Correct Option)

C : Bending moment alone

D : Bending moment and shear alone

57 Determine the reaction on the beam shown in figure.



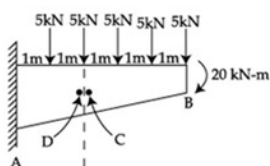
A : Reaction at A = 100 kN and Moment at A = 400 kN.m

B : Reaction at A = 125 kN and Moment at A = 325 kN.m

C : Reaction at A = 120 kN and Moment at A = 600 kN.m –(Correct Option)

D : Reaction at A = 150 kN and Moment at A = 650 kN.m

58 Determine the internal moment acting in the cantilever beam shown in figure at sections passing through points C and D



A : $M_C = -75 \text{ kN.m}$; $M_D = -75 \text{ kN.m}$

B : $M_C = -25 \text{ kN.m}$; $M_D = -25 \text{ kN.m}$

C : $M_C = -50 \text{ kN.m}$; $M_D = -50 \text{ kN.m}$ –(Correct Option)

D : $M_C = -37.5 \text{ kN.m}$; $M_D = -37.5 \text{ kN.m}$

59	While deriving the necessary relation between the force in the cable and its slope, the assumptions that the cable is _____ and _____ A : perfectly rigid, extensible B : perfectly straight, inextensible C : perfectly flexible, extensible D : perfectly flexible, inextensible -(Correct Option)
60	The absolute maximum Bending Moment for a set of moving loads occurs A : under the maximum Wheel load only B : at the centre of span C : at the point where the resultant of the load system coincides with heavier load -(Correct Option) D : None of the above
61	Recommended value of concrete slump for mass concrete A : 20 to 50 mm -(Correct Option) B : 10 to 20 mm C : 80 to 150 mm D : 70 to 80 mm
62	Which of the following equation is used in mix design to determine the mean target strength (f_t) A : $f_t = f_{ck} + 1.65 s$ -(Correct Option) B : $f_t = f_{ck} + 1.05 s$ C : $f_t = f_{ck} + 1.25 s$

	D :
63	The clear cover to cables in a post-tensioned girder should be not less than A : 25 mm B : 40 mm C : 50 mm -(Correct Option) D : 100 mm
64	If the effective length of a column increases, what happens to its load carrying capacity ? A : Increases B : Decreases -(Correct Option) C : Remains same D : Depends upon the type of reinforcement
65	In the slab design, the diameter of steel reinforcement should not exceed A : $\frac{1}{6}$ of total thickness of slab B : $\frac{1}{8}$ of total thickness of slab – (Correct Option) C : $\frac{1}{10}$ of total thickness of slab D : $\frac{1}{4}$ of total thickness of slab
66	The development length (L_d) of the bar can be determined by _____ where ϕ is the nominal bar diameter, τ_{bd} is the design bond strength and σ_s is stress in bar at the section considered when loaded at design load A : $\frac{\phi \tau_{bd}}{4 \sigma_s}$

	B : C $\frac{\sigma_s \tau_{bd}}{3\phi}$: D $\frac{\phi \sigma_s}{4\tau_{bd}}$ – (Correct Option) :
67	In working stress Method of Design, the design constants for M20 grade concrete and Fe 250 steel are A $K_C = 0.400, j = 0.867, R_C = 1.214, P_c(\%) = 1.000$ – (Correct Option) : B $K_C = 0.400, j = 0.867, R_C = 0.867, P_c(\%) = 0.714$: C $K_C = 0.329, j = 0.890, R_C = 0.732, P_c(\%) = 0.433$: D $K_C = 0.400, j = 0.867, R_C = 1.474, P_c(\%) = 1.214$:
68	IS code recommends the Nominal Shear Stress in the case of beams of varying depth A $\tau_v = \frac{V}{bd}$: B $\tau_v = \frac{V \pm \frac{M_v}{d} \tan \beta}{b \cdot d}$ – (Correct Option) : C $\tau_v = \frac{A_{st}}{b \cdot d} \times 100$: D $\tau_v = \tau_c \times b \times d$:
69	Shape factor for a triangular section of base b and height h A : 1.5 B : 2 C : 2.34 – (Correct Option)

	D : 1.7
70	Collapse load of a fixed beam of length L subjected to a concentrated load at mid-span is A : $\frac{4Mp}{L}$ B : $\frac{8Mp}{L}$ – (Correct Option) C : $\frac{16Mp}{L}$ D : $\frac{12Mp}{L}$
71	A soil ($G_s = 2.70$) is to be compacted for an embankment construction. What is the theoretical maximum dry density that can be achieved for the soil at a water content of 12% ? A : 18.00 kN/m³ B : 23.65 kN/m³ C : 20.00 kN/m³ –(Correct Option) D : 25.36 kN/m³
72	In a soil specimen, 70% of particles are passing through 4.75 mm I.S. sieve and 4% of, granular particles are passing through 75 μ IS Sieve. Its uniformity coefficient is 8 and coefficient of curvature is 2. As per IS classification this soil is classified as : A : SW –(Correct Option) B : SP C : GW D : GP
73	The East Coast Sea at a certain location is 90 m deep. The sea bed consists of a depth of sand of saturated unit weight 19.81 kN/m³. What is the effective vertical stress at 10 m below the top of the sand ?

	A : 1081KPa B : 981KPa C : 198.1KPa D : 100KPa -(Correct Option)
74	Find the capillary rise of water into clean glass tubes of 1 cm diameter. A : 0.306 cm -(Correct Option) B : 3.06 cm C : 30.6 cm D : 0.0306 cm
75	A drainage pipe beneath a dam has clogged with sand whose coefficient of permeability is found to be 8.0m/day. The average difference in head water and tail water elevation is 21.2 m and it has been observed that there is a flow of 162 litres per day through the pipe. The pipe is 94.3 m long and has a cross-sectional area of 180 sq.cm. What length of the pipe is filled with sand ? A : $\frac{1}{5}$th pipe length is filled with sand – (Correct Option) B : $\frac{1}{4}$th pipe length is filled with sand C : $\frac{1}{2}$th pipe length is filled with sand D : $\frac{1}{3}$rd pipe length is filled with sand
76	For a gravity dam of 120 m long, the following details were obtained from the flow net: $N_f = 5$ and $N_d = 15$. The coefficient of permeability of the foundation soil is 2×10^{-5} m/s. The difference in water levels between the upstream and downstream of the dam is 5 m. The quantity of seepage under the dam is A : $3.33 \times 10^{-5} \text{ m}^3/\text{s}$

	B : – (Correct Option) C : $0.012 \text{ m}^3/\text{s}$ D : $0.036 \text{ m}^3/\text{s}$
77	The discharge velocity 'V' seepage velocity "V_s" and Porosity 'n' are related as A : $V = n \cdot V_s$ – (Correct Option) B : $V_s = n \cdot V$ C : $V = \frac{1}{n \cdot V_s}$ D : $V = (1+n) \cdot V_s$
78	If temperature of the pore fluid increases then A : Viscosity decreases and permeability increases –(Correct Option) B : Viscosity increases and permeability increases C : Viscosity decreases and permeability decreases D : Viscosity increases and permeability decreases
79	The top-most water strata having no confined impermeable overburden material lying over them are called A : Confined aquifers B : Principal aquifers C : Aquiclude D : Non-Artesian aquifers –(Correct Option)

80	Which of the following statements is incorrect ? A : The area ratio of a sampler should preferably be upto 10% and in no case it should exceed 25% to help it obtain undisturbed samples B : The inside clearance of a soil sampler helps in the elastic expansion of the soil sample after it enters the sampler tube from within the cutting edge; and hence the inner dia of the tube is kept higher than the inner dia of the cutting edge by about 1 to 3% C : The outside clearance of a soil sampler is provided by keeping the outer dia of the cutting edge to be about 0 to 2% more than the outer dia of the sampler tube, to help in reducing the force required to withdraw the tube. D : None of the above -(Correct Option)
81	A slope of infinite extent is made in dense sand layer at an angle of 30° to horizontal. The factor of safety of the slope against shear failure, if the angle of internal friction of the sand is 36°, is A : 1.000 B : 1.258 -(Correct Option) C : 1.500 D : 1.558
82	Standard Penetration resistance in very stiff clays lies between A : 2 and 4 B : 4 and 8 C : 8 and 15 D : 15 and 30 -(Correct Option)
83	A 60 cm diameter concrete pile is driven 15 m into a homogeneous consolidated clay deposit. The adhesion factor and undrained cohesion are 0.70 and 50KPa respectively. What is the safe load, the pile can carry with a factor of safety of 2.5 ? A : 127.9KPa B : 446.7KPa -(Correct Option) C : 989.6KPa

	D : 1116.8KPa
84	The net ultimate bearing capacity of a pure cohesive soil A : depends on the width of the footing and is independent of the depth of the footing B : depends on the depth of the footing and is independent of the width of the footing C : depends on the width of the footing as well as on the depth of the footing D : is independent of the width as well as the depth of the footing -(Correct Option)
85	The initial test is performed on a test pile to determine the ultimate load capacity and safe load capacity. The Maximum load on such an individual pile should not be less than A : $1\frac{1}{3}$ times the design load B : $1\frac{1}{2}$ times the design load C : $2\frac{1}{2}$ times the design load -(Correct Option) D : 4 times the design load
86	The load carrying capacity of an individual friction pile is 200 kN. The total load carrying capacity of a group of 9 such piles with group efficiency factor of 0.8 is A : 1800 kN B : 1640 kN C : 1440 kN -(Correct Option) D : 900 kN
87	The Newmark's influence chart aids in the estimation of vertical stress below A : strip loaded area only B : square and rectangular loaded area only

	C : circular loaded D : any shape of loaded area -(Correct Option)
88	The Reynold's number is the ratio of A : Pressure force to Inertial force B : Internal force to Viscous force C : Inertial force to Viscous force -(Correct Option) D : Viscous force to Pressure force
89	The drag force acting on a moving object in a fluid is directly proportional to A : The square of the density of the object B : The square of the viscosity of the fluid C : The square of the velocity of the object -(Correct Option) D : The square of the projected area of the object
90	Given below are two statements: One is labelled as Assertion (A) and the other is labelled as Reason (R) The Turbulent Boundary layer is Assertion (A): Much more steeper velocity gradients at the boundary than the laminar boundary layer Reason (R): Velocity distribution is Logarithmic and could be conveniently expressed in the form of a power law, $u/V = (y/d)^{1/n}$ over a range of Reynolds number. In the light of the above statements, choose the most appropriate answer from the options given below: A : Both (A) and (R) are correct and (R) is the correct explanation of (A) -(Correct Option) B : Both (A) and (R) are not correct C : Both (A) and (R) are correct but (R) is not the correct explanation of (A) D : (A) is not correct but (R) is correct
91	A model of ship, $\frac{1}{50}$ of size of its prototype has 0.125 N of resistance when simulating a speed of 5 m/s of the prototype. In both cases water is the same for model and prototype. The corresponding resistance in the prototype is _____

	A : 15850 N B : 15750 N C : 15625 N -(Correct Option) D : 15370 N
--	---

92	The classification of gradually varied flow of the mild slope channel for the condition of y = actual depth, y_o = normal depth and y_c = critical depth is : A : $y \geq y_o \geq y_c, y_o \leq y < y_c, y_o \geq y_c > y.$ B : $y > y_o > y_c, y_o > y > y_c, y_o > y_c > y.$ – (Correct Option) C : $y > y_c > y_o, y_c > y > y_o, y_c > y_o > y.$ D : $y_c \leq y < y_o, y \geq y_c \geq y_o, y_c \geq y_o \geq y.$
----	--

93	Match the following List – I and List – II for the categories of channel flow with normal depth (y_o), critical depth (y_c), and bed slope (s_o)in the Manning's formula. <table> <tr> <th>List – I</th><th>List – II</th></tr> <tr> <th>Characteristic Condition</th><th>Type of flow and depth(s)</th></tr> <tr> <td>(a) $y_c = y_o$</td><td>(i) Subcritical flow at normal depth</td></tr> <tr> <td>(b) $y_o > y_c$</td><td>(ii) Critical flow at normal depth</td></tr> <tr> <td>(c) $s_o < 0$</td><td>(iii) Super critical flow at normal depth</td></tr> <tr> <td>(d) $y_c > y_o$</td><td>(iv) Cannot sustain uniform flow</td></tr> </table> Choose the correct answer from the options given below : A : (a)-(iii), (b)-(iv), (c)-(ii), (d)-(i) B : (a)-(ii), (b)-(i), (c)-(iv), (d)-(iii) -(Correct Option) C : (a)-(iv), (b)-(i), (c)-(iii), (d)-(ii) D : (a)-(i), (b)-(iii), (c)-(iv), (d)-(ii)	List – I	List – II	Characteristic Condition	Type of flow and depth(s)	(a) $y_c = y_o$	(i) Subcritical flow at normal depth	(b) $y_o > y_c$	(ii) Critical flow at normal depth	(c) $s_o < 0$	(iii) Super critical flow at normal depth	(d) $y_c > y_o$	(iv) Cannot sustain uniform flow
List – I	List – II												
Characteristic Condition	Type of flow and depth(s)												
(a) $y_c = y_o$	(i) Subcritical flow at normal depth												
(b) $y_o > y_c$	(ii) Critical flow at normal depth												
(c) $s_o < 0$	(iii) Super critical flow at normal depth												
(d) $y_c > y_o$	(iv) Cannot sustain uniform flow												

94	
----	--

	A : (a)-(ii), (b)-(iii), (c)-(iv), (d)-(i) B : (a)-(iv), (b)-(i), (c)-(ii), (d)-(iii) C : (a)-(i), (b)-(iii), (c)-(ii), (d)-(iv) D : (a)-(iii), (b)-(iv), (c)-(i), (d)-(ii) -(Correct Option)
95	Darcy's law is valid for Laminar flow in the range of _____ for ground water flow A : 1 to 20 B : 1 to 10 -(Correct Option) C : 1 to 30 D : 1 to 40
96	_____ is the beginning and _____ is the end of Water Year in India. A : June 1st and May 31st -(Correct Option) B : May 1st and April 30th C : July 1st and June 30th D : April 1st and March 31st
97	A catchment of area 90 ha has run off coefficient of 0.4. A storm of duration larger than the time of concentration of the catchment and of intensity 4.5 cm/n creates a peak discharge rate of A : $0.45 \text{ m}^3/\text{s}$

B

:

– (Correct Option)

C

:

10.3 m³/s

D

:

450 m³/s

98

The infiltration capacity in a basin is expressed as $f_p = 3.0 + e^{-3t}$ where f_p is in cm/hr, t - hrs. Assuming infiltration to take place at capacity rates in a storm of 60 minutes duration, estimate the depth of infiltration in the first half an hour.

A : 2.239 cm

B : 1.759 cm -(Correct Option)

C : 1.286 cm

D : 2.759 cm

Question Dropped

99

Flood frequency computations for a river using Gumbel's method yielded the following results.

Return Period T (years)	Peak flood (m ³ /s)
50	40, 800
100	51, 300

A

:

75, 528 m³/s

B

:

85, 528 m³/s

C

:

95, 528 m³/s

D

:

65, 528 m³/s

100

	A : (a)-(ii), (b)-(iii), (c)-(i), (d)-(iv) -(Correct Option) B : (a)-(iv), (b)-(iii), (c)-(ii), (d)-(i) C : (a)-(iii), (b)-(ii), (c)-(iv), (d)-(i) D : (a)-(i), (b)-(ii), (c)-(iv), (d)-(iii)
101	The design of major dam spillway with storages more than 60 Mm³, the recommended design floods as per CWC is A : Flood with a return period of 100 (or) 50 years depending on the importance of the project B : Standard Projected Flood (SPF) determined by unit hydrograph and Standard Projected Storm (SPS) which is usually largest recorded storm in the region. C : Probable Maximum Flood (PMF) is determined by unit hydrograph and Probable Maximum Storm (PMP) -(Correct Option) D : Flood with a return period of 100 years
102	In Muskingum channel flood routing $S = K [x * I + (1 - x) Q]$ The Storage Coefficient Value K is equal to A : Inflow amount B : Outflow amount C : Total storage in the reservoir D : Equal to the time of travel of a flood wave through the channel reach. -(Correct Option)
103	Arrange the following materials in ascending order according to their coefficient of permeability values (a) Mixed sand (b) Silt

	(c) Coarse sand (d) Silty sand A : (b), (d), (a), (c) -(Correct Option) B : (a), (b), (c), (d) C : (b), (a), (c), (d) D : (d), (b), (a), (c)
104	A well fully penetrates a 25 m thick confined aquifer. After a long period of pumping at a constant rate of $0.05 \frac{\text{m}^3}{\text{s}}$ The drawdowns at distances of 50 and 150 m from the well were observed to be 3 and 1.2m respectively. Determine the hydraulic conductivity (K) A : 1.68 cm/day B : 16.8 m/day -(Correct Option) C : 0.168 m/day D : 0.168 cm/day
105	Determination of evapotranspiration are generally classified as A : Temperature based method B : Radiation based method C : Combined method (Temperature + Radiation) -(Correct Option) D : None of the above
106	Which of the following data are essential while designing well (or) barrage ? A : Crest level, Afflux, Waterway, Pond level B : High flood level, Maximum flood discharge, River cross-section, Stage discharge curve - (Correct Option) C : High flood level, Maximum discharge, crest level, Afflux D : River cross-section, Stage discharge curve, Waterway, Maximum flood discharge

107	As per Food and Agriculture Organisation (FAO) United Nations has suggested the following empirical equations to estimate monthly effective rainfall (Re) in mm from Total Monthly Rainfall Value (R) in mm A $Re = (0.6R - 25 \text{ mm})$ if $R > 75 \text{ mm/month}$: $Re = (0.8R - 10 \text{ mm})$ if $R < 75 \text{ mm/month}$ B $Re = (0.6R - 10 \text{ mm})$ if $R > 75 \text{ mm/month}$: $Re = (0.8R - 25 \text{ mm})$ if $R < 75 \text{ mm/month}$ C $Re = (0.8R - 25 \text{ mm})$ if $R > 75 \text{ mm/month}$: $= (0.6R - 10 \text{ mm})$ if $R < 75 \text{ mm/month}$ – (Correct Option) D $Re = (0.8R - 10 \text{ mm})$ if $R > 75 \text{ mm/month}$: $= (0.6R - 25 \text{ mm})$ if $R < 75 \text{ mm/month}$								
108	Identify the correct option from the given match the following. <table> <tr> <td>(a) Critical Velocity Ratio</td><td>(i) Khosla's theory</td></tr> <tr> <td>(b) Exit gradient</td><td>(ii) Kennedy's theory</td></tr> <tr> <td>(c) Normal scour depth</td><td>(iii) Bligh's theory</td></tr> <tr> <td>(d) Safe Hydraulic gradient</td><td>(iv) Lacey's theory</td></tr> </table> A : (a)-(ii), (b)-(iii), (c)-(iv), (d)-(i) B : (a)-(iv), (b)-(iii), (c)-(i), (d)-(ii) C : (a)-(iv), (b)-(ii), (c)-(i), (d)-(iii) D : (a)-(ii), (b)-(i), (c)-(iv), (d)-(iii) –(Correct Option)	(a) Critical Velocity Ratio	(i) Khosla's theory	(b) Exit gradient	(ii) Kennedy's theory	(c) Normal scour depth	(iii) Bligh's theory	(d) Safe Hydraulic gradient	(iv) Lacey's theory
(a) Critical Velocity Ratio	(i) Khosla's theory								
(b) Exit gradient	(ii) Kennedy's theory								
(c) Normal scour depth	(iii) Bligh's theory								
(d) Safe Hydraulic gradient	(iv) Lacey's theory								
109	Given below are two statements : One is labelled as Reason (R) and the other is labelled as Assertion (A) Assertion (A) : Uplift pressure can be reduced by forming drain through the concrete. Reason (R) : Drains are usually provided near the upstream faces of the dam. A : Both (A) and (R) are correct and (R) is the correct explanation of (A) –(Correct Option) B : Both (A) and (R) are correct , but (R) is not the correct explanation of (A) C : (A) is not correct but (R) is correct								

	D : (A) is correct but (R) is not correct								
110	Which of the following options are correct to represent the ions responsible for hardness of water ? A : $\text{Ca}^{2+}, \text{Mg}^{2+}, \text{HCO}_3^-, \text{CO}_3^{2-}$ and CO_2 – (Correct Option) B : $\text{Ca}^{2+}, \text{Zn}^{2+}, \text{SO}_3^-, \text{CO}_3^{2-}$ and HCO_3^- C : $\text{Ca}^{2+}, \text{Mg}^{2+}, \text{Zn}^{2+}, \text{SO}_3^-$ and CO_3^- D : $\text{Ca}^{2+}, \text{Zn}^{2+}, \text{NO}_3^-, \text{SO}_3^-$ and HCO_3^-								
111	Match the following and choose the correct option : <table> <tr> <td>(a) Dry weather flow</td><td>(i) Incremental Increase Method</td></tr> <tr> <td>(b) Population growth</td><td>(ii) Flows through sewer in dry weather when no storm water is in the sewer</td></tr> <tr> <td>(c) Peak factor</td><td>(iii) Additional flow during rainy season</td></tr> <tr> <td>(d) Storm water flow</td><td>(iv) Ratio of Minimum to average flow</td></tr> </table> A : (a)-(iv), (b)-(i), (c)-(ii), (d)-(iii) B : (a)-(iv), (b)-(i), (c)-(iii), (d)-(ii) C : (a)-(ii), (b)-(i), (c)-(iv), (d)-(iii) – (Correct Option) D : (a)-(ii), (b)-(i), (c)-(iii), (d)-(iv)	(a) Dry weather flow	(i) Incremental Increase Method	(b) Population growth	(ii) Flows through sewer in dry weather when no storm water is in the sewer	(c) Peak factor	(iii) Additional flow during rainy season	(d) Storm water flow	(iv) Ratio of Minimum to average flow
(a) Dry weather flow	(i) Incremental Increase Method								
(b) Population growth	(ii) Flows through sewer in dry weather when no storm water is in the sewer								
(c) Peak factor	(iii) Additional flow during rainy season								
(d) Storm water flow	(iv) Ratio of Minimum to average flow								
112	What is the range of size of suspended solids in treated waste water which is partly in colloidal and partly in discrete ? A : 10^{-4} to $100\ \mu\text{m}$. B : 10^{-4} to $1000\ \mu\text{m}$. C : 10^{-3} to $100\ \mu\text{m}$. – (Correct Option) D : 10^{-3} to $1000\ \mu\text{m}$.								

113	For equivalent pipe, the following are the two principles of Hydraulics. (i) The Loss of head caused by the given flow of water through the pipes connected in series is subtractive. (ii) The quantity of discharge flowing through the different pipes connected in parallel will be such as to cause equal head loss through each pipe. A : Both (i) and (ii) are correct B : (i) is correct and (ii) is wrong C : (i) is wrong and (ii) is correct -(Correct Option) D : Both (i) and (ii) are wrong
114	The frictional head loss (H_L) given by Hazen William's formula is : A : $V = 0.85 C_H \cdot R^{0.63} \cdot S^{0.54} \cdot L.$ B : $V = \frac{1}{N} R^{\frac{2}{3}} S^{\frac{1}{2}}$ C : $V = C \sqrt{mi}$ D : None of the above – (Correct Option)
115	The tolerance limit for industrial effluent discharged into Inland Surface Waters as per BIS Standards for the effluent cyanides is A : 0.2 mg/l -(Correct Option) B : 0.1 mg/l C : 0.01 mg/l D : 0.02 mg/l
116	The expression for settling velocity of a spherical particle as per Stoke's law is given by Where, V_s = velocity of settlement of particle in m/s d - diameter of particle in m. G - Specific gravity of the particle. ν - Kinematic viscosity of water in m^2/s^2

A
: $v_s = \frac{g}{18}(G-1) \frac{d^2}{\nu}$ for $d < 0.1\text{mm}$.
– (Correct Option)

B
: $v_s = \frac{G}{18}(g-1) \frac{\nu}{d^2}$ for $d < 0.1\text{mm}$.

C
: $v_s = \frac{g}{18}(G-1) \times \frac{\nu}{d^2}$ for $d < 0.1\text{mm}$.

D
: $v_s = \frac{G}{18}(g-1) \times \frac{\nu^2}{d^2}$ for $d < 0.1\text{mm}$.

117 The minimum particle size that can be removed in "µm" for the mechanical device Gravitational settling chamber is

A : > 50 µm -(Correct Option)

B : > 75 µm

C : < 50 µm

D : < 25 µm

118 If a sample of air is analysed at Standard Temperature and Pressure, and is found to contain 0.3 ppm of sulphur di oxide, the equivalent SO₂ concentration in µg./m³ will be :

A : 8000

B : 800 -(Correct Option)

C : 80

D : 0.8

119 Match the following :

List – I	List – II
Instrumental Technique	Parameters
(a) Photometry	(i) Oxidants
(b) Polarography	(ii) SO ₂ , NO _x , Particulates
(c) Coulometry	(iii) SO ₂ , NO _x , Oxidants/O ₃ CO
(d) Non-dispersive-UV- visible Absorption	(iv) Metals
	(v) Trace organic and inorganic matter

	A : (a)-(i), (b)-(ii), (c)-(iii), (d)-(v) B : (a)-(ii), (b)-(iv), (c)-(iii), (d)-(i) -(Correct Option) C : (a)-(ii), (b)-(iv), (c)-(v), (d)-(i) D : (a)-(i), (b)-(iii), (c)-(ii), (d)-(v)										
120	Match List – I (Equipment) with List – II (Pollutants removed) and select the correct answer using codes given below in the lists : <table> <tr> <th>List – I</th><th>List - II</th></tr> <tr> <td>α - Electrostatic Precipitators</td><td>1 - Coarse particles</td></tr> <tr> <td>β - Cyclones</td><td>2 - Fine dust</td></tr> <tr> <td>γ - Wet scrubbers</td><td>3 - Gas</td></tr> <tr> <td>δ - Absorbers</td><td>4 - Sulphur dioxide</td></tr> </table> A : α-1, β-2, γ-4, δ-3 B : α-2, β-1, γ-3, δ-4 -(Correct Option) C : α-2, β-1, γ-4, δ-3 D : α-2, β-4, γ-1, δ-3	List – I	List - II	α - Electrostatic Precipitators	1 - Coarse particles	β - Cyclones	2 - Fine dust	γ - Wet scrubbers	3 - Gas	δ - Absorbers	4 - Sulphur dioxide
List – I	List - II										
α - Electrostatic Precipitators	1 - Coarse particles										
β - Cyclones	2 - Fine dust										
γ - Wet scrubbers	3 - Gas										
δ - Absorbers	4 - Sulphur dioxide										
121	The most energy-efficient method for recycling polyethylene terephthalate (PET) is A : Pyrolysis B : Mechanical recycling C : Depolymerization -(Correct Option) D : Thermal cracking										
122	Which of the following material recovery technologies is most suitable for extracting high purity ferrous metals from mixed waste streams ? A : Eddy current Separator B : Trommel Screen C : Magnetic Separator -(Correct Option) D : Froth Floatation										

123

The thickness of clay liner in the design of Engineered landfill is typically of

A : 150 mm

B : 300 mm

C : 200 mm

D : 450 mm -(Correct Option)

124

Match the RDF type with Description.

List – I	List - II
α - RDF – 1	1 - Unprocessed MSW
β - RDF - 2	2 - MSW shredded but no separation
γ - RDF - 3	3 - Organic fraction of shredded MSW
δ - RDF - 4	4 - Organic Waste Produced by an MRF

A : α -1, β -2, γ -3, δ -4 -(Correct Option)

B : α -1, β -3, γ -4, δ -2

C : α -1, β -3, γ -2, δ -4

D : α -2, β -1, γ -4, δ -3

125

Match the following as per ISI values given below for various tests.

List – I	List - II
(a) Road Tar Grade 1	(i) Viscosity – 30 to 55 seconds
(b) Road Tar Grade 2	(ii) Temperature – 35°C
(c) Road Tar Grade 3	(iii) Temperature – 55°C
(d) Road Tar Grade 4	(iv) Specific gravity – 1.18 to 1.28

A : (a)-(ii), (b)-(i), (c)-(iv), (d)-(iii) -(Correct Option)

B : (a)-(iii), (b)-(iv), (c)-(i), (d)-(ii)

C : (a)-(iv), (b)-(iii), (c)-(i), (d)-(ii)

D : (a)-(iii), (b)-(iv), (c)-(ii), (d)-(i)

126

Traffic signs and devices should be placed within a cone of

	A : B : 10° – (Correct Option) C : 15° D : 20°
127	The relation between Pavement layers of thickness t_1 and t_2 of elastic modulus E_1 and E_2 is given by A : $\frac{t_1}{t_2} = \left(\frac{E_1}{E_2}\right)^{1/2}$ B : $\frac{t_1}{t_2} = \left(\frac{E_2}{E_1}\right)^{1/3}$ – (Correct Option) C : $\frac{t_1}{t_2} = \left(\frac{E_1}{E_2}\right)^{1/3}$ D : $\frac{t_1}{t_2} = \left(\frac{E_2}{E_1}\right)^{2/3}$
128	Temperature tends to produce two types of stresses in a concrete pavement A : Bending stress, Shear stress B : Shear stress, Tensile stress C : Tensile stress, Warping stress D : Warping stress, Frictional Resistance –(Correct Option)
129	A vehicle has a wheel base of 6.5 m. What is the off tracking while negotiating a curved path with a mean radius of 32 m A : 0.77 m B : 0.55 m

C : 0.66 m -(Correct Option)

D : 0.45 m

130 The relationship between pavement thickness, wheel load, tyre pressure and CBR value is :

Where t = thickness of pavement, CM

P = Wheel load, Kg,

CBR = California Beaming Ratio, %

p = tyre pressure, Kg/cm²

A
:
$$t = P \left[\frac{2.75}{\text{CBR}} - \frac{1}{p\pi} \right]^{\frac{3}{2}}$$

B
:
$$t = \sqrt{P} \left[\frac{1.75}{\text{CBR}} - \frac{1}{p\pi} \right]^{\frac{1}{2}} \quad \text{-- (Correct Option)}$$

C
:
$$t = P^2 \left[\frac{3.75}{\text{CBR}} - \frac{1}{p\pi} \right]^{\frac{1}{2}}$$

D
:
$$t = 2P \left[\frac{1.75}{\text{CBR}} - \frac{1}{p\pi} \right]^{\frac{3}{2}}$$

131 Westergaard Radius of relative stiffness is _____.

Where l = radius of relative stiffness, cm

E = Modulus of elasticity of cement concrete, kg/cm²

H = Slab thickness, cm

μ = Poisson's ratio for concrete

K = Subgrade modulus of subgrade reaction, kg/cm²

A
:
$$l = Eh^3 \times (12k(1-\mu^2))$$

B
:
$$l = \left(\frac{Eh^4}{12k(1-\mu^4)} \right)^{\frac{1}{2}}$$

C
:
$$l = Eh^4(24k(1-\mu^2))$$

D
:
$$l = \left[\frac{Eh^3}{12k(1-\mu^2)} \right]^{\frac{1}{4}} \quad \text{-- (Correct Option)}$$

132

From the liquid limit test data, soil flow index property can be calculated using formula

as

Where, FI = flow index

N_1 and N_2 are the number of flow counts corresponding to the water contents of w_1

and w_2 .

A

: $FI = (w_2 - w_1) \log_{10} \frac{N_1}{N_2}$

B

: $FI = \frac{w_2 - w_1}{\log_{10} \frac{N_1}{N_2}} - \text{(Correct Option)}$

C

: $FI = \frac{w_2 - w_1}{2 \log_{10} \frac{N_1}{N_2}}$

D

: $FI = (w_2 - w_1)^2 \log_{10} \frac{N_1}{N_2}$

133

The limit of aggregate crushing value according to the IRC for wearing course with bitumen construction is

A : < 45%

B : > 45%

C : > 30%

D : < 30% - (Correct Option)

134

The Skid resistance (S) for a vehicle to slow down from speed V_1 to V_2 (m/s) with average friction factor of f is given as

A

: $\frac{V_1^2 - V_2^2}{2gf} - \text{(Correct Option)}$

B

: $\frac{V_1^3 - V_2^3}{2gf}$

C

: $\frac{V_1^2 - V_2^2}{gf}$

	D $\frac{V_1^3 - V_2^3}{gf}$:
135	For sub-grade soils and granular materials, the elastic modulus is evaluated by employing _____ in the laboratory and is referred to as resilient modulus. A : Dynamic loads -(Correct Option) B : Static loads C : Single point load D : Two point load
136	With respect to the flow-density curve of traffic flow, two statements labelled Assertion (A) and Reason (R) are given below. (A) There exists a density called maximum density, between zero and jam density when flow is maximum. (R) When number of vehicles increases, the density and the flow both increase till maximum density. After this, flow decreases even though density increases. In the light of the above statements, choose the most appropriate option from those below A : Both (A) and (R) are correct and (R) is the correct explanation of (A) B : Both (A) and (R) are correct but (R) is not the correct explanation of (A) -(Correct Option) C : (A) is correct but (R) is not correct D : (A) is not correct but (R) is correct
137	The cycle time of an intersection is 120 seconds, the green time for a phase is 55 seconds and the corresponding yellow time is 5 seconds. If the saturation headway is 2.4 seconds per vehicle, the start-up lost time is 2 seconds/phase and the clearance lost time is 2 seconds/phase, find the capacity of movement per lane. A : 1400 vehicles/hr/lane B : 700 vehicles/hr/lane -(Correct Option) C : 638 vehicles/hr/lane D : 1275 vehicles/hr/lane
138	

	A : (a)-(iii), (b)-(ii), (c)-(i), (d)-(iv) -(Correct Option) B : (a)-(i), (b)-(ii), (c)-(iii), (d)-(iv) C : (a)-(iv), (b)-(i), (c)-(ii), (d)-(iii) D : (a)-(ii), (b)-(iii), (c)-(i), (d)-(iv)
139	Arrange the following channelisation devices in increasing order of their height : (a) Flush channelisation (b) Traversable raised curb (c) Wide raised median (d) Non-traversable raised island A : $a < b < c < d$ -(Correct Option) B : $d < c < b < a$ C : $a < d < b < c$ D : $a < b < d < c$
Question Dropped	
140	A Theodolite was set up at a station P. The angle of depression to a vane 2 m above the foot of a staff held at another station Q was 45°. The horizontal distance between P and Q is 8 m. The staff reading at a benchmark S of R.L. 440.500 m is 2.500 m. Neglecting the errors due to curvature and refraction, the R.L. of station Q (in m) is : A : 413.05 m B : 437.00 m C : 431.00 m D : 443.00 m
141	A level instrument at a height of 1.25 m has been placed at a station having a Reduced Level (R.L) of 460.500 m. The instrument reads - 3.250 m on a levelling staff held at the bottom of a bridge deck. The R.L (in m) of the bottom of the bridge deck is _____ m

	A : 400.650 B : 325.500 C : 365.000 D : 465.000 -(Correct Option)
142	The magnetic bearing of line AB was S 70°E in the year 1988, when the magnetic declination was 2°W. If the present (2025) declination is 3°30'E, the magnetic (whole circle) bearing of the line AB is _____ A : 115° 30' -(Correct Option) B : 105° 30' C : 109° 30' D : 68° 30'
143	According to laws of weights, for survey adjustments and errors, an angle $\alpha = 60^{\circ}39'30''$ with a weight = 4 is measured. If the angle α is divided by 3, then the corresponding weight would be _____. A : 12 B : 24 C : 36 -(Correct Option) D : 48
144	A spectral signature with a strong reflectance in the blue and green bands but low reflectance in the red band would most likely correspond to A : Water bodies -(Correct Option) B : Urban areas C : Barren land D : Vegetation

145	The interaction of the electromagnetic radiation produced by a system with a specific wave length to illuminate a target on the terrain for studying the scattered radiance is called A : Active remote sensing -(Correct Option) B : Passive remote sensing C : Neutral remote sensing D : Micro optic remote sensing								
146	De-stripping is a part of _____. A : Detector response calibration -(Correct Option) B : Image classification C : Sun angle and topographic correction D : Atmosphere correction								
147	Envisat, Radarsat-1 and ERS-2 satellites used which wavelength band for their radar systems ? A : S - band B : L - band C : C - band -(Correct Option) D : C - band for Envisat and ERS -2 and L - Band for Radarsat -1								
148	Match the below map projection systems with their common uses : <table><tr><td>(a) Azimuth equidistant/planar</td><td>(i) Topographic mapping of areas with North-South extent</td></tr><tr><td>(b) Equidistant conical</td><td>(ii) Polar region maps</td></tr><tr><td>(c) Stereographic/planar</td><td>(iii) Region mapping of mid-latitude areas with East-West extent</td></tr><tr><td>(d) Transverse Mercator/cylindrical</td><td>(iv) Equatorial and polar area large-scale maps</td></tr></table> A : (a)-(i), (b)-(ii), (c)-(iii), (d)-(iv) B : (a)-(ii), (b)-(i), (c)-(iv), (d)-(iii) C : (a)-(iv), (b)-(iii), (c)-(ii), (d)-(i) -(Correct Option)	(a) Azimuth equidistant/planar	(i) Topographic mapping of areas with North-South extent	(b) Equidistant conical	(ii) Polar region maps	(c) Stereographic/planar	(iii) Region mapping of mid-latitude areas with East-West extent	(d) Transverse Mercator/cylindrical	(iv) Equatorial and polar area large-scale maps
(a) Azimuth equidistant/planar	(i) Topographic mapping of areas with North-South extent								
(b) Equidistant conical	(ii) Polar region maps								
(c) Stereographic/planar	(iii) Region mapping of mid-latitude areas with East-West extent								
(d) Transverse Mercator/cylindrical	(iv) Equatorial and polar area large-scale maps								

	D : (a)-(i), (b)-(ii), (c)-(iv), (d)-(iii)
149	A map showing average household income by country is an example for A : Graduated symbol map B : Choropleth map -(Correct Option) C : Graduated colour map D : Dasymmetric map
150	The network of parallels and meridians that comprise the system of Geographic co-ordinates is known as A : Latitude B : Graticule -(Correct Option) C : Longitude D : Prime Meridian