MEGA MOCK CHALLENGE

gradeup

SSC JE 2019-20

Mechanical Engineering

Mega Mock Challenge

(27Mar - 28Mar 2020)

Questions & Solutions

1. In the following question, which one of the given responses would be a meaningful order of the following?

1. Reading
2. Listening
3. Writing
4. Speaking

A. 4, 2, 1, 3
B. 2, 4, 3, 1
C. 2, 4, 1, 3
D. 4, 3, 2, 1

Ans. C

Sol. The order shows stages the way a child goes the learning phase: A child first listens to people which enables him to start speaking after that they are taught to read stuff from various sources, recognize alphabets and other things which ultimately helps them in writing on their own what they listen, speak and read.

So, the meaningful order of words will be:

2. Listening
↓
4. Speaking
↓
1. Reading
↓
3. Writing

Thus the correct order is 2, 4, 1, 3.

Hence, the correct option is C.

2. Which one of the given responses would be the meaningful order of the following words?

1) Consultations
2) Illness
3) Doctor
4) Treatment
5) Recovery

A. 2, 3, 1, 4, 5
B. 2, 3, 4, 1, 5
C. 4, 3, 1, 2, 5
D. 5, 1, 4, 3, 2

Ans. A

Sol. Clearly, illness occurs first, then the person goes to the doctor and after consultation with the doctor, the person then undergoes treatment to finally attain recovery. Thus, the correct order is 2,3,1,4,5.

Hence, the correct option is A.

3. Arrange the given words in the sequence in which they occur in the dictionary.

1. Dramp
2. Drabbet
3. Dragbar
4. Draug
5. Drail

A. 1, 3, 4, 5, 2
B. 1, 3, 2, 4, 5
C. 2, 3, 5, 1, 4
D. 4, 3, 1, 2, 5

Ans. C

Sol. Here, the correct order is as follows:

2. Drabbet
3. Dragbar
5. Drail
1. Dramp
4. Draug

Hence, the correct option is C.

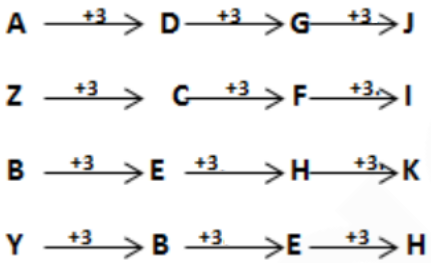
4. A series is given with one term missing. Select the correct alternative from the given ones that will complete the series.

AZBY, DCEB, GFHE,?

A. JIHK
B. JIKH
C. JKIH
D. JHIK

Ans. B

Sol. The series will be,



Thus, AZBY, DCEB, GFHE, JIKH

Hence, the correct option is B.

5. A series is given with one term missing. Select the correct alternative from the given ones that will complete the series.

IM, JO, KQ, LS, ?

A. NV
B. MU
C. MY
D. NT

Ans. B

Sol.

Alphabet	A	B	C	D	E	F	G	H	I	J	K	L	M
Position value	1	2	3	4	5	6	7	8	9	10	11	12	13
Alphabet	Z	Y	X	W	V	U	T	S	R	Q	P	O	N
Position value	26	25	24	23	22	21	20	19	18	17	16	15	14

I + 1 = J, J + 1 = K, K + 1 = L, L + 1 = M

M + 2 = O, O + 2 = Q, Q + 2 = S, S + 2 = U

Hence, the correct option is B.

6. A series is given with one term missing. Select the correct alternative from the given ones that will complete the series.

MAN, ODR, QGV, SJZ, ?

A. UMD
B. VNC
C. UNC
D. VMD

Ans. A

Sol.

Alphabet	A	B	C	D	E	F	G	H	I	J	K	L	M
Position value	1	2	3	4	5	6	7	8	9	10	11	12	13
Alphabet	Z	Y	X	W	V	U	T	S	R	Q	P	O	N
Position value	26	25	24	23	22	21	20	19	18	17	16	15	14

M + 2 = O, O + 2 = Q, Q + 2 = S, S + 2 = U

A + 3 = D, D + 3 = G, G + 3 = J, J + 3 = M

N + 4 = R, R + 4 = V, V + 4 = Z, Z + 4 = D

Hence, the correct option is A.

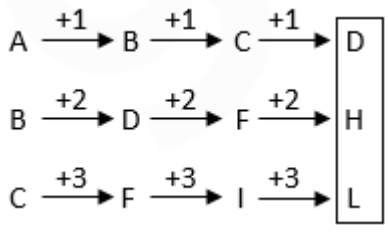
7. A series is given with one term missing. Select the correct alternative from the given ones that will complete the series.

ABC, BDF, CFI, ?

A. DLH
B. LDH
C. DIL
D. DHL

Ans. D

Sol. As,



Thus the next term in the series is DHL.

Hence, the correct option is D.

8. A series is given with one term missing. Select the correct alternative from the given ones that will complete the series.

84, 42, 28, 21, ?

A. 10.5 B. 16.8

C. 18.4 D. 19.6

Ans. B

Sol. $(84 \div 2) \times 1 = 42$

$(42 \div 3) \times 2 = 28$

$(28 \div 4) \times 3 = 21$

$(21 \div 5) \times 4 = 16.8$

Thus the next number in the series is 16.8

Hence, the correct option is B.

9. A series is given with one term missing. Select the correct alternative from the given ones that will complete the series.

127, 63, 31, 15, 7, ?

A. 2 B. 3

C. 4 D. 5

Ans. B

Sol. $127 - 1 = 126$; $126 \div 2 = 63$,

$63 - 1 = 62$; $62 \div 2 = 31$,

$31 - 1 = 30$; $30 \div 2 = 15$,

$15 - 1 = 14$; $14 \div 2 = 7$,

$7 - 1 = 6$; $6 \div 2 = 3$

Thus the next number in the series will be '3'.

Hence, the correct option is B.

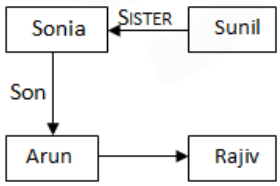
10. Rajiv is the brother of Arun. Sonia is the sister of Sunil. Arun is the son of Sonia. How is Rajiv related to Sunil?

A. nephew B. son

C. brother D. father

Ans. A

Sol. From the information given in the question,



Clearly, Rajiv is the nephew of Sunil.

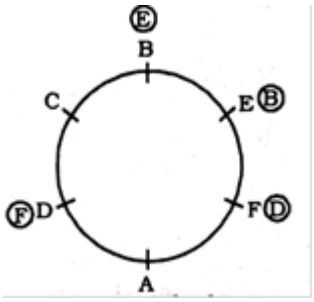
Hence, the correct option is A.

11. Six person are sitting in a circle. A is facing B, B is to the immediate right of E and immediate left of C. C is to the left of D. F is to the right of A. Now D exchanges his seat with F and E with B. Who will be sitting to the left of D ?

A. D
B. E
C. A
D. B

Ans. C

Sol. According to the given information:



Clearly, A is to the left of D.

Hence, the correct option is C.

12. In the following question, select the word which cannot be formed using the letters of the given word.

ABNEGATION

A. ACTION
B. GOAT
C. BEAT
D. GOT

Ans. A

Sol. In this question, we show that the letter 'C' is not present but option A but the letter 'C' is used once in the word ABNEGATION. Thus we cannot form word ACTION.

Hence, the correct option is A.

13. In a certain code language, "EXCITED" is written as "DETICXE". How is "KINLEY" written in that code language?

A. YELNIK
B. NIKLEY
C. NIKYEL
D. LJOMFZ

Ans. A

Sol. The word 'EXCITED is written in reverse order as DETICXE. Similarly, KINLEY will be written as YELNIK.

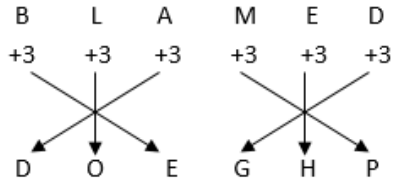
Hence, the correct option is A.

14. In a certain code language, "BLAMED" is written as "DOEGHP" and "DISECT" is written as "VLGWFH". How is "POLARY" written in that code language?

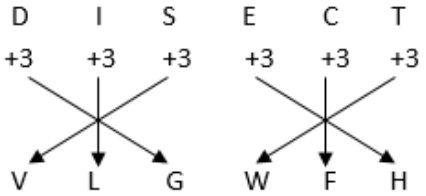
A. QPMBSZ
B. ORSBUD
C. DBVSRO
D. KNOCQZ

Ans. B

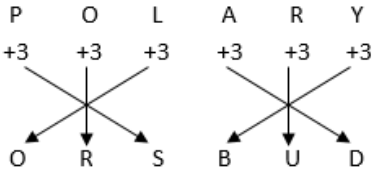
Sol. As,



And



Similarly,



Thus POLARY is coded as ORSBUD.

Hence, the correct option is B.

15. Which of the following interchanges of signs and numbers would make the flowing equation correct?

18 – 8 ÷ 12 × 6 + 10 = 12

A. × and ÷, 12 and 6
B. + and -, 8 and 10
C. + and -, 6 and 8
D. × and -, 18 and 6

Ans. C

Sol. By checking Option A,

18 – 8 ÷ 12 × 6 + 10 = 12

After changing the symbols,

18 – 8 × 6 ÷ 12 + 10

Applying BODMAS we get,

=18 – 4 + 10

=14 + 10

=24

Therefore, 18 – 8 ÷ 12 × 6 + 10 = 12 is not the correct equation.

By checking Option B,

18 – 8 ÷ 12 × 6 + 10 = 12

After changing the symbols,

18 + 10 ÷ 12 × 6 - 8

Applying BODMAS we get,

=18 + 5 – 8

=23 – 8

=15

Therefore, 18 – 8 ÷ 12 × 6 + 10 = 12 is not the correct equation.

By checking Option C,

18 – 8 ÷ 12 × 6 + 10 = 12

After changing the symbols,

18 + 6 ÷ 12 × 8 - 10

Applying BODMAS we get,

=18 + 4 – 10

=22 – 10

=12

Therefore, 18 – 8 ÷ 12 × 6 + 10 = 12 is the correct equation.

As, we found the correct answer, so no need to check more options.

Hence, the correct option is C.

16. If RULE is written as 60, GAME is written as 30, then HOPE will be written as?

A. 50 B. 48

C. 44 D. 52

Ans. B

Sol. In this question, we show that-

Adding the place value of the letters of the word RULE –

18 + 21 + 12 + 5 = 56

Now again adding 4 to it = (56 + 4) = 60

For GAME –

7 + 1 + 13 + 5 = 26

Now again adding 4 to it = (26 + 4) = 30

For HOPE –

8 + 15 + 16 + 5 = 44

Now again adding 4 to it = (44 + 4) = 48

Hence, the correct option is B.

17. If 'B × C' means 'B is the daughter of C', 'B + C' means 'B is the husband of C' and 'B – C' means 'B is the sister of C', then what does 'X + Y – Z × U' mean ?

A. X is the brother – in – law of U B. X is the uncle of U

C. X is the son-in-law of U D. U is the mother-in-law of X

Ans. C

Sol. Different symbols used to draw a family tree,

Symbol in Diagram	○	□	=	∧	|
Meaning	Female	Male	Married Couple	Siblings	Difference of A Generation

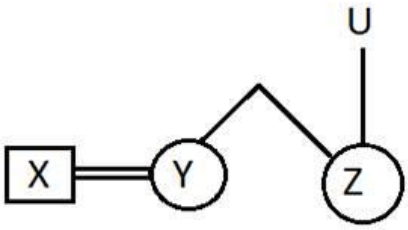
'B × C' means 'B is the daughter of C',

'B + C' means 'B is the husband of C'

'B – C' means 'B is the sister of C'

B is	×	Daughter	of C
	+	Husband	
	–	Sister	

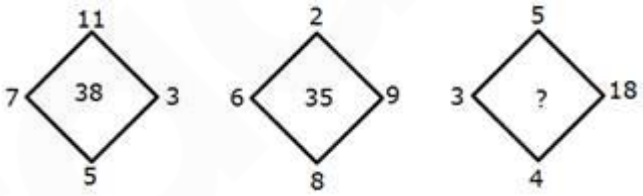
X + Y – Z × U ⇒ X is the husband of Y, Y is the sister of Z, Z is the daughter of U.



Clearly, X is the son-in-law of U.

Hence, the correct option is C.

18. In the following question, select the missing number from the given alternatives.



A. 41 B. 32

C. 49 D. 37

Ans. D

Sol. 1st Figure:

[(7×3)+(11×5)]×0.5

=[21+55]×0.5

=76×0.5=38

2nd Figure:

[(6×9)+(2×8)]×0.5

=[54+16]×0.5

=70×0.5=35

Similarly,

3rd Figure:

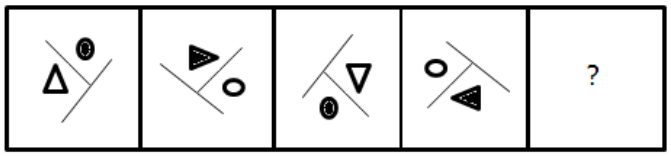
[(3×18)+(5×4)]×0.5

=[54+20]×0.5

=74×0.5=37

Hence, the correct option is D.

19. Select the figure that will come next in the following figure series.



A. 

B. 

C. 

D. 

Ans. C

Sol. After carefully observing the figures given in the question, it is very clear that the answer figure(C) will be the next figure.

Logic- whole shape moves 90 degree right in each step, triangle and bubbles gets whitened and darken alternately.

Hence, the correct answer is option C.

20. Pinki moves 30m in the west direction from her house. Now she turned her left and moves 70m and again turned left and moves 85m. Now she took left turn and moves 70m. Now how far she is from her house?

A. 55m

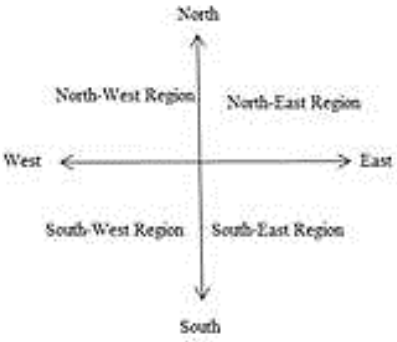
B. 50m

C. 65m

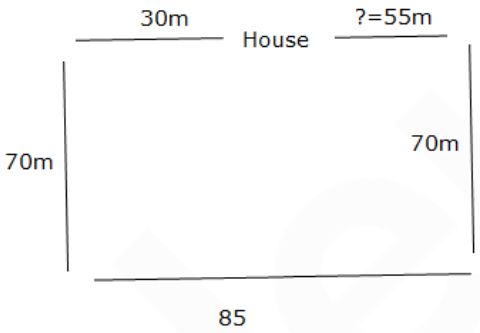
D. 60m

Ans. A

Sol. We know that:



We can show the given data in the following figure:



Required distance=85-30=55m

Hence, the correct option is A.

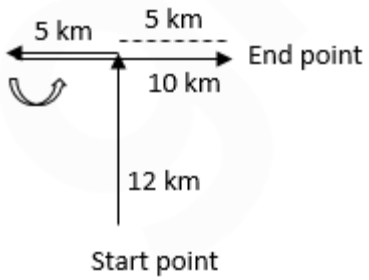
21. A travels 12 km towards north and then takes a left turn and covers another 5 km. From there, he turns 180 ° anticlockwise and travels 10 km further. What is the minimum distance between his initial and final position?

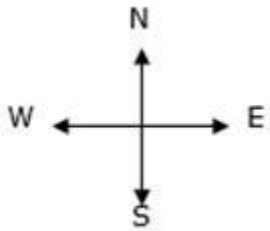
A. 8 km B. 13 km

C. 6 km D. 12 km

Ans. B

Sol.





Thus applying Pythagoras theorem distance between initial and final position is $\sqrt{5^2 + 12^2} = 13$ km.

Hence, the correct option is B.

22. Two statements are given, followed by three conclusions numbered I, II and III. Assuming the statements to be true, even if they seem to be at variance with commonly known facts, decide which of the conclusions logically follow(s) from the statements.

Statements:

Some males are swimmers.

All swimmers are athletes.

Conclusions:

I. Some athletes are males.

II. No athlete is male.

III. Some athletes ate swimmers.

A. Only conclusions I and III follow

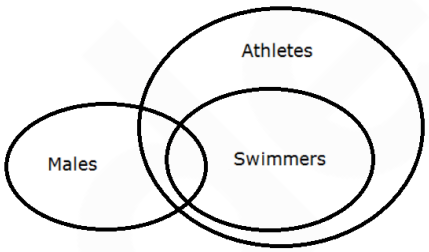
B. All of the conclusions follow.

C. Only conclusions I and II follow.

D. Only conclusions II and III follow.

Ans. A

Sol. The least possible Venn-diagram is-



Conclusions:

I. Some athletes are males - (It is a definite case hence true).

II. No athlete is male - (It is not a definite case hence false).

III. Some athletes ate swimmers -(It is a definite case hence true).

So, only conclusions I and II follow.

Hence, the correct option is A.

23. Two statements are given, followed by three conclusions numbered I, II and III. Assuming the statements to be true, even if they seem to be at variance with commonly known facts, decide which of the conclusions logically follow(s) from the statements.

Statements:

All teachers are researchers.

No researcher is unemployed.

Conclusions:

I. Some unemployed are teachers.

II. No teacher is unemployed.

III. Some teachers are unemployed.

A. Only conclusion II follows.

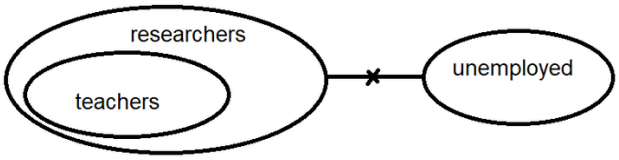
B. Only conclusion I follows.

C. Only conclusions II and III follow

D. Only conclusions I and III follow.

Ans. A

Sol. The least possible Venn-diagram is-



Conclusions:

I. Some unemployed are teachers -(It is not a definite case hence false).

II. No teacher is unemployed - (It is a definite case hence true).

III. Some teachers are unemployed - (It is not a definite case hence false).

So, only conclusions II follows.

Hence, the correct option is A.

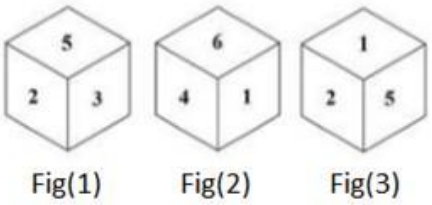
24. Three different position of the same dice are shown below. Which number is on the face opposite the face showing "4"?

A. 5 B. 3

C. 2 D. 6

Ans. A

Sol.



From fig(1) and fig(3), 2 and 5 are the consecutive side face of 3, also 2 and 5 are the consecutive side face of 1, therefore 3 is the opposite of 1.

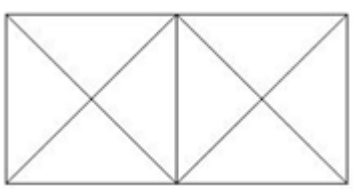
From fig(2) and fig(3), 4, 6, 5, 2 are the consecutive side face of 1.

From 4, 6, 5, 2-

4 is opposite of 5 and 6 is opposite of 2.

Hence, the correct option is A.

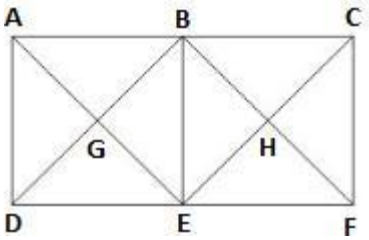
25. How many triangles are there in the given figure?



A. 16
B. 18
C. 20
D. 22

Ans. B

Sol.



The triangles that we get from the given figure are,

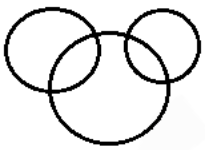
ABG, BEG, DEG, DAG, BCH, CFH, EFH, EBH, ADE, ABE, DEB, ADB, BEC, BCF, EFB, EFC, BDF and AEC.

Thus we get 18 triangles.

Hence, option B is the correct answer.

26. Identify the diagram that best represents the relationship among the given classes.

Father, Male, Mother

A. 

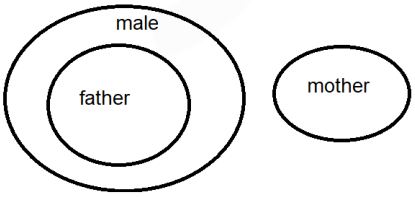
B. 

C. 

D. 

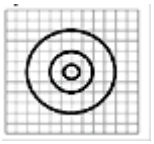
Ans. B

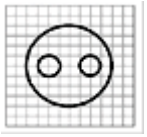
Sol. All fathers are male, while the mother is a separate unit so it will be represented by a different circle.

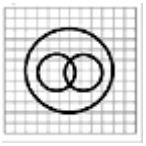


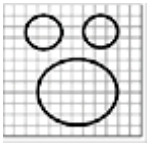
Hence, the correct option is B.

27. Identify the diagram that best represents the relationship among the given classes.
Delhi, Sri Lanka, Asia

A. 

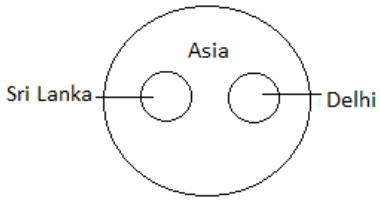
B. 

C. 

D. 

Ans. B

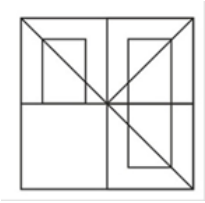
Sol.



Clearly, both Delhi & Sri Lanka are the part of Asia Continent.

Hence, the correct option is C.

28. Which answer figure will complete the pattern in the question figure?



A. 

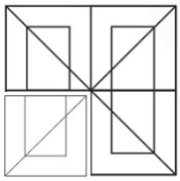
B. 

C. 

D. 

Ans. A

Sol.

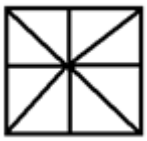


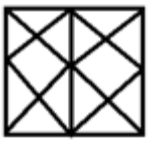
Clearly, the figure in option A completes the pattern in the question figure.

29. From the given answer figures, select the one in which the question figure is hidden/embedded.

A. 

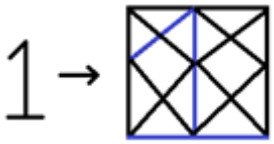
B. 

C. 

D. 

Ans. D

Sol.



After observing the given diagram carefully, option figure D has the given embedded figure.

30. The sequence of folding a piece of square paper (figure X and Y) and the manner in which the folded paper has been cut (figure Z) are shown. How will the paper appear when unfolded?

A. 

B. 

C. 

D. 

Ans. D

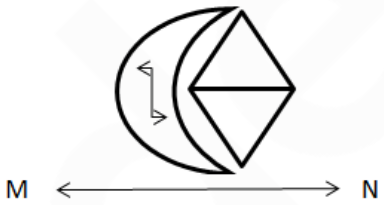
Sol. The paper is unfolded in two steps:

Step-1

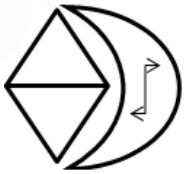
Step- 2

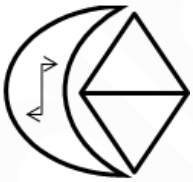
Hence, the correct option is D.

31. If a mirror is placed on the line MN, then which of the answer figures is the right image of the given figure?



A. 

B. 

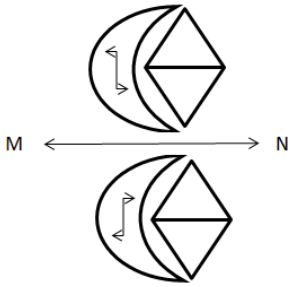
C. 

D. 

Ans. C

Sol. In a plane mirror, a mirror image is a reflected duplication of a figure that appears almost identical, but it is reversed in the direction perpendicular to the mirror surface. As an optical effect it results from reflection of substances such as a mirror or water.

In this question figure, three symbol of infinity given, since, mirror image of infinity symbol remains same.



Hence, the correct option is C.

32. A statement is given followed by two course of action. The candidate is required to grasp the statement and analyses the problem or policy it mentions and then decide which course of action logically follows.

Statement:

Raju has topped his class in the 10^{th} board examination.

Course of action:

I. Raju went to school regularly and studied carefully throughout the session.

II. Raju likes video games.

A. Only I follows
B. Only II follows
C. Both I and II follow
D. Either I or II follows

Ans. A

Sol. Course of action:

I. Raju went to school regularly and studied carefully throughout the session -(It follows as one needs to attend school regularly and study very carefully to obtain good marks in the examination and sometimes it leads to become top rank holders.)

II. Raju likes video games - (It does not follow as it doesn't affect his study.)

So, only I follow.

Hence, the correct option is A.

33. In the following question, select the related word from the given alternatives.

Happy : Sad :: Benevolent : ?

A. Selfish
B. Glowing
C. Sympathetic
D. Depressed

Ans. A

Sol. After observing the given words carefully, we can conclude that both the words are opposite to each other.

As, happy is the opposite of sad. Similarly, benevolent is the opposite of Selfish.

(Benevolent meaning - well-meaning and kindly.)

(Selfish meaning - lacking consideration for other people.)

Hence, the correct option is A.

34. In the following question, select the related word from the given alternatives.
Fossils : Creatures :: Mummies :?
A. Mothers
B. Dead human
C. Dried bodies
D. Dead plants

Ans. B

Sol. As 'Fossils' are the remains of 'Creatures' dug up from earth in the same way 'Mummies' are the remains of the 'Human-beings' or dead bodies.
Hence, the correct option is B.

35. In the following question, select the related word from the given alternatives.
Chanakya : Politician :: Aryabhata : ?
A. Literature
B. Sanskrit
C. Vikramaditya
D. Mathematician

Ans. D

Sol. Chanakya was a famous politician and Aryabhata was a famous mathematician.
Hence, the correct option is D.

36. In the following question, select the related letters from the given alternatives.
EGIK : JLNP :: DFHJ : ?
A. IKMN
B. IKOM
C. IKMO
D. IKMP

Ans. C

Sol. Let us first write down the alphabets and their corresponding positions in the English alphabetic series.

A	B	C	D	E	F	G	H	I	J
1	2	3	4	5	6	7	8	9	10
K	L	M	N	O	P	Q	R	S	T
11	12	13	14	15	16	17	18	19	20

U	V	W	X	Y	Z
21	22	23	24	25	26

Here, EGIK : JLNP may be written as,

E $\xrightarrow{+5}$ J

G $\xrightarrow{+5}$ L

I $\xrightarrow{+5}$ N

K $\xrightarrow{+5}$ P

Similarly,

D $\xrightarrow{+5}$ I

F $\xrightarrow{+5}$ K

H $\xrightarrow{+5}$ M

J $\xrightarrow{+5}$ O

Thus, (DFHJ : IKMO)
Hence, the correct option is C.

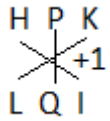
37. In the following question, select the related group of letters from the given alternatives.

HPK : LQI :: COT : ?

A. UPD
B. GPQ
C. GPP
D. VPR

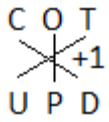
Ans. A

Sol. HPK : LQI => HPK is reversed ,KPH ,then each alphabet is replaced by next alphabet .



Similarly,

COT => UPD



Hence, the correct option is A.

38. In the following question, select the related letters from the given alternatives.

BRIGHT : FWMLLY :: WINDOW : ?

A. ANISBR
B. ARNISB
C. ANRISB
D. ANRSIB

Ans. C

Sol. Let us first write down the alphabets and their corresponding position in the English alphabetic series.

A	B	C	D	E	F
1	2	3	4	5	6
G	H	I	J	K	L
7	8	9	10	11	12
M	N	O	P	Q	R
13	14	15	16	17	18
S	T	U	V	W	X
19	20	21	22	23	24
Y	Z				
25	26				

B+4 = F

R+5 = W

I+4 =M

G+5 =L

H+4 =L

T+5 =Y

The alphabets are adding up by (+4) and (+5) alternatively.

Similarly,

W+4 =A

I+5 =N

N+4 =R

D+5 = I

O+4 =S

W+5 = B

Hence, option C is correct.

39. In the following question, select the related number from the given alternatives.

7 : 350 :: 9 : ?

A. 738 B. 879

C. 768 D. 675

Ans. A

Sol. The relationship used in this question is : $x^3 + x$.

Here, 7: 350 may be represented as $7 : 7^3 + 7$

Similarly,

$\Rightarrow 9 : 9^3 + 9 = 9 : 738$

Thus, 738 is the required answer.

Hence, the correct option is A.

40. In the following question, select the related number from the given alternatives.

8743 : 44 : : 6545 : ?

A. 40 B. 45

C. 37 D. 42

Ans. A

Sol. In a pair second number is twice of the sum of digits of first number.

⇒ In 8743 : 44

⇒ (8 + 7 + 4 + 3) = 22 x 2 = 44

In the similar way,

⇒ (6 + 5 + 4 + 5) = 20 x 2 = 40

41. Select the option that is related to the third term in the same way as the second term is related to the first term.

3360 : 15 :: 9240 : ?

A. 11 B. 21

C. 17 D. 25

Ans. B

Sol. The pattern is:

$15^3 - 15 : 15$

$3375 - 15 : 15$

$3360 : 15$

Similarly,

$21^3 - 21 : 21$

$9261 - 21 : 21$

$9240 : 21$

Hence, the correct option is B.

42. In the following question, select the odd word from the given alternatives.

A. Grace B. Relief

C. Cruelty D. Charity

Ans. C

Sol. Option C (Cruelty) is the antonyms of mercy and rest of the options A (Grace), option B (Relief) and option D (Charity) are the synonyms of mercy.

So, Cruelty is different from others.

Hence, the correct option is C.

43. In the following question, select the odd word from the given alternatives.

A. Sofia B. Zurich

C. Havana D. Male

Ans. B

Sol. From the given options,

Option B Zurich is the city of Switzerland, not capital.

Option A, Sofia is the capital of Bulgaria.

Option C Havana is the capital of Cuba.

Option D Male is the capital of Maldives.

So Zurich is different from others.

Hence, the correct option is B.

44. In the following question, select the odd word from the given alternatives.

A. Apple B. Coffee

C. Juice D. Tea

Ans. A

Sol. Coffee, juice and tea are in liquid form but apple is in solid form.

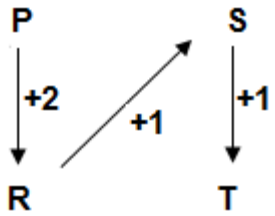
Hence, the correct option is A.

45. In the following question, select the odd letter group from the given alternatives.

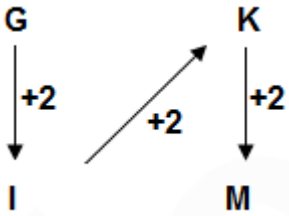
A. PRST
B. GIKM
C. CEFG
D. LNOP

Ans. B

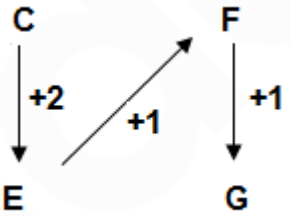
Sol. In option A –



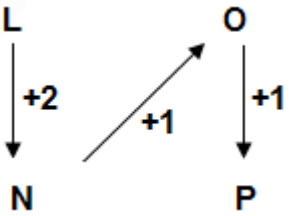
In option B –



In option C –



In option D –



Clearly, option B is not following the same pattern as other options.

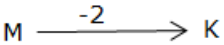
Hence, the correct option is B.

46. In the following question, select the odd letters from the given alternatives.

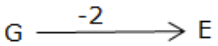
A. MK
B. GE
C. DB
D. TQ

Ans. D

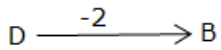
Sol. Option(A):



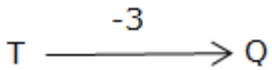
Option(B):



Option(C):



Option(D):



Hence, option D is the correct response.

47. In the following question, select the odd letters from the given alternatives.

A. EG B. SW

C. MQ D. GK

Ans. D

Sol. EG → E is 5th alphabet, 5 is prime number, next prime number is 7,7th alphabet is G.

SW → S is 19th alphabet, 19 is prime number, next prime number is 23,23th alphabet is W.

MQ → M is 13th alphabet, 13 is prime number, next prime number is 17,17th alphabet is Q.

GK → G is 7th alphabet, 7 is prime number, next prime number is 11, but K is 11th alphabet.

So, GK is the correct response.

Hence, the correct option is D.

48. Select the odd number from the given alternatives.

A. 27 B. 39

C. 65 D. 51

Ans. C

Sol. All are divisible by '3' except '65'.

Hence, the correct option is C.

49. Select the odd number from the given alternatives.

A. 42 B. 84

C. 91 D. 71

Ans. D

Sol. 71 is a prime number while others are not.

Hence, the correct option is D.

50. In the following question, select the odd number from the given alternatives.

A. 67 B. 87

C. 97 D. 11

Ans. B

Sol. Prime number is divisible by 1 and itself only. In the given question numbers 67, 97, 11 are prime number except 87.

So, 87 is the correct answer.

Hence, the correct option is B.

51. Which country has the world's largest reserves of Uranium?

A. Canada B. India

C. Australia D. USA

Ans. C

Sol. • Australia is considered to have the largest reserves of uranium in the world.

• Canada, Australia and Namibia are the leading countries in uranium production in the world.

• The world's largest uranium producing mine is Cigar Lake in Canada.

• The second-largest mine is Olympic Dam in Australia, with nearly 3,200 metric tons of uranium produced in 2018.

52. The deficiency of Sodium in the body is called as?

A. Hypokalemia B. Hyponatremia

C. Hypocalcemia D. Hypo Filariasis

Ans. B

Sol. The deficiency of sodium in the body is called Hyponatremia.

• Sodium is an essential electrolyte that helps maintain the balance of water in and around your cells.

• Normally, sodium level should be between 135 and 145 milliequivalents per liter (mEq/L).

• Severe hyponatremia can lead to coma and can be fatal.

• Adrenal insufficiency, hypothyroidism, and cirrhosis of the liver etc. are associated with Hyponatremia.

53. Menander and Nagasena's conversation were recorded in the book _____.

A. Arthashastra B. Milindapanho

C. Si-Yu-Ki D. None of these

Ans. B

Sol. • Menander reigned around 90-85 BC in Gandhara, north of modern Pakistan and parts of Afghanistan.

• It was Menander who has been mentioned as the mighty Yavana King of Sakala.

• Menander and Nagasena's conversation were recorded in the book Milindapanho or 'the questions of Milinda'.

54. In which year was the battle of Buxar fought?

A. 1765 B. 1758

C. 1764 D. 1757

Ans. C

Sol. • Battle of Buxar was fought in 1764.

• The battle was fought between British forces against the joint forces of Bengal, Awadh and Mughal Emperor.

The major participants of battle are as follow-

• Shuja-ud-daulah form Awadh

• Mir Qasim

• Shah Alam II – Mughal Emperor –

• Bengal Hector Munro and Robert Clive from British side

• The battle was won by British forces and eventually Treaty of Allahabad was signed in 1765.

55. Which compound is known as pearl ash?

A. Sodium Hydroxide B. Potassium Carbonate

C. Sodium Nitrate D. Liquid Hydrogen

Ans. B

Sol. Potassium Carbonate is known as pearl ash.

• Potassium carbonate is an inorganic compound with the formula K2CO3.

• It is widely used in productions of soaps and glasses.

• It is also known as salts of tartar.

• Commercially it is produced by mixing Potassium hydroxide and carbon dioxide.

• It is also used as a drying agent, as a food ingredient, as a buffering agent, etc.

56. Phenyl, which is commonly used in toilets is basically a _____ product.

A. Isoprene B. Sodium Thiosulphate

C. Benzene D. Neoprene

Ans. C

Sol. • Phenyl which is commonly used in toilets is basically Benzene. It is nothing but hydroxylated benxene.

• The molecular formula of benzene is C_6H_6 .

• Phenyl is formed by abstraction of hydrogen atom from benzene.

• Benzene is a natural constituent of crude oil and is one of the elementary petrochemicals.

57. Who wrote the book "Making India awesome"?

A. Chetan Bhagat B. Mohit Suri

C. Durjoy Datta D. Anusha Bhagat

Ans. A

Sol. The book 'Making India Awesome' is written by Chetan Bhagat.

• In this book he analyses and provides inspired solutions to the country's most intractable problems—poverty, unemployment, corruption, violence against women etc.

• Some major works of Chetan Bhagat are- India Positive, The Girl In Room 105, What Young India Wants, Revolution 2020, 2 States, Three Mistakes of My Life etc.

58. Millerite is an ore of which element?

A. Cadmium
B. Uranium
C. Silver
D. Nickel

Ans. D

Sol. • Millerite is an ore of Nickel. It is a nickel sulphide mineral having compound formula NiS.

• It has a hardness of 3.5 on mohr's scale and exists in Hexagonal system.

• It was discovered by Wilhelm Haidinger in 1845.

• Other important ores of Nickel are- Pentlandite, Pyrrhotite, Garnierite and Niccolite.

59. What is the name of the movement which was led by Birsa Munda?

A. Ulgulan
B. Ahom
C. Bhagatpanth
D. Gadkari

Ans. A

Sol. Birsa started a movement called 'Ulgulan', or 'The Great Tumult'.

• Munda Rebellion is one of the prominent 19th century tribal rebellions in the subcontinent. Birsa Munda led this movement in the south region of Ranchi in 1899-1900.

• Birsa Munda did all this by the age of 25 when he died in a prison in Ranchi on June 9, 1900.

60. Acid rain mainly contains oxides of which elements?

A. Sulphur and Nitrogen
B. Phosphorous and Argon
C. Carbon and Fluorine
D. Antimony and Mercury

Ans. A

Sol. • The Acid rain mainly contains the oxides of Sulphur and Nitrogen.

• The oxides of nitrogen and sulphur are blown away by the wind along with the dust particles. They settle on the earth's surface after coming down in the form of precipitation.

• Acid rain has ph near 5.5 and is toxic to human health, Environment and Heritage monuments and buildings.

• Taj Mahal is largely affected by acid rain. It make the marble colour dull and also decreased it's strength.

• Robert Angus Smith was the first to show the relationship between acid rain and atmospheric pollution in Manchester, England in 1852.

61. 'Humpy Koneru' is associated with which of the following sports?

A. Swimming
B. Cricket
C. Badminton
D. Chess

Ans. D

Sol. • Humpy Koneru is an Indian chess grandmaster and current World Rapid Chess Champion.
• In 2002, She became the youngest woman ever to achieve the title of grandmaster at the age of 15 years.
• She was awarded the Arjuna Award in 2003 and the Padma Shri Award in 2007 by the Government of India.

62. Deepa Malik won the Rajiv Gandhi Khel Ratan Award 2019 belongs to which sports ?

A. Cricket
B. Shot put
C. Boxing
D. Badminton

Ans. B

Sol. Bajrang Punia and Deepa Malik won the Rajiv Gandhi Khel Ratan Award 2019. She is the first Indian woman to win a medal in Paralympic Games and won a Silver medal at the 2016 Summer Paralympics in the shot put.
• Rajiv Gandhi Khel Ratan Award is the highest award in sports initiated in 1991-92.
• Vishwanathan Anand-the Chessmaster was the first recipient of the Rajiv Gandhi Award.
• Mirabai Chanu and Virat Kohli won this award in 2018.
• It is awarded annually by the Ministry of Youth Affairs and Sports.

63. A short circuit occurs as, current travel along an unintended path with _____.

A. Very low electrical impendence
B. Impact of overvoltage
C. Very high electrical impendence
D. None of these

Ans. A

Sol. • A short circuit is simply a low resistance connection between the two conductors supplying electrical power to any circuit.
• The limitation on the current is due to the resistance or impedance of the load to which it is connected.
• If the resistance or impedance of the load is bypassed or shorted then an abnormally high current will flow through the circuit. This situation is called a short circuit.

64. Who appoints Advocate General of State in India?

A. Governor of State
B. Chief Minister of State
C. Law Minister of State
D. No option is correct.

Ans. A

Sol. • The Governor appoints the Advocate General of the state.
• The Advocate General is the highest law officer in the state.
• He is responsible to assist the state government in all its legal matters.
• He defends and protects the interest of the state government. The office of the Advocate General in state corresponds to the office of Attorney General of India. Article 165 deals with the Advocate General for the State.

65. On 28th January 2020, Who was appointed as India's Ambassador to the USA?

A. Reenat Sandhu
B. Manjeev Singh Puri
C. Vikas Swaroop
D. Taranjit Singh Sandhu

Ans. D

Sol. Taranjit Singh Sandhu was appointed as Indian Ambassador to the United States on 28 January 2020.

• He has previously served as Deputy Chief of Mission at Embassy of India in Washington D.C. from July 2013 to January 2017 and Consul General of India in Frankfurt from September 2011 to July 2013.

• He was the first secretary in Washington DC from 1997 to 2000.

• He also worked as deputy chief of mission at Washington DC from 2013 to 2017.

66. Matki Dance is prominent in which of the following state?

A. Kerala
B. Andhra Pradesh
C. Gujrat
D. Madhya Pradesh

Ans. D

Sol. * Matki dance is performed using a small pitcher. This pitcher dance mainly belongs to the state of Madhya Pradesh.

* It is usually performed solo by woman in various ceremonies.

* The main musical instrument used in this dance is the dhol.

67. Which instrument is used to measure the depth of water?

A. Fathometer
B. Anemometer
C. Ammeter
D. Alfalfa

Ans. A

Sol. • Fathometer is used to measure the depth of water.

• It is a depth finder that uses sound waves to determine the depth of water

• Fathometer is generally used on ships to determine the depth of water by measuring the time it takes a sound produced just below the water surface to return.

68. Which of following organelle is only found in plant cells?

A. Peroxisome
B. Vacuole
C. Cytoplasm
D. Plastids

Ans. D

Sol. Plastids are only found in Plant cells.

• Plastids are responsible for manufacturing and storing of food, and contain pigments used in photosynthesis.

• The four main type of plastids are-

a) Chloroplasts – these are sites for process of photosynthesis.

b) Chromoplasts – responsible for different colours in plants and attracting pollinators.

c) Gerontoplasts – these are basically chloroplast with aging process

d) Leucoplasts – responsible for storage sheds for starches, lipids, and proteins.

69. Khed City is located in which of the following states of India?

A. Arunachal Pradesh
B. Maharashtra
C. Tamil Nadu
D. West Bengal

Ans. B

Sol. • Khed City is an Industrial park in Pune, Maharashtra.
• It came into existence in the year 2010.
• It was formed under Khed Economic Infrastructure Ltd (KEIPL).
• With an area of over 4200 acres, Khed city is a joint venture between Kalyani group and Maharashtra industrial development corporation (MIDC).
• As of 2019, Khed City has over 47 domestic and multinational companies.

70. Chenda is which type of a musical instrument?

A. Air Blown
B. Percussion
C. Wired
D. Multi wired

Ans. B

Sol. Chenda is a cylindrical percussion (pressing) musical instrument.
• It is popular in Kerala and some parts of Karnataka.
• It is made from the wood of jackfruit tree.
• Thrippekkulam Achutha Marar is famous Chenda player of country.
• There are three types of Chendas-
a) Uruttu Chenda - used to play variations in music. It is used to lead the orchestra.
b) Veekku Chenda - used to beat the basic rhythm
c) Acchan Chenda

71. Which International organization has designated 2020 as the Year of the Nurse and the Midwife to honor the 200th birth anniversary of Florence Nightingale?

A. WHO
B. UNICEF
C. UNESCO
D. WLO

Ans. A

Sol. • World Health Organization (WHO) designated 2020 as the Year of the Nurse and the Midwife to honor the 200th birth anniversary of Florence Nightingale.
• The World Health Organization (WHO) is the collaborating partner in the three-year Nursing Now Campaign (2018–2020).
• The World Health Organization (WHO) is a specialized agency of the United Nations that is concerned with international public health.
• It was established on 7 April 1948.
• It is headquartered in Geneva, Switzerland.

72. Who is the richest person of world presently as per Forbes?

A. Bill Gates
B. Jeff Bezis
C. Tim Cook
D. Warren Buffet

Ans. B

Sol. As per Forbes, presently Jeff Bezos is the richest man of world.

- Presently Jeff Bezos has a net worth of 129 Billion dollars.
- He founded e commerce platform Amazon in 1994 and he remains CEO and owns a stake of 16%.
- He also owns the Washington Post and Blue Origin (an aerospace company).
- Bill gates is the second richest person presently with net worth of 113 Billion dollars.

73. Two main organs in the human body where the magnetic field produced are?

A. Brain and Liver
B. Brain and Heart
C. Kidney and Pancreas
D. Lung and Kidneys

Ans. B

Sol. Two main organs in the human body where the magnetic field produced are Brain and Heart.

- When we touch something, our nerves carry an electric impulse to the muscles we need to use and this leads to the production of magnetic fields in the body.
- This magnetic field produced in the body is very weak.
- The magnetic field inside the body forms the basis of obtaining the images of different body parts Like MRI etc.

74. The parameter which remains conserved in any collision is:

A. Linear Momentum
B. Kinetic Energy
C. Angular Momentum
D. Potential Energy

Ans. A

Sol.
- If two objects collide, momentum will always be conserved
- In all types of collision, momentum is always conserved since total momentum of both the objects before and after the collision is same

75. United Nation Organization was established after the end of which war?

A. Cold War
B. World War 1
C. World War 2
D. None of these

Ans. C

Sol.
- United Nation Organisation was established after the end of World War 2.
- The UNO was formed to maintain peace and security. It aimed to develop friendly relations among the nations and harmonize the actions of nations.
- The headquarters of UNO is in New York city.

76. In January 2020, the 31st International Kite Festival was launched in which state of India?

A. Rajasthan
B. Goa
C. Maharashtra
D. Gujarat

Ans. D

Sol. * The 31st International Kite Festival was launched at the Sabarmati riverfront in Ahmedabad, Gujarat.
* It was inaugurated by Chief Minister Vijay Rupani.
* The festival was conducted from 7-14 January in different parts of the state.

77. What is the full form of NDA?

A. National Democratic Assembly
B. National Democratic Alliance
C. National Disaster Agency
D. None of these

Ans. B

Sol. * The National Democratic Alliance (NDA) is a coalition of political parties in India established in 1998.
* It was formed as a coalition to contest the general elections.
* At the time of its formation in 1998, NDA Government was led by Bhartiya Janata Party (BJP) and 13 constituent parties.
* For the first time the coalition was in power from 1998 to 2004
* Currently, Amit Shah is the chairperson of NDA.

78. Who has been appointed as the first chairman of the National Medical Commission (NMC) in Jan 2020?

A. Dr. Harshvardhan
B. Surendra Sinha
C. Suresh Chandra Sharma
D. Radha Mohan Krishna

Ans. C

Sol. • In January 2020, Suresh Chandra Sharma was appointed as the first chairman of the National Medical Commission (NMC).
• The Appointment Committee of the Cabinet approved the appointment of Suresh Chandra Sharma for three years.
• The governors of the Medical Council of India (MCI) appointed as the secretary of the Commission for a similar term.

79. The Indian Ocean Rim Association has how many member states?

A. 12
B. 22
C. 52
D. 62

Ans. B

Sol. The Indian Ocean Rim Association is an international organization of 22 member states.

• It also has 9 Dialogue partners.

• It was formed in 1997; the vision of IORA was originated by Nelson Mendela when he visited India in 1995.

• To become members, States must adhere to the principles and objectives enshrined in the Charter of the Association.

80. What is the full form of CCTV?

A. Circuit closed Television
B. Closed Circuit Television
C. Closed Circuit Telecommunication
D. Circuit Closed Telecommunication

Ans. B

Sol. * The full form of CCTV is Closed Circuit Television.

* CCTV is as known a video Surveillance and is the use of video camera for various Surveillances.

* It differs from broadcast television in that the signal is not openly transmitted.

81. Which one of the following is NOT an operating system?

A. Linux
B. Unix
C. Intel
D. Windows

Ans. C

Sol. Intel is not an operating system.

• Intel Corporation is commonly known as Intel. It is an American multinational corporation and technology company.

• An operating system is the main software that allows different parts of a computer to work together by translating data from one part to another.

• Linux is a system used for tablet PC's, computer software and hardware and so on.

• Unix is a system usually used in universities, big enterprises, companies and so forth.

82. Nephrons are functional unit of which of the following organ?

A. Heart
B. Lungs
C. Kidney
D. Brain

Ans. C

Sol. Nephrons are functional unit of Kidneys.

• Nephrons are composed of a renal corpuscle and a renal tubule.

• The renal corpuscle is the site of the filtration of blood plasma.

• The nephron functions through Ultrafiltration. Ultrafiltration occurs when blood pressure forces water and other small molecules through tiny gaps in capillary walls.

83. On 1st February 2020, the 34th Surajkund International Crafts Mela-2020 was inaugurated in_____.

A. Haryana
B. Bihar
C. Madhya Pradesh
D. Rajasthan

Ans. A

Sol. President Ram Nath Kovind inaugurated the 34th Surajkund International Crafts Fair on February 1, 2020, in Faridabad, Haryana.
The Mela was organized by the Surajkund Mela Authority & Haryana Tourism in collaboration with Union Ministries of Tourism, Textiles, Culture and External Affairs.
Himachal Pradesh is the theme state of this year's (2020) Surajkund Mela.
Surajkund International Crafts Mela was organized for the first time in 1987.

84. Which of the following enzyme is secreted by pancreas?

A. Pepsinogen
B. Pepsin
C. Trypsin
D. All of the above

Ans. C

Sol. • Trypsin is secreted by the pancreas. It is a proteolytic enzyme
• It is one of the three digestive proteinases along with pepsin and chymotrypsin which breaks down dietary protein molecules into simpler forms.
• Pancreatic proteases (such as trypsin and chymotrypsin) help to digest proteins.
• Pancreatic amylase helps to digest sugars (carbohydrates).
• Pancreatic lipase helps to digest fat.

85. During the freedom struggle, who was the only President of Indian National Congress who resigned from the presidency even after being elected?

A. Nellie Sengupta
B. Jawaharlal Nehru
C. JB Kripalini
D. Subhash Chandra Bose

Ans. D

Sol. • During the freedom struggle, Subash Chandra Bose was the only President of Indian National Congress who resigned from the presidency even after being elected.
• In 1939, SC Bose was appointed the president of Congress, having defeated Pattabhi Sitaramaiya, 1580 to 1377 Votes.
• Sitaramiya was supported by Gandhiji and his defeat is indirectly defeat of Gandhiji hence 13 members resigned from CWC after election of SC Bose as president.
• It was increasingly becoming difficult for Bose to work as the President and hence he resigned from the President ship in 1939.

86. What is the rank of India in the 2019 World Giving Index (WGI)?

A. 86
B. 82
C. 102
D. 119

Ans. B

Sol. • India got 82nd rank in World Giving Index 2019.

• It was released by the Charities Aid Foundation.

• It aims to promote giving to transform lives and communities across the world. USA topped the list. Followed by Myanmar and New Zealand.

• As per this report, India showed that 19 percentage people donated their time and 34 percentage helped a stranger.

• India's neighbour Nepal ranker 53 and Pakistan ranker 69.

87. Who is the first woman to have been awarded the Yudh Seva Medal?

A. Minty Agarwal
B. Shaliza Dhami
C. Aparna Kumar
D. Bhawana Kanth

Ans. A

Sol. • Minty Agarwal is the fiest woman to have been awarded the Yudh Seva Medal.

• Minty Agarwal who provided Abhinandan Varthaman air support during 27 feb, 2019 to shoot down Pakistan F16.

• The Yudh Seva Medal is one of India's military decorations for distinguished service during wartime.

• Sarvottam Yudh Seva Medal is India's highest Wartime Distinguished Service decoration.

• Bhawana Kant is the first woman fighter pilot to qualify to undertake combat missions.

88. Chairman of Legislative Council of States submits his resignation to _____?

A. Governor
B. Deputy Chairman
C. Chief Justice of High Court
D. Chief Minister

Ans. B

Sol. * Chairman of Legislative Council of States submits his resignation to the Deputy Chairman of Legislative Council.

* The Legislative Council has two elected officials: the Chairman and Deputy Chairman.

* They are elected by the members of Legislative Council from amongst themselves.

* The Chairman, and in his absence the Deputy Chairman, presides over the meetings of the Legislative Council.

* The Legislative Council (Vidhan Parishad) is the upper house in those states of India that have a bicameral legislature; the lower house being the State Legislative Assembly.

* Its establishment is defined in Article 169 of the Constitution of India.

89. International Internet Day is annually celebrated on_____.

A. 5th November
B. 29th October
C. 7th December
D. 8th October

Ans. B

Sol. * International Internet Day is annually celebrated on 29th October.

* Internet Day is an event celebrated in Mexico, Peru, Chile, Paraguay, Argentina, Spain, Colombia, Uruguay, Ecuador, Bolivia, Venezuela, and other parts of the world.

* It is promoted by the Association of Internet Users.

* It was celebrated for the first time on October 29th, 2005.

90. Which layer of earth's atmosphere contains electrically charged particles known as Ions?

A. Exosphere
B. Stratosphere
C. Ionosphere
D. Mesosphere

Ans. C

Sol. The Ionosphere layer of earth contains electrically charged particles known as ions.

• The ionosphere is not a distinct layer. Instead, the ionosphere is a series of regions in parts of the mesosphere and thermosphere.

• The ionosphere is ionized by solar radiation.

• Due to the ability of ionized atmospheric gases to refract high frequency radio waves, this layer is vital for Radio communication.

91. Krishna deva Raya of Vijaynagar Empire belonged to which dynasty?

A. Sangam
B. Saluva
C. Tuluva
D. Aravidu

Ans. C

Sol. * Krishna deva Raya of Vijaynagar Empire belonged to Tuluva Dynasty.".

* Krishna Deva Raya earned the titles Kannada Rajya Rama Ramana, Andhra Bhoja and Mooru Rayara Ganda.

92. No Confidence Motion can be passed in .....?

A. Only Lok Sabha
B. Only Rajya Sabha
C. Both Rajya and Lok Sabha
D. Neither A and B

Ans. A

Sol. No Confidence Motion can be passed only in Lok Sabha.

• The no confidence motion needs 50 members for support to be admitted in house.

• The motion is based on the fact under Article 75 which says that the council of ministers shall be collectively responsible to the Lok Sabha.

• It is not require to state reason for putting No Confidence Motion.

• It can be moved against the whole council of ministers only.

93. Which city is known as the 'Steel City of India'?

A. Jamshedpur
B. Ranchi
C. Dhanbad
D. Hazaribagh

Ans. A

Sol. • Jamshedpur is known as the 'Steel City of India'.
• The city is known by this name because the first steel plant was established here by the TATA company.
• It was the first industrial city in India, and almost the entire town works in the steel industry.
• It was founded by Jamsetji Tata (Founder of Tata Groups) and was also named after him.

94. Human Development Index is released by?
A. UNDP
B. WB
C. IMF
D. WEF

Ans. A

Sol. The Human Development Index is developed by United Nations Development Programme.
• It is a part of Human Development Report published by UNDP.
• The focus of the 2019 Report is on 'Inequality in Human Development'.
• Human development index is measured on the basis of three basic dimensions, which are-
A long and healthy life,
Access to knowledge, and
A decent standard of living.

95. Which bank has announced the launch of a 'Cardless Cash Withdrawal' facility from its ATMs on 21 January 2020?
A. HDFC
B. Bank of India
C. Punjab National Bank
D. ICICI

Ans. D

Sol. • ICICI Bank has announced the launch of a 'Cardless Cash Withdrawal' facility from its ATMs on 21 January 2020.
• ICICI Bank's Cardless Cash Withdrawal service will allow customers to withdraw cash from over 15,000 ATMs of the bank by raising a request on its mobile banking app, iMobile.
• ICICI Bank Limited is an Indian multinational banking and financial services company.
• It is headquartered in Mumbai, Maharashtra.
• It was established on 5th January 1994.

96. Who is the author of the book 'The Free Voice: On Democracy, Culture and the Nation'?
A. Barkha Dutt
B. Rahul Kanwal
C. Ravish Kumar
D. Arnab Goswami

Ans. C

Sol. • 'The Free Voice: On Democracy, Culture and the Nation' is written by Ravish Kumar on 27 Feb 2018.
• Ramon Magsaysay Award was also won by Ravish Kumar in 2019 for journalism.
• He is also the first recipient of Gauri Lankesh Award for Journalism, awarded by Gauri Lankesh Memorial Trust.

97. A Compact Disk (CD) is which type of storage device?

A. Electrical
B. Optical
C. Magnetic
D. None of these

Ans. B

Sol. • A Compact Disk (CD) is an optical storage device.
• There are three main types of secondary storage in a computer system:
a) Solid state storage devices, such as USB memory sticks.
b) Optical storage devices, such as CD, DVD and Blu-ray discs.
c) Magnetic storage devices, such as hard disk drives

98. What is the full form of E in EPROM?

A. Effective
B. Endurable
C. Erasable
D. Effective

Ans. C

Sol. The full form of EPROM is Erasable Programmable Read Only Memory.
* EPROM retains data when its power supply is switched off.
* The data of E-PROM is erased by shining an intense ultraviolet light through a window designed into memory chip. EPROMS are easily recognised by transparent fused quartz window in the top of the package, through which the silicon chip is visible.

99. In January 2020, the World's largest meditation centre was inaugurated in which state of India?

A. Uttrakhand
B. Himachal Pradesh
C. Uttar Pradesh
D. Telangana

Ans. D

Sol. • In January 2020, the World's largest meditation centre was inaugurated at Kanha Shanti Vanam in Hyderabad, Telangana.
• This centre is built to mark the 75th anniversary of the formation of Shri Ram Chandra Mission (SRCM) and Heartfulness Institute.
• It was inaugurated on 28th January 2020.

100. India is on _____ rank in military expenditure all over the world.

A. Second
B. Third
C. First
D. Fourth

Ans. D

Sol. • India has risen to fourth place in global military spending rankings.
• According to this report the top five biggest spenders were the United States, China, Saudi Arabia and India.

101. Spot welding is to be carried out for two 1 mm thick steel plates at a current of 5000 A flowing for 0.2 second. Taking an effective resistance of the joint as 200 micro-ohm , the heat generated during the welding process is :

A. 5 J
B. 0.2 J
C. 1 J
D. 1000 J

Ans. D

Sol. The heat generated during the welding process will be:

$Q = I^2 Rt = 5000^2 \times 200 \times 10^{-6} \times 0.2 = 1000$ J

102. Which of the given boilers operate above critical pressure?

A. Natural circulation boilers
B. Forced circulation boilers
C. Once-through boilers
D. Water tube boilers

Ans. C

Sol. Once-through boilers operate above critical pressure i.e., above 221.2bar. As the density of water and steam are same above the critical pressure there will be no recirculation. These types of boilers are also called as positive forced circulation boilers.

103. A single cylinder engine running at 1200 rpm develops a torque of 7 N-m. The indicated power of the engine is 1.76 kW. The loss due to friction power in the percentage is

A. 40%
B. 50%
C. 60%
D. 70%

Ans. B

Sol. Given,

T= 7N-m, N= 1200rpm

indicated power = 1.76kW

$$BP = \frac{2\pi NT}{60}$$

$$BP = \frac{2\pi \times 1200 \times 7}{60}$$

BP = 880 W

frictional power, FP = 1.76-0.88 = 0.88W

$$\text{Percentage loss} = \frac{FP}{IP} \times 100$$

$$\text{Percentage loss} = \frac{0.88}{1.76} \times 100$$

percentage loss = 50%

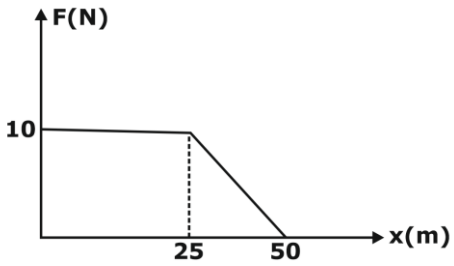
104. Permanent deformation of material with respect to time due to constant load and variable temperature is known as:

A. Elasticity
B. Isotropy
C. Hardness
D. Creep

Ans. D

Sol. Creep is time and temperature dependent phenomenon. With the passage of time and other environmental condition, material may lead to fracture point.

105. An object of mass 5 kg is acted upon by a force that varies with position of the object as shown. If the object starts out from rest at a point x = 0. What is its speed at x = 50 m.



A. 12.2 ms^{-1} B. 18.2 ms^{-1}

C. 16.4 ms^{-1} D. 20.4 ms^{-1}

Ans. A

Sol. Change in kinetic energy = work done

= Area under F-x graph

$\therefore \frac{1}{2} \times 5 \times v^2 = 10 \times 25 + \frac{1}{2} \times 25 \times 10 = 375$

$\therefore v = 12.5\ ms^{-1}$

106. A tank containing air is stirred by a paddle wheel. The work input to the paddle wheel is 9000 KJ and heat transferred to the surroundings from the tank is 3000KJ. The external work done by the system is:

A. Zero B. 3000 KJ

C. 6000 KJ D. None of these

Ans. A

Sol. Since the above system is a closed system and work done during a constant volume process is always zero. As change in volume will be zero.

$\partial W = P\int dV = 0$

107. Which type of boilers are called drum-less boilers?

A. Natural circulation boilers B. Fire tube boilers

C. Positive forced circulation boiler D. Forced circulation boiler

Ans. C

Sol. In positive forced boilers, water enters the bottom of the tubes and completely transforms into steam as it passes through the tubes and reaches at the top. Thus, these boilers do not need a steam drum and hence often referred as drum-less boilers. These boilers work at very high pressures.

108. Ball bearings are generally made up of

A. carbon steel
B. carbon chrome steel
C. stainless steel
D. grey cast iron

Ans. B

Sol. Ball bearing races are subjected to lapping, polishing and hardening and made of high carbon chrome steel.

109. Calculate the work done by 1 kg of steam when it is made to enter a De-Laval steam turbine with inlet velocity of 30 m/s & goes out with exit velocity of . 10 m/s.

A. 400 Nm
B. 600 Nm
C. 800 Nm
D. 1200 Nm

Ans. A

Sol. delaval turbine is an impulse turbine, thus complete kinetic energy is converted in work done

so, The work done by 1kg of steam is given by:

$= \frac{1}{2} m\left(V_1^2 - V_2^2\right) = \frac{1}{2} \times 1 \times (30^2 - 10^2) = 400 \text{ Nm}.$

110. MRP Stands for

A. Master Resource production
B. Materials requirement planning
C. Management Reaction Planning
D. Manufacturing Resource Planning

Ans. B

Sol. MRP Stands for Materials requirement planning

111. Triple point temperature of water is

A. 0°C
B. 0.01° C
C. 273.15° K
D. 273.16° C

Ans. B

Sol. Triple point temperature of water is 273.16° K or 0.01° C.

112. The intermediate pressure which produces minimum work also results in

A. equal discharge temperatures
B. equal work for two stages
C. equal pressure ratios in two stages
D. all of the mentioned

Ans. D

Sol. These are the results when we consider minimum work of compression

1. equal discharge temperature
2. equal pressure ratio in each stages

3. same amount of work is required in each stage of compression

4. intermediate pressure is the square root of the product of the inlet and delivery pressure

113. During dehumidification process, the relative humidity

A. Remains constant
B. Increases
C. Decreases
D. None of these

Ans. C

Sol. The process in which the moisture or water vapor or the humidity is removed from the air keeping its dry bulb (DB) temperature constant is called as the dehumidification process. This process is represented by a straight vertical line on the psychrometric chart starting from the initial value of relative humidity, extending downwards and ending at the final value of the relative humidity.

As we know that if we move vertically downward in psychometric chart , relative humidity decreases.

114. The property relation for enthalpy change, dh is:

A. Tds – pdv
B. Tds + vdp
C. Tds – vdp
D. Tds + pdv

Ans. B

Sol. Tds = du + pdv

Tds = dh – vdp

dh = Tds + vdp

115. Why can't mercury wet a glass?

A. Cohesion
B. Adhesion
C. Surface tension
D. Compressibility

Ans. C

Sol. Surface tension is an elastic tendency of a fluid. It results due to imbalance of intermolecular attractive forces. Any molecule at the surface of the liquid experiences a net inward force. Mercury having a higher density than water, cannot wet a glass.

116. In Otto cycle, if expansion is continued to lowest cycle pressure, then cycle becomes

A. Stirling cycle
B. Atkinson cycle
C. Lenoir cycle
D. Ericson cycle

Ans. B

Sol. In Otto cycle, if expansion is continued to lowest cycle pressure, then cycle becomes Atkinson cycle

117. A strip is to be rolled from a thickness of 60mm to 40 mm using a two high mill having rolls of diameter 600 mm, the coefficient of friction for unaided bite angle nearly be

A. 0.42 B. 0.25

C. 0.16 D. 0.50

Ans. B

Sol. Maximum draft = $\mu^2 R$

$$= \mu = \sqrt{\frac{\Delta h}{R}} = \sqrt{\frac{20}{300}} = 0.25$$

118. The cyclic integral of closed process is

A. Zero B. Greater than one

C. Less than one D. None of these

Ans. A

Sol. When a closed system undergoes a cycle the cyclic integral of heat is equal to the cyclic integral of work. Work interactions during a process are a property of the system. Surroundings Q=0 and W=0. Therefore, E remains constant for such a system.

119. According to Indian Standard specifications $50H_7g_6$ means that:

1) Actual size is 50 mm

2) Tolerance grade for hole is 7

3) Tolerance grade for shaft is 6

Which of the statements made above are correct?

A. 1 and 2 B. 1, 2 and 3

C. 2 and 3 D. None of these

Ans. C

Sol. According to Indian Standard specifications $50H_7g_6$ means that Tolerance grade for hole is 7 and Tolerance grade for shaft is 6.

120. In Klein's construction, the shape of velocity diagram is

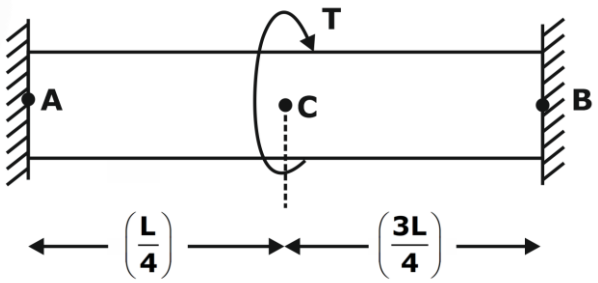
A. Quadrilateral B. Triangle

C. Rectangle D. Square

Ans. B

Sol. In Klein's construction, the shape of velocity diagram is triangle

121. A torque is applied on a circular shaft as shown below:-



[Assume, torsional rigidity of shaft = GJ]

What will be the torques developed at ends A and B respectively?

A. $T_A = \frac{3T}{4}, T_B = \frac{T}{4}$

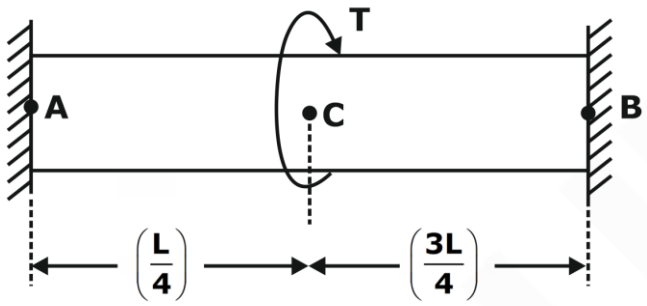
B. $T_A = \frac{T}{4}, T_B = \frac{3T}{4}$

C. $T_A = T_B = T$

D. $T_A = T_1, T_B = \frac{3T}{4}$

Ans. A

Sol. $T_B = T$ (cw)



Let, T_A and T_C = torques at ends A and C

(Acw)

$T_A + T_B = T$ … (1)

For portion AB Torque = $T_{AB} = T_A$

For portion BC Torque = $T_{BC} = T_A - T$

Now, As shaft is fixed at both ends.

∴ Total angular deflection = 0

∴ $\theta_{AB} + \theta_{BC} = 0$

$$\frac{T_{AB}.L_{AB}}{(GJ)} + \frac{T_{BC}.L_{BC}}{(GJ)} = 0$$

[$\because \theta = \frac{TL}{GJ}$ = angular deflection in shafts]

$$\therefore \frac{T_A\left(\frac{L}{4}\right)}{Gj} + \frac{(T_A - T)\left(\frac{3L}{4}\right)}{GJ} = 0$$

$$T_A\left(\frac{L}{A}\right) + \left(\frac{3L}{4}\right)T_A = \left(\frac{3L}{4}\right)T$$

$$T_A = \frac{3}{4}T$$

From equation (1), $T_A + T_B = T$

$$T_B = \frac{T}{4}$$

122. Turbulent boundary layer thickness is proportional to:

A. x
B. $x^{0.2}$
C. $x^{0.4}$
D. $x^{0.8}$

Ans. D

Sol. For turbulent boundary layer, $\delta \propto x^{0.8}$

123. The supersaturated flow of steam through a nozzle as compared to a stable flow, the available heat drop

A. increases
B. decreases
C. is unpredictable
D. remains same

Ans. B

Sol. The supersaturated flow of steam through a nozzle as compared to a stable flow, the available heat drop decreases.

124. The velocity ratio of two pulleys connected by an open belt or crossed belt is

A. directly proportional to their diameters
B. inversely proportional to their diameters
C. directly proportional to the square of their diameters
D. inversely proportional to the square of their diameters

Ans. B

Sol. We know that circumferential velocity of the belt on the driving pulley,

$$v_1 = \frac{\pi d_1 N_1}{60} \text{ m/s}$$

& circumferential velocity of the belt on the driven pulley

$$v_2 = \frac{\pi d_2 N_2}{60} \text{ m/s}$$

When there is no slip, then $v_1 = v_2$

$$\frac{\pi d_1 N_1}{60} = \frac{\pi d_2 N_2}{60}$$

$$\text{or, } \frac{N_2}{N_1} = \frac{d_1}{d_2}$$

125. If a liquid enters a pipe of diameter d with a velocity v, what will it's velocity at the exit if the diameter reduces to 0.5d?

A. v
B. 0.5v
C. 2v
D. 4v

Ans. D

Sol. According to the Continuity Equation,

$\rho_1 A_1 V_1 = \rho_2 A_2 v_2$

Where, A represents flow area, v represents flow velocity, i is for inlet conditions and o is for outlet conditions.

given,

$d_1 = d, \quad d_2 = 0.5d$

$v_1 = v, \quad v_2 =$

$$\frac{\pi}{4} d^2 \times V = \frac{\pi}{4} (0.5d)^2 \times V_2$$

$V_2 = 4V$

126. What will be the ratio of critical pressure to inlet pressure in a Nozzle?

A. $\left(\frac{P_c}{P_o}\right) = \left(\frac{\gamma+1}{2}\right)^{\frac{\gamma}{\gamma-1}}$

B. $\left(\frac{P_c}{P_o}\right) = \left(\frac{2}{\gamma+1}\right)^{\frac{\gamma}{\gamma-1}}$

C. $\left(\frac{P_o}{P_c}\right) = \left(\frac{2}{\gamma+1}\right)^{\frac{\gamma}{\gamma-1}}$

D. $\left(\frac{P_c}{P_o}\right) = \left(\frac{2}{\gamma+1}\right)$

Ans. B

Sol. $h_o = h_1 + \left(\frac{V_1^2}{2}\right)$

$$C_p T_o = C_p T_1 + \left(\frac{V_1^2}{2}\right)$$

$$T_o = T_1 = \left(\frac{V_1^2}{2C_p}\right)$$

$$\Rightarrow \frac{T_0}{T} = 1 + \frac{\gamma-1}{2} M^2$$

At critical pressure,

M = 1

T=Tc

$$\left(\frac{T_c}{T_o}\right) = \left(\frac{2}{\gamma+1}\right)$$

$$\left(\frac{T_c}{T_o}\right) = \left(\frac{P_c}{P_o}\right)^{\frac{\gamma-1}{\gamma}}$$

$$\left(\frac{P_c}{P_o}\right) = \left(\frac{2}{\gamma+1}\right)^{\frac{\gamma}{\gamma-1}}$$

127. The self-ignitiontemperature of diesel is _____ as compared to that of petrol.

A. is higher
B. is lower
C. is same
D. cannot be determined

Ans. B

Sol. Self Ignition Temperature(SIT) is the lowest temperature at which a diesel/Petrol will ignite itself without the presence of a spark or flame.SIT of diesel is 210 degree Celsius SIT of petrol is 240-280 degree Celsius.

128. The catalytic converter cannot control the following emission

A. NOx
B. HC
C. CO
D. Particulates

Ans. D

Sol. It cannot control the emission of the particulates.

129. For Power transmission purpose, which of the following screw thread is adopted in either direction?

A. Acme Threads
B. Square Threads
C. Buttress Threads
D. Multiple Threads

Ans. B

Sol. Square Threads can be used in either direction for Power transmission purpose.

130. Two composite bars of copper and steel, heated up to a certain temperature then thermal stress developed in copper and steel bar respectively.

A. Compressive and tensile
B. Tensile and compressive
C. Both compressive
D. Both tensile

Ans. A

Sol. Thermal expansion coefficient of copper bar is more than steel bar,
thus while heating, copper bar will try to expand more as compare to the steel bar.
so compressive thermal stresses will develop in copper and Tensile Thermal stress will develop in steel bar.

131. Which one of the following have a highest thermal conductivity

A. Boiling water
B. Steam
C. Solid ice
D. Rain water

Ans. C

Sol. the conductivity of solid substance is highest
followed by liquid and gas

132. Which of the following is the correct expression for mean effective pressure in an Otto cycle? (Symbols have their usual meanings)

A. $\frac{(r-1)(\gamma-1)}{\eta\,\Delta P}$

B. $\frac{\eta(r-1)}{\Delta P(\gamma-1)}$

C. $\frac{\eta\Delta(P-1)}{(\gamma-1)}$

D. $\frac{\eta\Delta P}{(r-1)(\gamma-1)}$

Ans. D

Sol. $\eta = W_{net}/Q$

$W_{net} = \eta \times m \times C_v\,(T_3 - T_2)$

$= \eta m \frac{R}{\gamma-1}(T_3 - T_2)$

$= \frac{\eta}{\gamma-1}[P_3V_3 - P_2V_2]$

$= \frac{\eta}{\gamma-1}V_2[P_3 - P_2]$

$P_m = \frac{W_{net}}{\text{Swept Vol.}}$

$= \frac{\frac{\eta}{\gamma-1}V_2(P_3-P_2)}{V_2\left(\frac{V_1}{V_2}-1\right)}$

$P_m = \frac{\eta(\Delta P)}{(r-1)(\gamma-1)}$

133. While cooling a cubical casting of side 10 cm, it undergoes volume shrinkage of 2%, 4% and 5% during the liquid state, phase change and solid state respectively. The volume of metal compensated by the riser and by shrinkage allowance on pattern respectively are:

A. 2% & 9%

B. 6% & 5%

C. 9% & 2%

D. 4% & 7%

Ans. B

Sol. Riser only compensate the volume shrinkage caused in liquid state and during phase transition.

So, 2 + 4 = 6%

The solid shrinkage is compensated by giving pattern allowance i.e. 5%

134. In a particular case Bending moment M is applied on a solid circular shaft and in another case torque 300 Nm is applied on the same solid circular shaft. If the maximum bending stress equals to maximum shear stress developed in both the cases, then M is equal to

A. 150 Nm

B. 300 Nm

C. 600 Nm

D. 1200 Nm

Ans. A

Sol. Bending stress due to bending moment.

$$\sigma = \frac{32M}{\pi d^3}$$

Shear stress due to twisting moment/torque:

$$\tau = \frac{16T}{\pi d^3}$$

If the maximum bending stress equals to maximum shear stress developed,then

$$\frac{32M}{\pi d^3} = \frac{16T}{\pi d^3} \Rightarrow 2M = T \Rightarrow M = \frac{T}{2}$$

$$\Rightarrow \therefore M = \frac{300}{2} \Rightarrow M = 150 \text{ Nm}$$

135. A car starting from rest moves along a curved road of radius 150m. Car attains a speed of 72 Kmph in 20 seconds. What is normal acceleration(m/s^2) at t=10s?

A. 1 B. 2.667

C. 0.667 D. None

Ans. C

Sol. $a_t = \frac{72000}{20 \times 3600} = \frac{20}{20}$

a_t = 1 m/s^2 , V= 10m/s

a_n = 100/150 = 0.667 m/s^2

136. The values of specific heat (C_P and C_V) remain constant for which kind of gas

A. Monoatomic B. Diatomic

C. Polyatomic D. None

Ans. A

Sol. For monoatomic gases specific heats are independent of temperature.

137. The effect of friction in nozzle is to .....

A. Keep dryness fraction constant

B. Increase dryness fraction

C. Decrease dryness fraction

D. First increase dryness fraction upto certain limit and then decrees it

Ans. B

Sol. due to presence of the friction the entropy of the steam at the outlet of the turbine increases so the dryness fraction.

The effect of friction in nozzle is to increase dryness fraction

138. Which type of support has a reaction and a bending moment components?

A. Hinge support B. Roller support

C. Fixed support D. None of these

Ans. C

Sol. Fixed supports can resist vertical and horizontal forces as well as a moment. Since they restrain both rotation and translation, they are also known as rigid supports.

139. Which force is responsible for the flow of fluid?

A. Tension
B. Compression
C. Shear
D. Bending

Ans. C

Sol. Fluid flows by virtue of Shear force, for static fluid shear force is 0.

140. What is the mechanics of electron beam machining for removal of metal?

A. Erosion due to cavitation
B. Melting and vaporization
C. Vibration causing erosion
D. None of these

Ans. B

Sol. EBM is done in vacuum, where thermo-ionic electron beam is focused on material where machining is to be done. This rays impinge in material causing high temperature rise and melting and rapid evaporation of material.

141. At a bank counter, customers arrive according to Poisson's distribution at a rate of 14 customers per hour. The staff at this counter takes 3 minutes per customer on an average with an exponential distribution. The mean waiting time of queue in minutes is.

A. 7
B. 14
C. 5
D. 10

Ans. A

Sol. Given λ = 14 customer per hour and 1/ μ = 3 mins per customer

Therefore, μ = 20 customers per hour

And the waiting time in the queue is

$$t_q = \frac{\lambda}{\mu(\mu-\lambda)} = \frac{14}{20(20-14)} = 0.1167 \text{ hour}$$

t_q = 7 minutes

142. Which of the following pair is correct

A. Nickel : corrosion resistance
B. Cobalt : heat resistance
C. Sulphur : machinability
D. Chromium : harden ability

Ans. C

Sol. addition Sulphur increases machinability of steel.

143. Which of the following fitting is a boiler mounting?

A. Superheater
B. Economizer
C. Feed check valve
D. feed pumps

Ans. C

Sol. Boiler mountings are necessary components so that a boiler works properly. Feed check valve is a boiler mounting used to regulate the flow of boiler feed water.

144. In a solid cube casting the volume of cast to be made is 125 cm^3. The solid shrinkage allowance is 2% for each side. If the ratio of liquid to solid shrinkage allowance is 4:1(Volumetric). What will be the volume (in cm^3) of molten material required while preparing such cast?

A. 135 B. 163.25

C. 150.5 D. 140.5

Ans. B

Sol. Volume of pattern with solid shrinkage allowance = $(5+0.1)^3$ = 132.651 cm^3

Solid Shrinkage allowance = 132.651 – 125 = 7.651 cm^3

Solid Shrinkage allowance = (7.651/125) = 0.0612

liquid Shrinkage allowance = 4 x 0.0612 =0.2448

total shrinkage allowance = 0.0612+0.2448

= 0.306

Total volume of molten metal required = 125 + 0.306X125 = 163.25 cm^3

145. The ratio of heat transfer coefficient to the flow of heat per unit temperature rise due to the velocity of the fluid is known as

A. Fourier number B. Grashof number

C. Peclet number D. Stanton number

Ans. D

Sol. Stanton number can be used in correlating forced convection data. This becomes obvious when we observe the velocity V contained in the expression of Stanton number. It is the ratio of heat transfer coefficient to the flow of heat per unit temperature rise due to the velocity of the fluid.

146. The average velocity of a one dimensional in-compressible fully developed viscous flow, between two fixed parallel plates, is 6 ms^{-1}. The maximum velocity (in ms^{-1}) of the flow is

A. 12 B. 9

C. 4 D. 6

Ans. B

Sol. For flat plate and fully developed flow, ratio of mean velocity to maximum velocity is 2/3.

$U_{mean}/U_{max} = \frac{2}{3}$

$\frac{6}{U_{max}} = \frac{2}{3}$

U_{max} = 9 m/s^{-1}

147. Choose the INCORRECT statement among the following for a closed system having fixed boundary.

A. Heat transfer associated with the system may or may not be zero.

B. There will be no mass transfer across the system

C. Work associated with the system will always be zero.

D. All the above.

Ans. C

Sol. For a closed system with fixed boundary:

1. There will be no mass transfer taking place across the boundary.

2. Since, the information about insulation is not known, so there may or may not be heat transfer across the boundary.

3. Since, boundary of the system is fixed so, boundary work associated with the system will be zero, but system may have work associated in the form of shaft work, Electrical work.

So, the incorrect statement is C..

148. Volumetric analysis of dry products of combustion is done by

A. bomb calorimeter

B. viscosity meter

C. orsat apparatus

D. calorimeter

Ans. C

Sol. volumetric analysis of dry product is done by with the help of orsat apparatus.

Analysis of fossil fuel gas is done by orsat apparatus.

149. Carnot cycle consist of

A. Two reversible adiabatic, two reversible isothermal processes

B. Two reversible adiabatic, two reversible isobaric processes

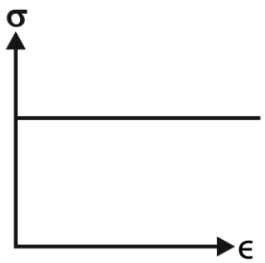
C. Two reversible adiabatic, one reversible isochoric process, one reversible isobaric process

D. Two reversible adiabatic, two reversible isochoric processes

Ans. A

Sol. Carnot cycle: Adiabatic compression→ Isothermal heat addition→ Adiabatic expansion →isothermal heat rejection

150. Following diagram represents the stress strain curve for



A. Perfect rigid material
B. Perfect elastic material
C. Perfect plastic material
D. Rigid plastic material

Ans. C

Sol. This is a stress strain curve for a perfect plastic material

151. Thermal diffusivity is
A. a dimensionless parameter
B. function of temperature
C. used as mathematical model
D. a physical property of the material

Ans. D

Sol. In heat transfer analysis, thermal diffusivity is the thermal conductivity divided by density and specific heat capacity at constant pressure. It measures the rate of transfer of heat of a material from the hot end to the cold end.

152. The Roots blower and vane-type compressor are the types of
A. displacement compressor
B. steady-flow compressor
C. both of the mentioned
D. none of the mentioned

Ans. A

Sol. These are the two types of rotary positive displacement machines.

153. Which of the following is a thermosetting plastic?
A. Polyethylene
B. Bakelite
C. Polyvinyl chloride
D. Nylon

Ans. B

Sol. Thermosetting plastic is a plastic that is irreversibly cured from a soft solid or viscous liquid, prepolymer or resin. The process of curing changes the resin into an infusible, insoluble polymer network, and is induced by the action of heat or suitable radiation often under high pressure, or by mixing with a catalyst. Nylon, resin, Bakelite etc.

154. Failure in rivet occurs by which mode?
A. Shear
B. Compression
C. Tensile
D. any of the mentioned

Ans. D

Sol. Rivet may fail by shearing, plates between two rivets can undergo tensile failure and plates might fail by crushing

155. What will be the ratio of bending force required in case of V-bending, U- bending and edge bending?

A. 1:1:1 B. 2:1:0.5

C. 1:2:1 D. 1:2:0.5

Ans. D

Sol. Ratio of bending force in v- bending, U- bending and Edge bending is 1:2:0.5.

156. Octane number of Natural gas is

A. 110 B. 80

C. 95 D. 40

Ans. A

Sol. The octane number of natural gas is greater than 100.

157. δ-Ferrite has which micro-structure

A. HCP B. FCC

C. BCC D. None

Ans. C

Sol. δ-Ferrite has BCC micro-structure

158. The total no. of molecules in 2 kg moles of an ideal gas is

A. 6.023×10^{23} B. 12.046×10^{23}

C. 6.023×10^{26} D. 12.046×10^{26}

Ans. D

Sol. As we know Avogadro's no.,

A = 6.023×10^{23} molecules/g mol = 6.023×10^{26} molecules/kg mol

Total no. of molecules = $2 \times 6.023\times10^{26} = 12.046 \times 10^{26}$ molecules

159. Which of the following statements are TRUE?

A. A capillary tube is a variable opening area type expansion device

B. In a capillary tube pressure drop takes place due to fluid friction

C. In a capillary tube pressure drop takes place due to fluid acceleration

D. In a capillary tube pressure drop takes place due to fluid friction and acceleration

Ans. D

Sol. The pressure reduction in a capillary tube occurs due to the following two factors:

1. The refrigerant has to overcome the frictional resistance offered by tube walls. This leads to some pressure drop, and

2. The liquid refrigerant flashes (evaporates) into mixture of liquid and vapour as its pressure reduces. The density of vapour is less than that of the liquid. Hence, the average density of refrigerant decreases as it flows in the tube. The mass flow rate and tube diameter (hence area) being constant, the velocity of refrigerant increases since $\dot{m} = \rho VA$. The increase in velocity or acceleration of the refrigerant also requires pressure drop.

160. In case of thrust bearings, the load acts:

A. Along the axis of rotations

B. parallel to axis of rotations

C. perpendicular to to axis of rotations

D. in any directions

Ans. A

Sol. Thrust bearings are designed for such applications, where the load acts along the axis of rotation.

161. Which among the following is formula for friction factor of circular pipes?

A. 16/Re B. 64/Re

C. Re/16 D. Re/64

Ans. B

Sol. Circular pipes have a diameter treated in a round manner. For a fluid flow which is laminar head loss is directly proportional to the fluid velocity. Thus, friction factor is inversely proportional to its velocity. Therefore, the correct option is '64/Re'.

162. The point of contraflexure in case of beams is:-

A. The point, where shear force is zero

B. The point, where shear force changes its sign

C. The point, where bending moment is zero and changes its sign

D. The point, where no load acts on the beam.

Ans. C

Sol. At point of contraflexure, bending moment on beam is zero and changes its sign.

163. A Mohr's circle to reduces to a point when the body is subjected to

A. pure shear

B. uniaxial stress only

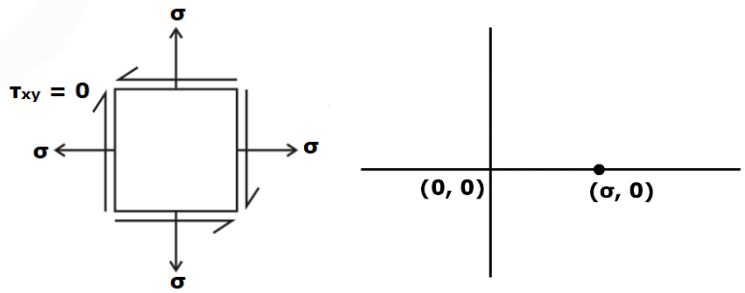
C. equal and opposite axial stresses on two mutually perpendicular planes, the planes being free of shear

D. equal axial stresses on two mutualy perpendicular planes, the planes being free of shear.

Ans. D

Sol. When the normal stresses on the two mutually perpendicular planes are equal and alike and shear stress is zero then radius of mohr circle will be zero.

state of stress is shown below



164. Sub cooling is beneficial as it:

1) Increases specific refrigeration effect

2) Decreases work of compression

3) Ensures liquid entry into expansion device

4) All of the above

A. 1 & 2 B. 2 & 3

C. 1 & 3 D. 4

Ans. C

Sol. Subcooling is beneficial as it increases the refrigeration effect by reducing the throttling loss at no additional specific work input. Also subcooling ensures that only liquid enters into the throttling device leading to its efficient operation.

165. What is the function of a diffuser?

A. increases pressure at the expense of kinetic energy

B. increses kinetic energy at the expense of pressure

C. it may increase kinetic energy or pressure energy depending upon the Mach no of the flow.

D. increses pressure energy as well as kinetic energy

Ans. C

Sol. diffuser may increase kinetic energy or pressure energy depending upon the Mach no of the flow.

if Mach No > 1, in diffuser kinetic energy increses at the expense of pressure

if Mach No < 1 in diffuser, pressure energy increases at the expense of kinetic energy

166. Match the Thermometer (Column I) with their Thermometric Property (Column II).

Column I	Column II
A) Thermocouple	1) Infrared rays
B) Clinical Thermometer	2) Electromotive force
C) Thermogram	3) Volume
D) Constant Pressure Thermometer	4) X-rays
	5) Length of liquid column.

A. 2 - 4 - 4 – 3 B. 5 - 4 - 1 - 3

C. 2 - 5 - 1 – 3 D. 2 - 5 - 4 - 3

Ans. C

Sol. Thermometric property of different thermometers is:

Constant Volume Thermometer - Pressure

Constant Pressure Thermometer - Volume

Electrical Resistance thermometer - Resistance

Thermocouple - Electromotive forces

Liquid in column (Clinical Thermometer) - Length of liquid column

Thermograph - Infrared Rays

So, from above information the match we get is A-2 B-5 C-1 D-3.

Therefore option C. is correct.

167. A block of mass 4 kg is placed on a rough horizontal plane. A time dependent force F = kt^2 acts on the block, where k = 2 Ns^{-2}, Coefficient of friction μ = 0.8. Force of friction between block and the plane as t = 2 s is

A. 8 N B. 4 N

C. 2 N D. 32 N

Ans. A

Sol. $f_{max} = \mu mg = 0.8 \times 4 \times 10 = 32$ N

At t = 2s, $F = kt^2(2)(2)^2 = 8N$

Since applied force $f < f_{max}$, force of friction will be 8N

168. The flow in which the parameters do not change with respect to time is called as _____

A. unsteady flow B. transient flow

C. steady flow D. continuous flow

Ans. C

Sol. The flow in which the flow parameters do not change with respect to time is called a steady flow. here at every instant of time, flow properties remain constant.

169. The cross-section areas of various sections of the gating system are as follows:

Base of sprue = 2 mm^2

Ingates = 4

Pouring cup = 8

Runner = 3

Find the gating ratio for the system?

A. 1 : 1.5 : 2 B. 1 : 4 : 2

C. 1 : 2 : 4 D. 1 : 1.5 : 4

Ans. A

Sol. Gating ratio = ratio of cross-sectional areas of the sprue, runner and ingate.

Therefore the gating ratio = 2 : 3 : 4

Gating ratio = 1 : 1.5 : 2

170. For circular section, ratio of the maximum to the average shear stress is

A. 1.5 B. 1

C. 2 D. $\frac{4}{3}$

Ans. D

Sol. For circular section, the maximum shear stress is equal to 1.33 times the average shear stress.

171. What is the optimum tool life for max. production (in min), if the Taylor's tool life exponent is 0.4 and tool changing time is 1.2 min.

A. 1.2 B. 1.4

C. 1.8 D. 1

Ans. C

Sol. Use formula:

for max. production

$$T_0 = T_C\left(\frac{1-n}{n}\right)$$

$$T_0 = 1.2\left(\frac{1-0.4}{0.4}\right)$$

$T_0 = 1.8\text{min}$

172. The ratio of power at the shaft of turbine and power delivered by water to runner is known as?

A. Mechanical efficiency B. Volumetric efficiency

C. Hydraulic efficiency D. Overall efficiency

Ans. A

Sol Due to mechanical losses, power available at shaft of turbine is less than power delivered to the runner of turbine. Hence ratio of power at the shaft of turbine and power delivered by water to runner is known as mechanical efficiency.

173. If a glass tube of 10 mm diameter is immersed in water, what will be the rise or fall in capillary?

(Take surface tension = 0.075 N/m, g = 10 m/s^2 and angle of contact = 0)

A. 0.75 B. 1.5

C. 3 D. 6

Ans. C

Sol. $h = \frac{4S\cos\theta}{\rho dg}$

where h = rise in liquid height in the tube, S = surface tension, θ = the angle of contact, d = diameter of the tube, ρ = density of liquid and g = acceleration due to gravity.

Substituting all the values,

$$h = \frac{4\times 0.075\times\cos 0}{10^3\times 10\times 10^{-3}\times 10}\text{m} = 3\text{ mm}$$

174. Match the following Column I (Equality/ Inequality) with Column II (the Type of engine according to Clausius).

A) $\oint \frac{dQ}{T} < 0$ - 1) Reversible

B) $\oint \frac{dQ}{T} = 0$ - 2) Irreversible

C) $\oint \frac{dQ}{T} > 0$ - 3) Impossible

A. 1 - 2 – 3
B. 2 - 1 - 3
C. 3 - 2 – 1
D. 3 - 1 - 2

Ans. B

Sol. According to inequality of Clausius, an engine is possible if and only if

$$\oint \frac{dQ}{T} \leq 0$$

The above possible engine becomes reversible when

$$\oint \frac{dQ}{T} = 0$$

So, the correct match is A-2 B-1 C-3.

175. Modulus of resilience in a member is stored strain energy

A. per unit volume
B. in whole volume
C. per unit area
D. per unit length

Ans. A

Sol. modulus of resilience is energy stored per unit volume

176. A thin cylindrical pressure vessel of diameter 2m and wall thickness 5 mm is subjected to an internal pressure of 0.5 MPa. The longitudinal stress developed in the wall of vessel will be:

A. 50 MPa
B. 100 MPa
C. 25 MPa
D. 75 MPa

Ans. A

Sol. P = 0.5 MPa, D = 2 m, t = 5 mm

$$\therefore \sigma_L = \frac{pD}{4t} = \frac{0.5 \times (2 \times 10^3)}{4 \times 5}$$

$\sigma_L = 50$ MPa

177. Which one of the following statements is correct about the Fanno flow?

A. For an initially subsonic flow, the effect of friction is to decrease the Mach number towards unity

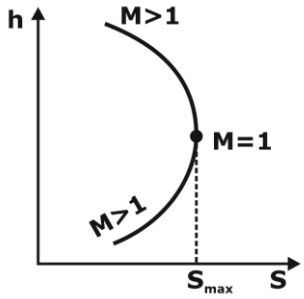
B. For an initially supersonic flow, the effect of friction is to increase the Mach number towards unity

C. At the point of maximum entropy, the Mach number is unity

D. Stagnation pressure always increases along the Fanno line

Ans. C

Sol. At the point of maximum entropy, the Mach number is unity. The state on the upper part of each curve is subsonic and lower part supersonic.



178. In which of the following case stress concentration factor is ignored?

A. Ductile material under static load

B. Ductile material under fluctuating load

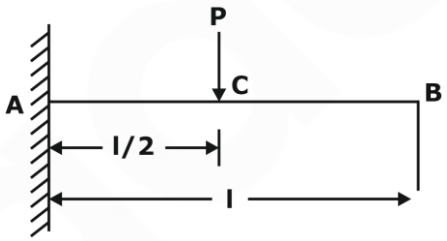
C. Brittle material under static load

D. Brittle material under fluctuating load

Ans. A

Sol. In ductile materials under static load, there is plastic deformation near yielding point and hence redistribution of stresses take place. The plastic deformation is restricted to a smaller area and hence no perceptible damage take place.

179. For the Cantilever beam as shown Below



Deflection At centre will be:

A. $\frac{Pl^3}{3EI}$

B. $\frac{Pl^3}{24EI}$

C. $\frac{Pl^3}{8EI}$

D. $\frac{Pl^3}{48EI}$

Ans. B

Sol. For cantilever Beam, deflection under point load P is given as,

$$\delta = \frac{PL^3}{3EI}$$

For deflection at centre, Put $L = \left(\frac{l}{2}\right)$

$$\therefore \delta = \frac{P\left(\frac{l}{2}\right)^3}{3EI} = \frac{Pl^3}{24EI}$$

180. Column I contain name of different Processes and Column II contains the Pressure and Temperature relation for different processes of Ideal gas. The correct match for all the options is

Column I - Column II

A) Isothermal Process - 1) $\frac{P_2}{P_1}=1$

B) Isentropic Process - 2) $\frac{P_2}{P_1}=\frac{T_2}{T_1}$

C) Isochoric Process - 3) $\left(\frac{P_2}{P_1}\right)^{\frac{\gamma-1}{\gamma}}=\frac{T_2}{T_1}$

D) Isobaric Process - 4) $1=\frac{T_1}{T_2}$

A. 1 - 4 - 2 – 3 B. 4 - 3 - 2 - 1

C. 4 - 3 - 1 – 2 D. 1 - 2 - 4 - 3

Ans. B

Sol. For Isochoric Process $V_2 = V_1$

Therefore, from ideal gas equation we have $\frac{P_2}{T_2}=\frac{P_1}{T_1}$

On rearranging, we get $\frac{P_2}{P_1}=\frac{T_2}{T_1}$

For Isothermal Process $T_2 = T_1$

$\therefore \frac{T_1}{T_2}=1$

For Isobaric Process $P_2 = P_1$

$\therefore \frac{P_2}{P_1}=1$

For Isentropic Process PV^{γ} = Constant

$\therefore \frac{V_1}{V_2}=\left(\frac{P_2}{P_1}\right)^{\frac{1}{\gamma}}$

also, $\frac{P_1V_1}{P_2V_2}=\frac{T_1}{T_2}$

$\therefore \left(\frac{P_2}{P_1}\right)^{\frac{\gamma-1}{\gamma}}=\frac{T_2}{T_1}$

So, Correct match is A-4 B-3 C-2 D-1.

181. If young's modulus of elasticity of a material is 140 GPa and Bulk modulus is 70 GPa. What will be the Poisson's ratio (μ).

A. 0.13 B. 0.15

C. 0.17 D. 0.19

Ans. C

Sol. E = 140 GPa, K = 70 GPa

$E = 3k(1 - 2\mu)$

$140 = 3 \times 70 \times (1 - 2\mu)$

$\frac{2}{3} = 1 - 2\mu$

$2\mu = \frac{1}{3} \Rightarrow \mu = \frac{1}{6} = 0.167 \cong 0.17$

182. For the stable equilibrium of a floating body

A. The metacenter is below the centre of gravity

B. The metacenter is above the centre of gravity

C. The centre of buoyancy is below the centre of gravity

D. The metacenter coincides with the centre of gravity

Ans. B

Sol. For the stable equilibrium of a floating body, the metacenter is above the centre of gravity.

So the correct option is (b).

183. The highest velocity for flow of water of viscosity 1 centipoise to be laminar in a 0.6 cm pipe is

A. 100/3 cm/s B. 125/3 cm/s

C. 50 cm/s D. 200 cm/s

Ans. A

Sol. $Re = \frac{VD}{\upsilon}$

$2000 = \frac{V \times 0.6}{1 \times 10^{-2}}$

$V = \frac{100}{3}\text{cm/s}$

184. Steel can be hardened quickly by _____ process

A. carburizing B. cyaniding

C. induction hardening D. None & these

Ans. C

Sol. Steel can be quickly hardened by induction hardened followed by rapid cooling of water.

185. One kg of steam sample contains 0.8 kg dry steam; it's dryness fraction is

A. 0.2 B. 0.8

C. 0.6 D. 0.5

Ans. B

Sol. mass of sample steam = 1 kg

mass of dry steam = 0.8 kg

$$\text{dryness fraction} = \frac{m_v}{m_s} = \frac{0.8}{1} = 0.8$$

186. Determine the Degree of reaction of the stage, If the drop in enthalpy of fixed blade and moving blade of a stage in a reaction turbine respectively are 11 kJ/kg and 9 kJ/kg.

A. 0.1 B. 0.45

C. 0.55 D. 0.5

Ans. B

Sol. By definition:

$$\text{Degree of Reaction} = \frac{(\Delta h)_{MB}}{(\Delta h)_{MB} + (\Delta h)_{FB}} = \frac{9}{9+11} = 0.45$$

187. What offset is provided for a cam follower mechanism?

A. To avoid jerk B. To accelerate

C. To decelerate D. To minimize side thrust

Ans. D

Sol. When the motion of the follower is along an axis away from the axis of the cam centre, it is called off-set follower. While taking offset reduces stroke length also reduces thrust and tear and wears.

188. Which one among the following welding processes uses non-consumable electrode?

A. Gas metal arc welding B. Submerged arc welding

C. Gas tungsten arc welding D. Flux coated arc welding

Ans. C

Sol. In TIG welding non consumable electrode of Tungsten is used which is held in the welding gun.

189. Refrigeration Cycle will not include process like:

A. evaporation B. compression

C. condensation D. sublimation

Ans. D

Sol. Refrigeration Cycle involves refrigerant that undergoes series of processes such as evaporation, compression, condensation, throttling and expansion.

190. In a sine bar, h denotes the slip gauge height. Let l be the distance between the rollers. Which of the following expresses the correct relationship between error in angular measurement (dθ) and the errors in slip gauge combination (dh) and in the spacing of the rollers?

A. $d\theta = \sin\theta\left[\frac{dh}{h} - \frac{dl}{l}\right]$

B. $d\theta = \cos\theta\left[\frac{dh}{h} - \frac{dl}{l}\right]$

C. $d\theta = \tan\theta\left[\frac{dh}{h} - \frac{dl}{l}\right]$

D. $d\theta = \cos\theta\left[\frac{dh}{h} - \frac{dl}{l}\right]$

Ans. C

Sol. For a sine bar, the height is given by :

$$\sin\theta = \frac{h}{l}$$

Taking logs both sides:

log sinθ = log h – log l

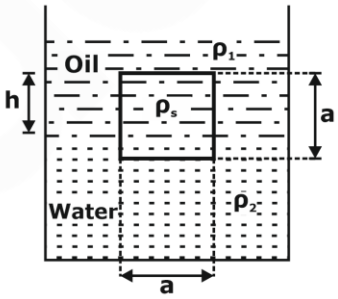
Differentiating both sides:

$$\frac{1}{\sin\theta} x \cos\theta\, d\theta = \frac{dh}{h} - \frac{dl}{l}$$

Thus:

$$d\theta = \tan\theta\left[\frac{dh}{h} - \frac{dl}{l}\right]$$

191. A cube of size 1 unit floats in two laminated fluid, one on top of the other, what is the height h ?



where, ρ_1 = 850 Kg/m^3

ρ_2 = 1000 kg/m^3

ρ_s = 900 Kg/m^3, a = 1m

A. 0.33 m

B. 0.85 m

C. 0.55 m

D. 0.67 m

Ans. D

Sol. $(m.g)_{body} = \rho_1 \forall_1 g + \rho_2 \forall_2 g$ ($\forall$ = Displaced Volume)

$\Rightarrow \rho_s V g = \rho_1 \forall_g + \rho_2 \forall_2 g$ (V = Volume)

$\Rightarrow 900 \times a^3 = 850 \times a^2 \times h + 1000 \times a^2 \times (a - h)$

$a = 1$

$\Rightarrow 900 = 850 \times h + 1000 (1 - h)$

$150\ h = 100$

$h = 0.67$ m

192. The Prandtl Number approximates _____

A. Momentum diffusivity to thermal diffusivity

B. Thermal diffusivity to momentum diffusivity

C. Shear stress to thermal diffusivity

D. Thermal diffusivity to kinematic viscosity

Ans. A

Sol. The Prandtl number is a dimensionless number. It approximates the ratio of momentum diffusivity to thermal diffusivity. It can be expressed as $P_r = v/\alpha(1)$. Where α= thermal diffusivity and v= momentum diffusivity.

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193. If the radius of insulation is less than the critical radius of insulation then by adding insulation heat transfer

A. Increase

B. Decreases

C. Remains same

D. Increases upto a certain limit then decreases

Ans. D

Sol. If the radius of insulation is less than the critical radius of insulation then by adding insulation heat transfer increases upto critical radius of insulation and further addition of insulation will reduce the heat transfer rate.

194. 1800 kJ of heat is transferred from condensing steam at 600 K to vaporizing water at 450K. The atmospheric temperature is 300 K. The net decrease of availability for the overall process of heat transfer in kJ is

A. 1200

B. 900

C. 600

D. 300

Ans. D

Sol. Decrease in availability $= T_0\left[\frac{Q}{T_2} - \frac{Q}{T_1}\right]$

$= 300\left[\frac{1800}{450} - \frac{1800}{600}\right]$

$= 300\ [4 - 3] = 300$ kJ

195. Hermetic compressors were developed to:

A. Improve energy efficiency

B. Overcome refrigerant leakage problems

C. Improve serviceability

D. Reduce weight

Ans. B

Sol. The hermetically sealed reciprocating compressor is widely used for the refrigeration and air conditioning applications. In all the household refrigerators, deep freezers, window air conditioners, split air conditioners, most of the packaged air conditioners, the hermetically sealed reciprocating compressor is used. This type of compressor is very easy to handle, have almost negligible leakage and requires low maintenance. They are used with motor power requirements from 1/20 to 71/2 hp.

196. Which of the below wear mechanisms is primarily responsible for flank wear during metal cutting?

A. Diffusion

B. Chemical Reaction

C. Abrasion

D. Adhesion

Ans. C

Sol. Abrasion is the wear mechanism mainly responsible for flank wear.

197. PQRS is a four-bar mechanism in which PQ = 10 cm and RS = 15 cm. At an instant, both PQ and RS are perpendicular to fixed link PS. If velocity of Q at this condition is V, then the velocity of R is

A. 2/3V

B. V

C. 3/2V

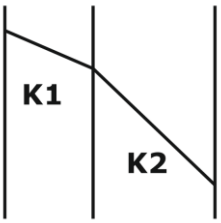
D. 4/3V

Ans. B

Sol. In this case, instantaneous velocity of both link is having zero relative velocity.

Thus, velocity of Q and R will be equal. So the velocity of R will be V

198.



Which of the following relation is true with respect to the diagram?

A. $K_1 > K_2$

B. $K_1 < K_2$

C. $K_1 = K_2$

D. can not be determine

Ans. A

Sol. Greater the slope, greater is the temperature gradient which is inversely proportional to thermal conductivity.

so the thermal conductivity of material 1 is higher than the thermal conductivity of material 2

Therefore, the correct answer is $K_1 > K_2$ is the relation which is true with respect to the diagram.

199. Inventory record file gives the following information

A. lot size
B. machine details
C. customer name
D. none of the mentioned

Ans. A

Sol. Only lot size is considered in inventory record file.

200. The chemical formula of a substance is C_3H_6. Its designation is

A. R-1270
B. R – 42
C. R-360
D. R-370

Ans. A

Sol. For an unsaturated hydrocarbon "$C_mH_nF_pCl_q$" the designation = R-1(m-1)(n+1)p

Given, m =3, n = 6, p = 0, q = 0

So, designation = R-1(3-1)(6+1)0 = R-1270

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