MEGA MOCK CHALLENGE

gradeup

VIZAG

Steel Management Trainee 2020

Mechanical Engineering

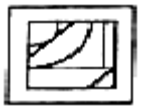
Mega Mock Challenge
(Apr. 25- Apr. 26 2020)

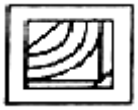
Questions & Solutions

1. **Direction**: In each of the following questions, which answer figure will complete the question figure?

Question Figure:

A. 

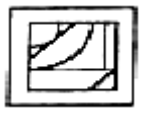
B. 

C. 

D. 

Ans. B

Sol. After observing the given question figure, it is clear that option figure B will complete the given question figure.



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

ADMINISTRATION

A. STATION

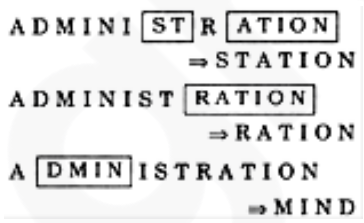
B. RATION

C. MINISTER

D. MIND

Ans. C

Sol. There is no 'E' letter in the given word. Therefore, the word MINISTER cannot be formed.



Hence, option C is the correct response.

3. **Direction**: Which of the following words will come fourth if arranged according to the English dictionary?

A. Rain

B. Reef

C. Ready

D. Rainbow

Ans. B

Sol. Rain → Rainbow → Ready → Reef

Clearly, Reef will come fourth.

Hence, B is correct.

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

Teachers, Singers, Boys

A. 

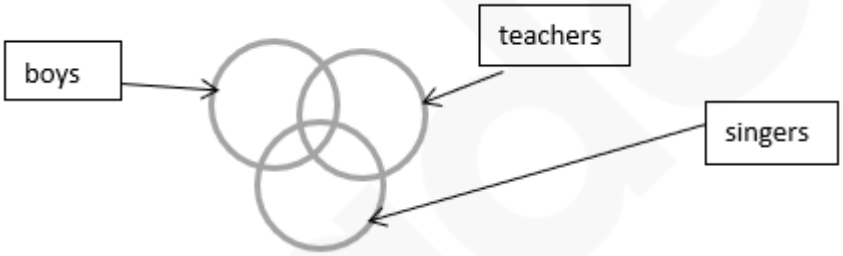
B. 

C. 

D. 

Ans. C

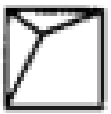
Sol. Some boys can be teachers. Some teachers can be singer. Some singers can be boys. So, the given class are partly related to each other. Hence, option C is the right answer.



5. **Directions**: In the following questions, which answer figure will complete the question figure?

Question figure:

A. 

B. 

C. 

D. 

Ans. D

Sol. After observing the given question figure, it is clear that, answer figure (D) will be complete the given pattern.

Hence, d is correct.

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

Men, Author, teacher

A. 

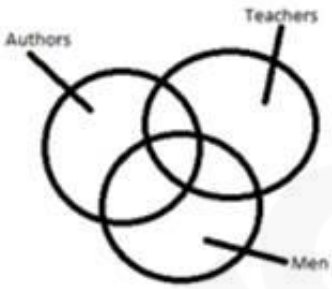
B. 

C. 

D. 

Ans. A

Sol. Some authors can be teachers. Some teachers can be men. Some authors can be men. So, the given items are partly related to each other. Thus,



Hence, option A is the correct response.

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

Bee : Honey :: Cow:?

A. Animal
B. Grass
C. Milk
D. Water

Ans. C

Sol. Honey is obtained from bees. Similarly, milk si obtained from cows.

Hence, option C is the correct response.

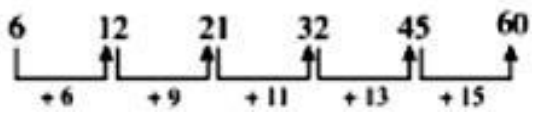
8. Find the wrong number in the series.

6, 12, 21, 32, 45, 60

A. 6
B. 12
C. 21
D. 32

Ans. A

Sol. 6, 12, 21, 32, 45, 60



Clearly, 6 is the wrong number in the given series.

Hence, option A is correct.

9. **Direction:** In the question given below there is a statement followed by two conclusions numbered I and II. You have to assume everything in the statement to be true. Then consider the 2 conclusions together and decide which of them follows beyond a reasonable doubt from the information given in the statement.

Statement:

One can master the English language only through extensive reading and constant use of the language through writing and conversing.

Conclusions:

I. People who do not read English books cannot master the language fully.

II. Only reading is not enough, one needs to practise speaking and writing in the language to master it.A. Only conclusion I follows

B. Only conclusion II follows

C. Both conclusion I and II follows

D. Neither conclusion I nor II follows

E. Either conclusion I nor II follows

Ans. C

Sol. One cannot learn complete command over the language without reading books or articles in that language. His/her knowledge regarding the usage will be incomplete. So I conclusion follows. Conclusion II also follows as the practice makes a man perfect. Without using the language accumulated by reading by conversing and writing one will not master the language.

10. Equations given below are solved on the basis, of a certain system. On the same basis, find out the correct answer for the unsolved equation.

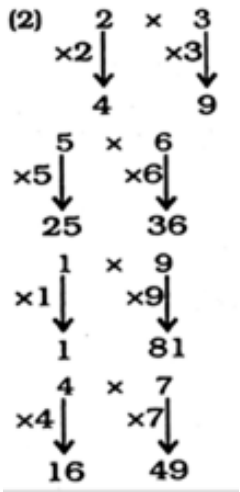
$2 \times 3 = 49$, $5 \times 6 = 2536$, $1 \times 9 = 181$, $4 \times 7 = ?$

A. 1628 B. 1649

C. 2549 D. 1219

Ans. B

Sol.



Hence, option B is the right answer.

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

1). Manifest

2). Meticulous

3). Meridian

4). Merchant

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

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

Ans. A

Sol. The correct order of the words is,

1). Manifest

4). Merchant

3). Meridian

2). Meticulous

→ 1, 4, 3, 2

12. **Direction**: If LUXOR is coded as 30, then GUILDS will be coded as?

A. 36 B. 38

C. 24 D. 40

Ans. C

Sol. LUXOR : 12, 21, 24, 15, 18 = 90 (sum) 90/3 =30)

Similarly

GUILDS : 7, 21, 9, 12, 4, 19 = 72 sum hence 72/3= 24

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

A. Japanese B. Italian

C. French D. German

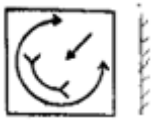
Ans. A

Sol. Japanese is an Asian country language, while Italian, French and German are European country languages.

Hene, option A is different from others.

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

M



N

A. 

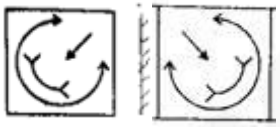
B. 

C. 

D. 

Ans. B

Sol. After observation the given question figure, Since, MN is the mirror line, then after reflection right portion of the question figure should be shown in left side in the reflected image, similarly, left portion of the question figure should be shown in right side in the reflected image.



Hence, b is correct.

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

CUZA : HYCC : : NNJO : ?

A. TURS

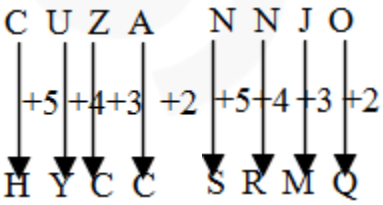
B. SRMQ

C. TRMP

D. SSNR

Ans. B

Sol.



Hence, option B is the right answer.

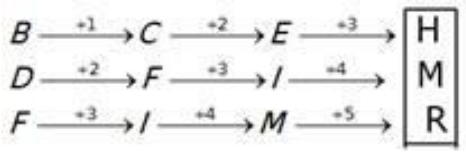
16. A series is given with one term missing. Select the correct alternative from the given ones that will complete the series.

BDF, CFI, EIM, ?

A. AEH
B. HMR
C. KPS
D. RVZ
E. HPR

Ans. B

Sol. The series will be,



Hence, option B is the correct answer.

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

SPECULATION

A. SPECIAL
B. TOPIC
C. SECULAR
D. CAUTION

Ans. C

Sol. Except C (SECULAR), all the given word can be formed by using the letters of the given word' SPECULATION'. Since, letter 'R' do not come in the word 'SPECULATION'.

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

AZBY : CXDW : : EVFU : ?

A. GTHS
B. GHTS
C. GSTH
D. TGSH

Ans. A

Sol. With reference to the position of the alphabets in the English Alphabet series.

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

Pairs of consecutive opposite letters are,

AZ, BY; CX, DW; EV,FU; GT, HS.

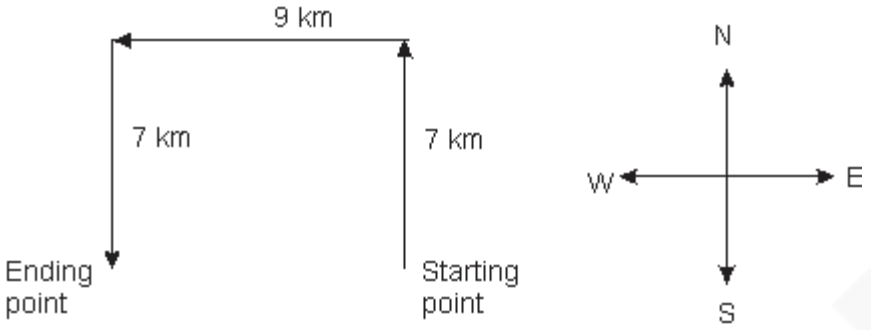
Hence, option A is the right answer.

19. Lata walks 7 km towards North, turns to her left and walks 9 km, again she turns to her left and walks 7 km. How far is she from the starting point?

A. 9 km
B. 6 km
C. 8.km
D. 7 km

Ans. A

Sol.



Hence, she is 9 km far from the starting point.

20. Statement is given followed by two conclusions I and II. You have to consider the statement to be true even they seem to be at variance from commonly known facts. You have to decide which of the given conclusions, if any, follows from the given statement.

Statement:

The manager humiliated Sachin in the presence of his colleagues.

Conclusions:

I. The manager did not like Sachin.

II. Sachin was not popular with his colleagues.

A. Only conclusion I follows
B. Only conclusion II follows
C. Both conclusion I and II follow
D. Neither conclusion I nor II follows

Ans. D

Sol. Clearly, none of the given conclusions is either mentioned in or can be drawn from the facts given in the statement. Hence, the answer is (D).

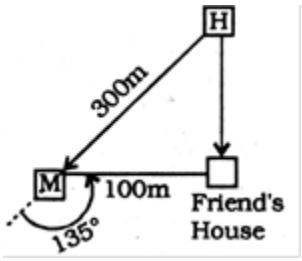
Hence, option D is the correct answer.

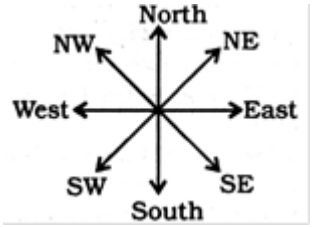
21. Rahim rode on his bicycle from his house towards the market for 300 m. He was moving south-west. Then he turned left at an angle of 135° and rode for 100 m to visit a friend. In which direction is Rahim's house located from his friend's house ?

A. North
B. East
C. West
D. South

Ans. A

Sol.





It is clear from the diagram that the house of Rahim is to the north of the house of his friend.

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

124, 235, 346, 457, ?

A. 455 B. 465

C. 565 D. 568

Ans. D

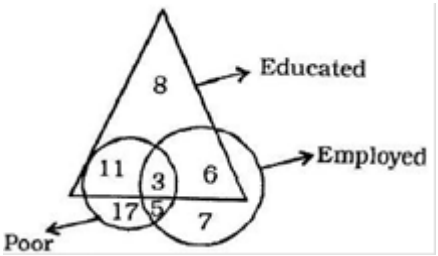
Sol. 124 + 111 = 235

235 + 111 = 346

346 + 111 = 457

So, missing number = 457 + 111 = 568

23. The figure represents three classes of youth in a village. How many educated youth are poor?

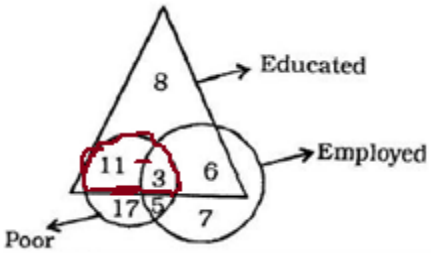


A. 14 B. 9

C. 6 D. 19

Ans. A

Sol.



11+3 = 14, educated youth who are poor.

Hence, option A is the correct response.

24. **Direction:** Find the odd number/ letter/ word from the given alternatives.

A. Bird
B. Crow
C. Kite
D. Pigeon

Ans. C

Sol. All the rest are the names of birds.

25. In a certain system A = 15(56)13, B = 17(50)8. What should be filled in the place of * to follow the same in C = 9(32)*

A. 6
B. 4
C. 3
D. 7

Ans. D

Sol. According to given system,

A = 15(56)13 => 15 + 13 = 28 => 28 × 2 = 56

B = 17(50)8 => 17 + 8 = 25 => 25 × 2 = 50

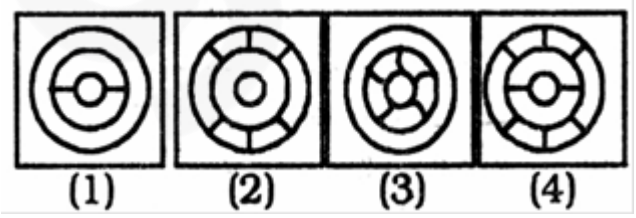
Similarly, C = 9(32) * => 9 + 7 => 16 × 2 = 32

Hence, option D is the right answer.

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

Question Figure

Answer Figure



A. Figure (1)
B. Figure (2)
C. Figure (3)
D. Figure (4)

Ans. D

Sol. After observing the given question figure, it is clear that option figure D is embedded in the given figure.

27. **Direction**: Select the related word/letters/ number from the given alternatives.

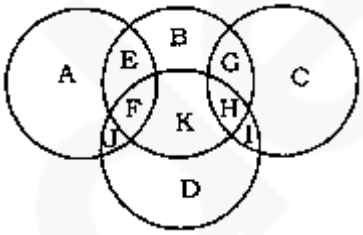
Scissors : Cloth :: ?

A. Pen : Ink
B. Razor : Beard
C. Furnace : Smoke
D. Nail: Hammer

Ans. B

Sol. 'Scissors' are used to cut 'Cloth'. Similarly 'Razor' is used to shave 'Beard'.
Hence Option B is correct

28. 'A' represents persons who talk Tamil, 'B' represents persons who talk Telugu, 'C' represents persons who talk Kannada, 'D' represents persons who talk Hindi.
How many persons can talk in any 3 language?



A. F, H
B. F, K
C. K, I
D. h, K

Ans. A

Sol. F and H talks three languages. F is common to circle A, B and D. H is common to circle C, D and B.
Hence, option A is the right answer.

29. Ann, Bill and Ken shared some stamps in the ratio 2 : 3 : 4. After a game, the ratio became 5 : 2 : 2. If Ann won 21 stamps, how many did ken lose?

A. 14
B. 21
C. 28
D. 7

Ans. A

Sol. Let Ann, Bill and Ken had 2x, 3x and 4x stamps respectively, after a game the stamp became 5x, 2x and 2x respectively
According to the question,
5x-2x=21
$\Rightarrow 3x = 21 \Rightarrow x = 7$

∴ Numbers of stamps lost by ken

$= 4x - 2x$

$= 2x = 2 \times 7 = 14$

Hence, option A is the right answer.

30. Which one set of letters when sequentially placed at the gaps in the given letter series shall complete it?

LU_TUPLUBTU_LUBT_P_UBTUP

A. BPUL
B. BUPL
C. LBPU
D. PBUL

Ans. A

Sol. The series is:

LU**B**TUP/LUBTU**P/**LUBT**U**P/**L**UBTUP.

Hence, option A is the right answer.

31. Find a word that is the synonym of -

A. TAMEA. Wild
B. savage
C. domesticated
D. silent

Ans. C

Sol. Tame = not dangerous or frightened of people; domesticated

Savage = extremely violent, wild, or frightening

Domesticated = tame and kept as a pet or on a farm

Hence, option C is the correct answer.

32. Improve the bracketed part of the sentence.

Mumbai is (larger) than many other towns in India.

A. large
B. largest
C. big
D. No improvement

Ans. D

Sol. The given sentence is correct. The rule with comparative degree is:

1. Comparative adjective + than + all/many other + noun (plural)
2. Comparative adjective + than + any other + noun (singular)

33. **Direction:** Read the following passage carefully and choose the best answer to each out of the four alternatives.

The arrival of the train did not disturb Sir Mohan Lal's sangfroid. He continued to sip his Scotch and ordered the bearer to tell him when he had moved the luggage to a first class compartment. Excitement, bustle and hurry were exhibitions of bad breeding and Sir Mohan was eminently well-bred. He wanted everything "tickety-boo" and orderly. In his five years abroad, Sir Mohan had acquired the manners and attitudes of the upper classes. He rarely

spoke Hindustani. When he did, it was like an Englishman's, only the very necessary words and properly anglicized. But he fancied his English, finished and refined at no less a place than the University of Oxford. He was fond of conversation and like a cultured Englishman, he could talk on almost any subject-books, politics or people. How frequently had he heard English people say that he spoke like an Englishman?

From his description in this passage, Sir Mohan Lal appears to be

A. A man of culture
B. An aristocrat
C. A snob
D. A scholar

Ans. C

Sol. As given in the passage, Sir Mohan Lal considered himself superior to other Indians. He rarely spoke Hindi as it considered it as inferior to English. He behaved like he is from a different higher class of society. He was the great admirer of English culture. In other words, we can call him a snob. A snob is someone who respects and likes only people who are of a high social class.

34. Select the most appropriate meaning of the idiom given in bold in the sentence.

For this act of indifference he will be **taken to task by** the authority.

A. to be reprimanded
B. to be rewarded
C. to ask for resignation
D. to be entrusted with an official job

Ans. A

Sol. The idiom "Take somebody to task" means to criticize somebody strongly for something they have done.

Hence option A is the correct answer.

35. According to the passage, a cultured Englishman is able to talk effortlessly on

A. Art and Culture
B. Human civilization
C. Modern Science
D. Almost any subject

Ans. D

Sol. Sir Mohan Lal was fond of conversation and like an Englishman, he could talk on almost any subject. Thus, option D is the correct answer.

36. Choose the correctly spelt word.

A. Rhapsody
B. Rhapsoady
C. Rapcody
D. Rapsody

Ans. A

Sol. Option A has the correctly spelt word. Rhapsody means an effusively enthusiastic or ecstatic expression of feeling.

37. **Direction:** In the following question, some part of the sentence have error and some have none. Find out which part of the sentence has an error. If the sentence is correct as it is, your answer is 'No error'.

Travel agents around the world have to rely on computers (A)/ to book seats in air flights or rooms in hotels (B)/ either now or a year from now. (C)/ No error

A. (A) B. (B)

C. (C) D. No error

Ans. B

Sol. The error is in part (B) of the sentence. The preposition should be "on" instead of "in".

38. Select the correct option to fill in the blank. |||End|||

He agreed _____ my business proposal.

A. at B. on

C. to D. for

Ans. C

Sol. The correct preposition to be used in the given sentence is "to". Hence, option C is the correct answer.

Explanation:

When you agree with someone/something, it means you accept the point of someone/something.

I agree with you.

She does not agree with my answer.

You agree on some issue or point of debate.

We agreed on this issue.

You agree to demands/queries, or you agree to do something.

He agreed to my demands.

He agreed to join me for the movie.

39. Select the word which means the same as the group of words given.

A written declaration of government or a political party.

A. Manifesto B. Affidavit

C. Dossier D. Document

Ans. A

Sol. Manifesto = a public declaration of policy and aims, especially one issued before an election by a political party or candidate.

Affidavit = a written statement confirmed by oath or affirmation, for use as evidence in court.

Dossier = a collection of documents about a particular person, event, or subject. Hence, the correct word is "manifesto".

40. Select the most appropriate antonym of the given word.
Permit
A. endorse
B. approve
C. certify
D. forbid

Ans. D

Sol. Permit means to allow someone to do something. The word which is opposite in meaning is "forbid" as it means to refuse to allow.
Endorse means declare one's public approval or support of.

41. **Choose the most appropriate alternative to complete the sentence:**
All of us are devoted _____ one another.
A. of
B. at
C. for
D. to

Ans. D

Sol. The verb "devote" is followed by the preposition "to". See below example:
He was entirely **devoted to** the affairs of his regimen.
So, option D is the correct answer.

42. Select the correctly spelt word.
A. Scarety
B. Scarcity
C. Scarsity
D. Scarecity

Ans. B

Sol. Option B has the correctly spelt word as "scarcity" which means insufficiency of amount or supply; shortage.

43. Select the most appropriate antonym of the given word. |||End|||
VIGOROUS
A. rough
B. rare
C. feeble
D. artful

Ans. C

Sol. Vigorous = strong, healthy, and full of energy.
The word opposite in meaning is "feeble" as it means lacking physical strength.
Artful = clever or skilful.

44. **Select the most appropriate meaning of the idiom underlined in the sentence.**
I tried <u>to feel his pulse</u> on the issue but in vain.
A. find his views
B. enlighten
C. argue with him
D. guide him

Ans. A

Sol. The idiom "feel the pulse" means try to determine the intentions or sentiments of a person.
Hence, option A is the correct answer.

45. When Sir Mohan/ Lal spoke Hindustani it was

A. Colloquial Hindi
B. Indian English
C. Literary Hindi
D. Anglicized Hindi

Ans. D

Sol. As per the following line of the passage, "He rarely spoke Hindustani. When he did, it was like an Englishman's, only the very necessary words and properly anglicized", we can say that the correct answer is option D.

46. According to Sir Mohan Lal, a wellbred person would

A. remain aloof from the crowd
B. like to drink only Scotch in public
C. always be calm and orderly
D. speak like an Englishman

Ans. C

Sol. Sir Mohan Lal believed that excitement, bustle and hurry were exhibitions of bad breeding. He considered himself as eminently well-bred and always behaved calmly and orderly.

47. Select the most appropriate option to substitute the bracketed segment in the given sentence. If no substitution is required, select No improvement.

All people want to be happy, **do they**?

A. don't they?
B. are they?
C. didn't they?
D. No improvement

Ans. A

Sol. When question tag is used in a sentence, it follows the rule of inversion. Inversion means that the verb is placed before the subject. Also, if the sentence is affirmative, the question tag must be negative and vice versa (except few cases).

Now, the first part of the sentence is affirmative, so, the question tag must be in negative form. In the given options, there are two choices with negative question tag. Option C is incorrect because the given sentence is in simple present tense. The correct answer is option A.

48. **One word substitution:**

People at a religious gathering

A. Rabble
B. Mob
C. Congregation
D. Crowd

Ans. C

Sol. Rabble = a large, noisy, uncontrolled group of people

Mob = a large crowd of people, especially one that is disorderly and intent on causing trouble or violence

Congregation = a group of people assembled for religious worship

So, the correct word is "congregation".

49. Sir Mohan Lal is portrayed as

A. An indophile
B. A true Englishman
C. A Hindu
D. An anglophile

Ans. D

Sol. In the passage, Sir Mohan Lal has been portrayed as someone who is a gread admirer of English culture and practise the same in his behaviour. He rarely spoke Hindi as he was fond of conversation in English language like a cultured Englishman. So, we can say that he was an anglophile.

50. In the following question, some part of the sentence may have errors. Find out which part of the sentence has an error and select the appropriate option. If the sentence is free from error, select 'No error'.

There were no furniture (1)/ in the flat (2)/ except for a couple of beds. (3)/ No error (4)

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

Ans. A

Sol. The error is in part (1) of the sentence. *Furniture* is a singular word, so, the associated verb should also be singular. The verb *were* is used for a plural noun, so, its use is incorrect in the given sentence. The correct verb would be *was*. The correct sentence would read as "*There was no furniture in the flat except for a couple of beds*".

51. India's First Freight village will be developed in which of the following places?

A. Chennai
B. Dehradun
C. Varnasi
D. Kolkatta
E. Chandigarh

Ans. C

Sol. India's first 'freight village' will be developed by the Inland Waterways Authority of India (IWAI) in Varanasi, Uttar Pradesh. The freight village, a one-of-its-kind infrastructure platform, will attract companies that require logistics services and can cluster to improve their competitiveness. This will allow relocation of retailers, warehouse operators and logistics service providers supplying the regional FMCG market. The facility will come around the proposed multi-modal terminal adjacent to the city on the banks of the Ganga

52. Who built the famous Shiva temple at Ellora?

A. Mauryan Emperor Ashoka
B. Gupta King Samudra Gupta
C. Chalukyan King Pulikeshi II
D. Rashtrakuta Ruler Krishna I

Ans. D

Sol. Rashtrakuta Ruler Krishna I was built the famous Shiva temple at Ellora. The massive Kailash Temple (cave 16) is nearly one a half times taller than the Parthnon and occupies almost twice its area. It is believed that it was constructed by excavating approx. 200,000 tones of rock and is possible the world's largest monolithic structure.

53. The main protein found in milk is _____

A. Albumin
B. Globulin
C. Globin
D. Casein

Ans. D

Sol.

- Casein is a protein commonly found in Mammalian milk, making 80% of the proteins in cow's milk and between 20-45% of the protein in human milk.
- Casein is used in making cheese, also as food additive, binder for safety matches etc.

54. Which of following Dam has been launched by the PM Narendra Modi at Rajkot, Gujrat?

A. Ukai Dam
B. Aji Dam
C. Kadana Dam
D. Sardar Sarovar Dam
E. None of these

Ans. B

Sol. The Prime Minister, Shri Narendra Modi has inaugurated the filling of 'Aji Dam' near **Rajkot** under Sauni Yojana.

55. Which of the following islands in India was once named "New Denmark"?

A. Elephanta Island
B. Salsatte Island
C. Lakshadweep
D. Nicobar Islands
E. None of these

Ans. D

Sol. In 1759, the Nicobar Islands were made a Danish colony, first named New Denmark and later as Frederick's Islands.

56. Which of the following is International Date Line?

A. 0 degree latitude
B. 0 degree longitude
C. Greenwich line
D. 180 degree longitude

Ans. D

Sol. The **International Date Line** is located halfway around the world from the prime meridian (0° longitude) or about 180° east (or west) of Greenwich, London.

57. First time in India which state announced cow cess?

A. Madhya Pradesh
B. Uttar Pradesh
C. Haryana
D. Rajasthan
E. Uttarakhand

Ans. D

Sol. First time in India Rajasthan announced cow cess. Rajasthan is the only state in India which has a dedicated Cow Ministry. Rajasthan government has imposed a 10% cow cess as surcharge on stamp duty for protection and propagation of cows in the state.

58. International boundary between India and Pakistan is demarcated by

A. McMahon Line
B. Durand Line
C. Radcliffe Line
D. Maginot Line

Ans. C

Sol. McMahon Line - India China
Durand Line - Pakistan Afghanistan
Radcliffe Line - India Pakistan
Maginot Line - France Germany

59. Who was the first Indian awarded the Oscar for lifetime achievements in Cinema?

A. Amitabh Bachchan
B. Satyajit Ray
C. Bhanu Athaiya
D. Shivaji Ganeshan

Ans. B

Sol.

- Satyajit Ray is one of the world's finest directors, producers, screenwriters, composers, writers, **Satyajit Ray was the first Indian awarded the Oscar for lifetime achievements in Cinema.**
- Oscars and graphic designers.
- are awards for artistic and technical merit in the film industry.

60. Where is Lomas rishi caves situated?

A. Barabar and Nagarjuni hills
B. Garo hills
C. Aravalli range
D. Baba budan hills
E. khasi hills

Ans. A

Sol. The Lomas Rishi Cave, also called the Grotto of Lomas Rishi, is a sacred architectural feature located in the Barabar and Nagarjuni hills of Jehanabad district in the Indian state of Bihar.

- This rock-cut cave was carved out as a sanctuary. It was built during the Ashokan period of the Maurya Empire in the 3rd century BC, as part of the sacred architecture of the Ajivikas.

61. NABARD was established on the recommendations of ___.

A. B. Sivaraman Committee
B. S. Wanchoo Committee
C. T. Rangarajan Committee
D. N. Tandon Committee
E. None of these

Ans. A

Sol. NABARD was established on the recommendations of **B. Sivaraman Committee**, (by Act 61, 1981 of Parliament) on 12 July 1982 to implement the National Bank for Agriculture and Rural Development Act 1981.

62. Who among the following Indian Prime Ministers was oldest to assume office?

A. Morarji Desai
B. Charan Singh
C. Indira Gandhi
D. Rajiv Gandhi

Ans. A

Sol. At the age of 81, Morarji Desai was the fifth Prime Minister of India from 1977-79.

63. Riboflavin is a/an

A. Hormone
B. Fatty acid
C. Enxyme
D. Vitamin

Ans. D

Sol. **Riboflavin** (vitamin B_2) is a water-soluble vitamin.

More Related to Riboflavin:

- It is required by the body for cellular respiration.
- Food sources include eggs, green vegetables, milk, and meat.
- Riboflavin was discovered in 1920, isolated in 1933, and first made in 1935.

64. Term 'Gambit' is associated with which of the following sports?

A. Basketball
B. Chess
C. Boxing
D. Golf
E. Tennis

Ans. B

Sol. Term 'Gambit' is associated with chess. It is derived from Italian word gambetto, meaning "to trip". It is s a chess opening in which the player of white, sacrifices a pawn, with the hope of achieving a resulting advantageous position.

65. The famous painting 'Monalisa' was the creation of:

A. Michael-Angelo
B.Leonardo-Da-Vinci
C. Piccasso
D. Van Gogh

Ans. B

Sol. The Mona Lisa is a half-length portrait of a woman by the Italian artist Leonardo da Vinci, which has been acclaimed as "the best known, the most visited, the most written about, the most sung about, the most parodied work of art in the world". Hence option B is the right answer.

66. The Keibul Lamjao, the only floating National Park in the world is in

A. Manipur
B. Mizoram
C. Assam
D. Meghalaya

Ans. A

Sol. The Keibul Lamjao National Park is a national park in the Bishnupur district of the state of Manipur in India. It is 40 km ² in area, the only floating park in the world, located in North East India, and an integral part of Loktak Lake.

67. ISRO has successfully launched GSAT-19 communication satellite through which of the following launching vehicle?

A. GSLV-Mk II
B. GSLV-Mk III
C. GSLV-Mk IV
D. GSLV-Mk V
E. None of these

Ans. B

Sol. India successfully launched its communication satellite GSAT-19 through GSLV-Mk III which is the heaviest rocket ever made by India.

Note: The satellite GSAT-19 has an intended lifespan of 10 years.It has an experimental payload called the geostationary radiation spectrometer(GRASP), to monitor and study the nature of charged particles in space and the influence of space radiation on satellites.

68. The largest country of the world by geographical area is _____.

A. Russia
B. Vatican City
C. Australia
D. USA

Ans. A

Sol. Russia is the largest country in the world (10.995% of the world landmass). Its Asian portion makes it the largest country in Asia, and its European portion makes it the largest country in Europe

69. When a ship enters the sea from a river what will be the effect?

A. It Lowers
B. It sways
C. It rises a little
D. It jolts

Ans. C

Sol. When a ship enters the sea from a river, it river, it rises a little since salt water is denser than river water. As the density of river water. As the density of river water is less than that of the sea water, the water displaced by the ship in the river is more than that displaced in the river is more than that displaced in the sea. So, it rises as it enters sea from river.

70. Which of the following is one of the sites from where Rockets are launched by ISRO, the Space Agency of India?

A. Sriharikota
B. Tarapore
C. Guwahati
D. Trombay
E. Jaitapur

Ans. A

Sol. Sriharikota is a barrier island off the Bay of Bengal coast located in the Indian state of Andhra Pradesh, India. It houses the Satish Dhawan Space Centre, one of the two satellite launch centers in India with the other being the Thumba Equatorial Rocket Launching Station in Thiruvananthapuram. Indian Space Research Organisation launch satellites using multistage rockets such as the Polar Satellite Launch Vehicle and the Geosynchronous Satellite Launch Vehicle from Sriharikota

71. Out of the first four numbers, the average of first three numbers is thrice the fourth number. If the average of the four numbers is 5 then the value of the fourth number is how much?

A. 4.5 B. 5

C. 2 D. 4

Ans. C

Sol. Let the fourth number be x.

Sum of four numbers = 5 × 4 = 20

Sum of first three numbers = 3x × 3 = 9x

Then, 9x + x = 20

⇒ x = 2

72. If a train 280 metres long runs at the speed of 7.4 m/ second, how much time will it take to cross a platform 460 metres long?

A. 95 sec B. 96 sec

C. 98 sec D. 99 sec

E. 100 sec

Ans. E

Sol. Total length to be coverd

$=(280+460=)740 \text{ metres}$

$\therefore$ Time taken $=\frac{740}{7.4}=100 \text{ seconds}$

73. A man can row $10\frac{4}{5}$ km/hr in still water and he finds that it takes him twice as much time to row up as to row down the same distance in river. The speed (km/hr) of the current is

A. 2 B. $2\frac{1}{2}$

C. $3\frac{3}{5}$ D. 5

E. None of these

Ans. C

Sol. Let speed of current = y

Acc. to question,

Total distance = D

$$=\frac{D}{\left(\frac{54}{5}-y\right)}=2\frac{D}{\left(\frac{54}{5}+y\right)}=\left(\frac{54}{5}+y\right)=2\left(\frac{54}{5}-y\right)$$

$$\Rightarrow y=3\frac{3}{5} km/hr$$

74. Find the numbers between 100 and 200, which are divisible by 3, 7 and 6 together?

A. 1 B. 2

C. 3 D. 4

E. 5

Ans. B

Sol. LCM of (3, 7 and 6) = 42

So, the number must be divisible by 42.

Therefore, there are only two numbers i.E. 126 and 168 which are divisible by 42.

Thus, only 2 numbers i.E. 126 and 168 are divisible by 3, 7 and 6.

So option (b) is the correct answer.

75. In a library, 20% of the books are in Hindi, 20% are in English and 18% are in the French. The remaining 29400 books are in regional language. What is the total number of books in the library?

A. 60000 B. 70000

C. 25000 D. 80000

E. None of these

Ans. B

Sol. Let total books = 100

Regional language book = 100 – (20 + 20 + 18) = 42

42 → 29400

$1 \longrightarrow \frac{29400}{42}$

$100 \longrightarrow \frac{29400}{42} \times 100 = 70000$

76. The cost of 26 kg of sugar is Rs 390. The cost of 17kg of rice is Rs 544 and the cost of 42 kg of wheat is Rs 672. What is the total cost of 24 kg of sugar, 36 kg of rice and 26 kg of wheat?

A. Rs 1850 B. Rs 1928

C. Rs 1880 D. Rs 1936

E. None of these

Ans. B

Sol. Cost of 26 kg of Sugar = 390

cost of 24 kg of sugar =390*24/26= 360

Cost of 17 kg rice = 544

cost of 36 kg of rice=544*36/17 = 1152

Cost of 42 kg of wheat = 672

cost of 26 kg of wheat=672*26/42 = 416

So total cost = (360+1152+416) = 1928

77. The compound interest on ₹ 30000 at 7% per annum for a certain time is ₹ 4347. The time is

A. 2 yr
B. 2.5 yr
C. 3 yr
D. 4 yr

Ans. A

Sol. Amount = 30000 + 4347 = 34347

Compound Interest = $P\times(1 + r/100)^n$

$34347 = 30000 \times (1 + 7/100)^n$

$34347/30000 = (107/100)^n = 11449/10000$

$(107/100)^n = (107/100)^2$

Hence n = 2

78. Three years ago, the ratio of the ages of A and B was 3:5 respectively. Three years hence the ratio of their ages will be 5:7 respectively. Find the present age of B.

A. 15 years
B. 21 years
C. 18 years
D. 12 years
E. None of these

Ans. C

Sol. Let the age of A and B 3 years ago be 3x and 5x respectively.

According to question,

$$\frac{3x+6}{5x+6}=\frac{5}{7}$$

21x + 42 = 25x + 30

4x = 12

x = 3

Therefore, present age of B = 5×3 + 3 = 18 years.

Hence, option C is correct.

79. A number is decreased by 20% and then again by 20%. By what percent should the new number be increased so as to get back the original number?

A. $56\frac{1}{4}\%$
B. $49\frac{2}{5}\%$
C. $47\frac{1}{3}\%$
D. $49\frac{1}{4}\%$
E. $57\frac{1}{4}\%$

Ans. A

Sol. Let the original number be a.

Given, number is decreased by 20% and then again by 20%.

Decreased number after 20% decrease = x - 20% of x = 0.8x

Decreased number after 2nd 20% decrease = 0.8x - 20% of 0.8x = 0.64x

% by which it should be increased to get the original number

$$= \frac{x - 0.64x}{0.64x} \times 100\%$$

$$= \frac{3600}{64}\% = \frac{225}{4}\%$$

$$= 56\frac{1}{4}\%$$

80. **Direction**: What will come in place of question mark in the following questions?

250, ?, 190, 167, 148, 131,

A. 207 B. 219

C. 216 D. 227

E. 232

Ans. B

Sol. 131+17=148

148+19=167

167+23=190

So 190+29=**219**

219+31= 250

so the difference of terms are prime numbers

81. Sum of three consecutive integers is 51 . The middle one is:

A. 14 B. 15

C. 16 D. 17

Ans. D

Sol. Sum of three consecutive integers is 51 .

Let consecutive numbers be a, a+1 and a + 2

Therefore,

a + a + 1 + a + 2 = 51

⇒3a + 3 = 51

⇒a + 1 = 17

⇒a = 16

Middle number = a + 1 = 16 + 1 = 17

82. The area of a rectangular park is 180 cm^2 and the difference between the sides is 8 cm. Find the sum of the sides of the park.

A. 8 B. 56

C. 28 D. 18

Ans. B

Sol. Let the sides be a and b=a+8.

So, a*b = 180

a(a+8) = 180

and, a^2+8a-180 = 0

Solve the quadratic equation,

Hence, a= 10 cm and b= 18 cm

So, the sum of the sides of the park is 56 cm

Note:

Sum of the sides of rectangle is perimeter

83. Two numbers are in the ratio of 3:5. If 9 be subtracted from each, then they are in the ratio of 12:23. Find the numbers.

A. 15 : 28 B. 36 : 115

C. 33 : 55 D. 60 : 69

Ans. C

Sol. According to the question,

$\frac{3x-9}{5x-9}=\frac{12}{23}$ (Numbers = 3x and 5x)

$\Rightarrow 69x-207=60x-108$

$\Rightarrow 9x=207-108=99$

$\Rightarrow x=11$

∴Required numbers $\Rightarrow 3\times11$

$=33\ and\ 5\times11=55$

84. Out of the four numbers, second is twice of the first, third is twice of the second and last is sum of first, second and third numbers. If the average of these numbers is 280, find the largest number among the four.

A. 1200 B. 540

C. 560 D. 1120

E. None of these

Ans. C

Sol. Let the numbers are a, b, c and d.

Given:

b = 2a

c = 2b = 2(2a) = 4a

d = a + b + c

= a + 2a + 4a

= 7a

⇒14a/4 = 280

⇒a = 80

And d = 7a = 560

85. A person has three iron bars whose lengths are 10, 15 and 20 m respectively. He wants to cut pieces of same length from each of the three bars. What is the least number of total pieces if he is cut without any wastage?

A. 45 B. 15

C. 9 D. 30

Ans. C

Sol. Since the number of pieces required is least. Hence the length of each piece should be largest.

Hence the reqd. length of one piece.

= H.C.F. of 10, 15 and 20 m = 5 m

$\therefore$ Total number of pieces = $\frac{10}{5}+\frac{15}{5}+\frac{20}{5}$

= 2 + 3 + 4 = 9

86. 20 litres of a mixture contains 20% alcohol and the rest water. If 4 litres of water be mixed in it, the percentage of alcohol in the new mixture will be

A. $33\frac{1}{3}\%$ B. $16\frac{2}{3}\%$

C. 25% D. $12\frac{1}{2}\%$

E. None of these

Ans. B

Sol. In 20 liters of mixture, Alcohol $\Rightarrow \frac{20\times 20}{100}$ = 4 litres

Water $\Rightarrow$ 20-4= 16 liters on adding 4 liters of water, Quantity of water $\Rightarrow$ 16+4=20 liters

Quantity of mixture = 24 liters

$\therefore$ Required percent

$= \frac{4}{24}\times 100 = \frac{50}{3} = 16\frac{2}{3}\%$

87. Successive discounts of 20% and 10% are equivalent to a single discount of :

A. 28%
B. 25%
C. 30%
D. 15%

Ans. A

Sol. We have two successive discount be x% and y%, then equivalent discount

$$=\left(x+y-\frac{xy}{100}\right)\%$$

$$=\left(20+10-\frac{20\times 10}{100}\right)\%$$

$$=(30-2)\%$$

$$=28\%$$

88. **Direction:** What should come in place of question mark (?) in the following number series?

12, 7, 8, 13, ?, 68.5

A. 27
B. 19
C. 21
D. 24
E. 28

Ans. A

Sol. This series following this pattern,

×0.5+1, ×1+1, ×1.5+1, ×2+1, ×2.5+1

=13×2+1=**27**

7= 12×0.5+1

8= 7×1+1

13= 8×1.5+1

27=13×2+1------hence 27 is missing term

68.5= 27×2.5+1

89. A car goes one kilometer at 30 km per hour and then goes another kilometer at 40 km per hour. The average speed (in km/hour) of the car for 2 km is

A. 35
B. $34\frac{2}{7}$
C. $33\frac{3}{7}$
D. $33\frac{5}{7}$

Ans. B

Sol. Time taken by a car to cover 1 km at a speed of 30 km/hr = 1/30 hr

Time taken by a car to cover another 1 km at a speed of 40 km/hr = 1/40 hr

Now, total distance covered by the car = 1 + 1 = 2 km

$$\text{Total time} = \frac{1}{30} + \frac{1}{40} = \frac{7}{120}\text{hr}$$

Therefore, The average speed of the car =

$$\frac{\text{total distance}}{\text{total time}} = \frac{2}{\frac{7}{120}} = \frac{2\times120}{7} = \frac{240}{7} = 34\frac{2}{7}\text{km/hr}$$

Hence, option B is correct.

90. A tree increases annually by 1/8th of its height. By how much will it increase after 2 years, if it stands today 64 cm high?

A. 72 cm B. 74 cm

C. 75 cm D. 81 cm

Ans. D

Sol. In first year tree will increase by;

= 64 × 1/8 = 8 cm

Tree's Height at the end of I year = 64 + 8 = 72 cm

In second year tree will increase by;

= 72 × 1/8 = 9 cm

Tree's Height at the end of II year = 72 + 9 = 81 cm

Hence Option D is correct.

91. Ram and Shyam together can do a work in 8 days. Both of them began to work. After 3 days Ram fell ill. Shyam completed the remaining work in 15 days. In how many days can Ram complete the whole work?

A. 17 B. 12

C. 15 D. 13

Ans. B

Sol. Work of Ram and Shyam for

1 day = 1/8

∴ Work of Ram and Shyam for 3 days 3/8

∴ Remaining work = 1 – 3/8 = 5/8

∵ 5/ 8 work is done by Shyam in 15 days

∴ 1 work is done by Shyam

= 15 × 8/5 = 24 days.

∴ work of Shyam for 1 day = 1/24

∴ work of Ram for 1 day

= 1/8 – 1/24 = 1/ 12

Hence Ram alone will complete the work in 12 days.

92. The ages of Puja and Rani were in the ratio 3 : 2 a year ago. Five year hence, the ratio of their ages become 7 : 5. Find the present age of Rani

A. 37 B. 28

C. 25 D. 32

E. 27

Ans. C

Sol. Let the present ages of Puja and Rani be 'a' and 'b'.

Given, ages of Puja and Rani were in the ratio 3 : 2 a year ago.

$$\therefore \frac{a-1}{b-1} = \frac{3}{2}$$

⇒2a – 2 = 3b – 3

⇒a = 1.5b – 0.5

Also, five year hence, the ratio of their ages become 7 : 5.

$$\therefore \frac{a+5}{b+5} = \frac{7}{5}$$

⇒5a + 25 = 7b + 35

⇒7.5b – 2.5 + 25 = 7b + 35

⇒0.5b = 12.5

⇒b = 25

∴Present age of rani = 25 years

93. When a number is divided by 24, the remainder is 16. The remainder when the same number is divided by 12 is

A. 3 B. 4

C. 6 D. 8

Ans. B

Sol. the number is of form

N = 24Q + 16

on dividing by 12

N/12 = 2Q + (16/12)

=2Q + 1 + (4/12)

Thus the remainder is 4

OR

Required remainder = 16 – 12 = 4 because 24 is the multiple of 12

Hence Option B is correct.

94. **Direction:** What approximate value should come in place of the question mark (?) in the following equation (Note: You are not expected to calculate the exact value)?

$9980 \div 49 \times (4.9)^2 - 1130 = ?$

A. 3870 B. 4500

C. 2600 D. 3000

E. 4080

Ans. A

Sol. Approximate value be calculated as

$9980 \div 49 \times (4.9)^2 - 1130 = ?$

$?\approx 10000 \div 50 \times 25 - 1130$

$= 200 \times 25 - 1130 = 3870$

95. Two numbers, when divided by 17, leave remainders 13 and 11 respectively. If the sum of those two numbers is divided by 17, the remainder will be

A. 13 B. 11

C. 7 D. 4

Ans. C

Sol. Let the first Quotient be x

Therefore;

First number = 17x + 13

Let the second quotient be y

Therefore; Second number = 17y + 11

Sum of two numbers = 17x + 13 + 17y + 11 = 17(x+y)+24

On dividing the sum by 17 we get;

$$\frac{17(x+y)}{17} + \frac{24}{17}$$

Therefore; the remainder will be obtained by 24/17 only i.e., 7

Hence Option C is correct

96. Simplify:

$$\frac{2\times\left(2^7-2^5\right)}{2^3} + \frac{\left(2^3+2^5\right)}{2^2}$$

A. 34 B. $2^6 - 2$

C. $2^6 - 2^2$ D. 60

Ans. A

Sol. $$\frac{2\times\left(2^7-2^5\right)}{2^3} + \frac{\left(2^3+2^5\right)}{2^2}$$

$= 2*2^2(3) + 2(5)$

$= 24 + 10$

$= \mathbf{34}$

97. If monthly salary of A is 20% more than the salary of B. Salary of B is 30% more than salary of C. if their total salary per month is Rs. 34740, then the salary of C is

A. Rs. 5000
B. Rs. 9000
C. Rs. 2500
D. Rs. 3500

Ans. B

Sol. Let the monthly salary of C be 100x

then monthly salay of B=130x

Monthly salary of A= 120% of 130x=156x

Total salary of A, B and C= 34740

100x+130x+156x=34740

x=90

Hence salary of C=100*90= 9000

98. **Direction:** What will come in place of the question mark (?) in the following question?

(23 × 8) – (13 × 5) + 67 = ? x 6

A. 21
B. 31
C. 41
D. 33
E. None of these

Ans. B

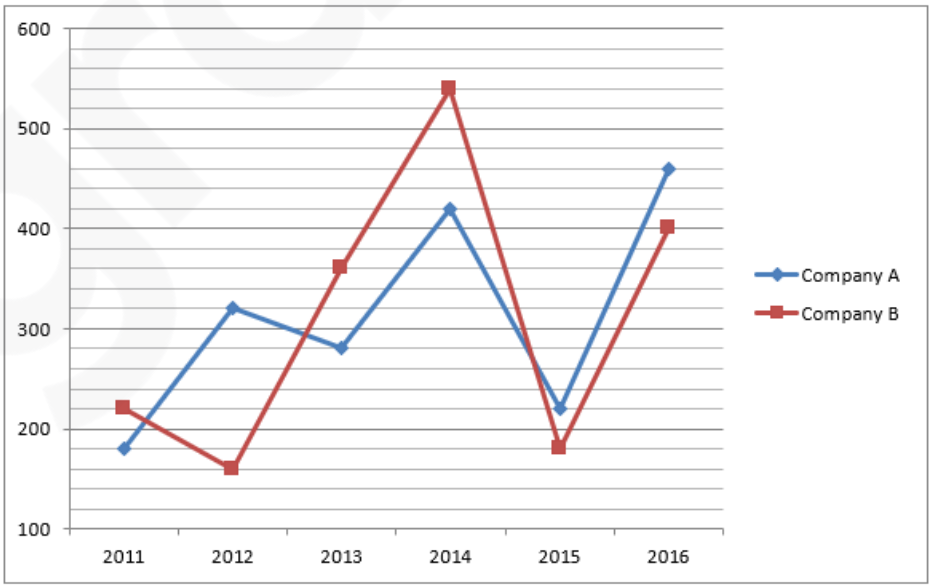
Sol. 184 – 65 + 67 = ? × 6

>186 = ? × 6

=>? = 186/6 = **31**

99. **Direction:** Refer the graph and answer the given questions.

The following line graph shows the number of products sold by company A and B during six years.



What is the difference between the total number of products sold by A and B together in 2013 to the total number of products sold in these two companies in 2016?

A. 240 B. 220

C. 180 D. 200

E. 270

Ans. B

Sol. Total products sold by A and B in 2013=280+360=640

Total products sold by A and B in 2016=460+400=860

Difference=860-640=220

Hence, option B.

100. The ratio of two numbers is 3 : 4 and their HCF is 4. Their LCM is

A. 12 B. 16

C. 24 D. 48

Ans. D

Sol. Let the numbers are 3x and 4x

then their HCF = x

But HCF = 4

$\therefore$ First number = 12

and Second number = 16

$\therefore$ LCM * HCF = 12*16

LCM * 4 = 12*16

LCM = 48

101. Young's modulus of elasticity and Poisson's ratio of a material are 2×10^5MPa and 0.34 respectively. The modulus of rigidity of the material is:

A. 0.4025×10^5 Mpa B. 0.4664×10^5 Mpa

C. 0.8375×10^5 MPa D. 0.7462×10^5 MPa

Ans. D

Sol. Relation between young's Modulus (E) and Modulus of rigidity (G) is given by:

$E = 2G(1+\mu)$

$E= 2 \times 10^5$ MPa

Poisson ratio (μ) = 0.34

$2 \times 10^5 = 2G(1 + 0.34)$

$G = 0.7462 \times 10^5$ MPa

102. In a simple gear train, if the number idler gear is odd. Then the direction of motion of driven gear will

A. be same as that of the driving gear.

B. Opposite to the driving gear.

C. depends upon the number of teeth on the driving gear

D. depends upon the total number of teeth on all gears of the train.

Ans. A

Sol. If the number of idler gears are odd then the direction of motion of driven and driver gear will be same whereas if the number of idler gears are even then the direction of motion of driven and driver will be opposite to each other

103. What is the S.I. unit of sectional modulus?

A. m^2 B. m

C. m^3 D. m^4

Ans. C

Sol. Section modulus is given by:

$$Z = \frac{I}{y}$$

Where Unit of I is m^4 and y is m.

Thus, SI unit of section modulus is m^3.

104. After a test on four cylinder, two stroke gasoline engine following observations were made:

Area of the positive loop of the indicator diagram = 5.75 cm^2

Area of negative loop of the indicator diagram = 0.25 cm^2

Length of indicator diagram = 55 cm

Spring constant = 3.5 bar/cm

What will be the indicated mean effective pressure (in bar) of the engine?

A. 0.35 B. 5.5

C. 3.5 D. 4.2

Ans. C

Sol. Given,

Area of the positive loop of the indicator diagram = 5.75 cm^2

Area of negative loop of the indicator diagram = 0.25 cm^2

Net area of diagram = 5.75 - 0.25 = 5.5cm^2

$$P_{imep} = \frac{\text{Area of diagram}}{\text{length of diagram}} \times \text{spring constant}$$

$$P_{imep} = \frac{5.5}{55} \times 3.5$$

$$P_{imep} = 0.35 \text{ bar}$$

105.

Find the cost time slope from the below data:	Cost (in Rs. /-)	Time (in days)
Normal	6000	10
Crashing	16000	6

A. 2500 B. 600

C. 1000 D. 2000

Ans. A

Sol. Cost time slope = ΔC/ΔT

$$\text{Cost time slope} = \frac{\text{Crash cost} - \text{Normal cost}}{\text{Normal time} - \text{crash time}}$$

$$\text{Cost time slope} = \frac{16000-6000}{10-6} = \frac{10000}{4} = 2500$$

Cost time slope = 2500 Rs/day

106. The velocity distribution in a turbulent boundary layer is given by $u/U = (y/\delta)^{1/6}$. The displacement thickness δ^*

A. δ/6 B. δ/7

C. 5δ/6 D. None of these

Ans. C

Sol. $$\delta^* = \int \left(1 - \frac{u}{U}\right) dy = \int_0^{\delta} \left(1 - \left(\frac{y}{\delta}\right)^{\frac{1}{6}}\right) dy$$

$$\delta^* = \delta - \frac{6}{7\delta^{\frac{1}{6}}} \delta^{\frac{7}{6}}$$

$$\delta^* = \frac{\delta}{7}$$

107. It is given that the actual demand is 59 units; a previous forecast 64 units and smoothing factor 0.3. What will be the forecast for next period, using exponential smoothing?

A. 36.9 units B. 57.5 units

C. 60.5 units D. 62.5 units

Ans. D

Sol. In exponential smoothing method, the forecast for time period t is related to the demand for the previous period D_{t-1} and forecast of previous period F_{t-1} using smoothing constant α as:

Forecast for next period is given by:

$$F_t = F_{t-1} + \alpha\left(D_{t-1} - F_{t-1}\right)$$

$F_t = 64+0.3(59-64) = 62.5$

108. An impulse turbine with a diameter of 1.4 m runs at 120 rpm. If the blade speed ratio is 0.5, then the inlet velocity of steam will be

A. 8.8 m/s B. 17.6 m/s

C. 4.4 m/s D. None of these

Ans. B

Sol. given,

D= 1.4m, N = 120RPM

speed ratio = 0.5

$$u = \frac{\pi DN}{60} = \frac{\pi \times 1.4 \times 120}{60} = 8.8 \text{ m/s}$$

$$k_u = 0.5 = \frac{u}{V} \Rightarrow 0.5 = \frac{8.8}{V}$$

V = 17.6 m/s

109. Specific gravity of stone weighing 500N in air and 200N in water when fully submerged is

A. 0.1666 B. 1.666

C. 0.666 D. 6. 666

Ans. B

Sol. Given,

Weight of stone in air = 500N,

Weight if stone in water = 200N

Weight of water displaced=Weight of stone in air – Weight of stone in water

=300 N

Volume of water displaced = Volume of stone = $\frac{300}{9.8 \times 1000}$ = 0.03061 m^3

Density of stone= mass/volume= $\frac{500}{9.8 \times 0.03061}$ =1666.66 kg/m^3

specific gravity= Density of stone/Density of water=1.666

110. NC code G04 is for _____.

A. CW circular interpolation B. CCW circular interpolation

C. Dwell D. spindle speed

Ans. C

Sol. Important NC G-codes:

- Rapid traverse: G00
- Linear interpolation: G01
- CW circular interpolation →G02
- CCW circular interpolation →G03
- Dwell →G04
- Spindle speed →G97

111. In general, the PERT deals with the project of _____.

A. repetitive nature B. non-repetitive nature

C. deterministic nature D. probabilistic nature

Ans. D

Sol.

- The PERT is used when activity time estimates are stochastic in nature.
- For each activity, three values of time are estimated and represented in β-distribution.
- Thus, the technique is useful for all projects that have an uncertainty in the estimation of duration, as is the case with new types of projects.

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

A. Superheater
B. Economizer
C. Feed check valve
D. Blow down cock

Ans. C

Sol. mountings are those device without which the plant will not work.
accessories are those which increase the efficiency of the plant
hear, Feed check valve fitting is a boiler mounting whereas others are accessories.

113. Thermodynamic relation for the isothermal compressibility is

A. $-\frac{1}{V}\left(\frac{dV}{dP}\right)_T$
B. $-V\left(\frac{dP}{dV}\right)_T$
C. $-P\left(\frac{dV}{dP}\right)_T$
D. $\frac{1}{P}\left(\frac{dV}{dP}\right)_T$

Ans. A

Sol. We know that, bulk modulus $(B.M.) = \frac{\text{direct strain}}{\text{volumetric strain}}$

$$\Rightarrow B.M. = \frac{dP}{-\left(\frac{dV}{V}\right)}$$

Also we know that,

$$\text{compressibility } k = \frac{1}{B.M.} = -\frac{1}{V}\left(\frac{dV}{dP}\right)$$

Then isothermal compressibility (i.e. compressibility at constant temperature) is

$$k_T = -\frac{1}{V}\left(\frac{dV}{dP}\right)_T$$

114. In a counter flow heat exchanger the ratio of masses of the hot and cold fluid is 2:1 and their ratio of specific heat is 1:3 respectively. Hot fluid enters at 80 °C and leaves the heat exchanger at 50 °C. Cold fluid enter at 40 °C and exit at some temperature. Find the exit temperature (in degree celcius) of the cold fluid.

A. 55
B. 60
C. 75
D. 36

Ans. B

Sol. $\frac{\dot{m}_{hot}}{\dot{m}_{cold}} = \frac{2}{1}$ and $\frac{Cp_{hot}}{Cp_{cold}} = \frac{1}{3}$

Energy balance equation

$\dot{m}_{hot}Cp_{hot}\left(T_{hi} - T_{ho}\right) = \dot{m}_{cold}Cp_{cold}\left(T_{ci} - T_{co}\right)$

$\frac{\dot{m}_{hot}Cp_{hot}}{\dot{m}_{cold}Cp_{cold}}\left(T_{hi} - T_{ho}\right) = \left(T_{ce} - T_{co}\right)$

$\frac{2}{1} \times \frac{1}{3} \times \left(80 - 50\right) = \left(T_{ce} - 40\right)$

T_{co} = 60°C

115. The process in which the material removal rate is governed by Faraday law is:

A. ECM
B. EDM
C. Abrasive jet machining
D. Laser beam welding

Ans. A

Sol. **Electrochemical Machining (ECM):**

It a machining process in which electrochemical process (ionic dissolution) is used to remove material from the workpiece.

Mass of metal removal ∝ q(charge)

Gram equivalent (w) ∝ It

w = Z It

where:

Z = electrochemical equivalent

$Z = \frac{e}{F} = \frac{\text{Chemical equivalent}}{\text{Faraday constant}}$

F = 96500 s-A/mol

116. Which of the following casting should be used to produce hollow castings with thin walls?

A. Investment casting
B. Centrifugal casting
C. Slush casting
D. Vacuum casting

Ans. C

Sol. **Slush Casting:**

- Slush casting is a variation of permanent mold casting that is used to produce hollow parts with thin walls.
- It is used mainly to manufacture toys and parts that are ornamental in nature, such as lamp bases and statues.

117. Grinding wheel is specified as "A 46 K 10 V 27". Type of wheel will be _____.

A. Hard
B. Soft
C. Medium
D. Can't say

Ans. C

Sol. Specification of Grinding Wheel:

Position 0	Position 1	Position 2	Position 3	Position 4	Position 5	Position 6
Manufacturer's code (optional)	Type of abrasive grain	Grain size	Grade	structure	Type of bond	Manufacturer's own mark (optional)

Given Specification: "A 46 K 10 V 27"

Here, A = Aluminium oxide abrasive grain

Grade: A to H: Soft wheels, I to P medium Wheels, Q to Z hard wheels.

Here, K represents the hardness of the wheel, notation I-P fall under medium.

118. A uniformly distributed load W (in KN/m) is acting over the entire length of a 2 m long cantilever beam. If the shear force at the midpoint of cantilever is 5 KN. What is the value of W?

A. 2 B. 3

C. 4 D. 5

Ans. D

Sol. Shear force at midpoint of cantilever:

$Wl/2 = 5$

$W \times (2/2) = 5$

$W = 5$

119. A steel rod of circular cross-section is to carry a tensile load P = 150 kN. The allowable working stress in shear for the rod is $\tau_{allowable}$ = 55 MPA. The required diameter for the rod is

A. 2.08 cm B. 4.17 cm

C. 8.34 cm D. 16.68 cm

Ans. B

Sol. $\sigma_{allowable} = 2 \times \tau_{allowable}$

$\sigma_{allowable} = 2 \times 55 = 110$ MPa

$$\frac{P}{A} \leq \sigma_{allowable}$$

$$\frac{150 \times 10^3 \times 4}{\pi d^2} \leq 110$$

$d \leq 41.67$ mm

$d \leq 4.17$ cm

120. For a reversible power cycle, the operating temperature limits are 800K and 300K. 400kJ of heat is supplied to this cycle from high temperature source.The unavailable work will be.

A. 250 kJ
B. 150 kJ
C. 120 kJ
D. 100 kJ

Ans. B

Sol. Given,

T_H = 800K, T_L = 300K

$$\eta = 1 - \frac{T_L}{T_H} = 1 - \frac{300}{800}$$

$$\eta = \frac{5}{8}$$

$$\eta = \frac{W_{net}}{\text{Heat supplied}} \Rightarrow \frac{5}{8} = \frac{W_{net}}{400}$$

W_{net} = 250 kJ

unavailable energy = heat supplied - work output

unavailable energy = 400- 250

unavailable energy = 150kJ

121 Taylor's tool life equation is given by $VT^n = C$. In this relation, the value of n is not dependent on:

A. Work material
B. Working conditions
C. Tool material
D. Type of chip produced

Ans. D

Sol.

- Taylor's Tool life equation: $VT^n = C$
- The values of both 'n' and 'C' depend mainly upon the tool-work materials and the cutting environment (cutting fluid application).

122. For shaping machine which of the following mechanism is used for obtaining the feed by the work piece (during return stroke) _____.

A. Whitworth quick return mechanism
B. Ratchet pawl mechanism
C. Scotch yoke mechanism
D. None of these

Ans. B

Sol.

- During return stroke there is no cutting of material hence, Ratchet pawl mechanism used for providing feed to the work piece.
- Feed is given at the end of return stroke.
- Cross feed is given by hand or automatic means.

123. When the relation FC = a.r + b is satisfied for a spring controlled governor as the relation between controlling force (FC) and radius of rotation (r). This type of governor is known as _____.

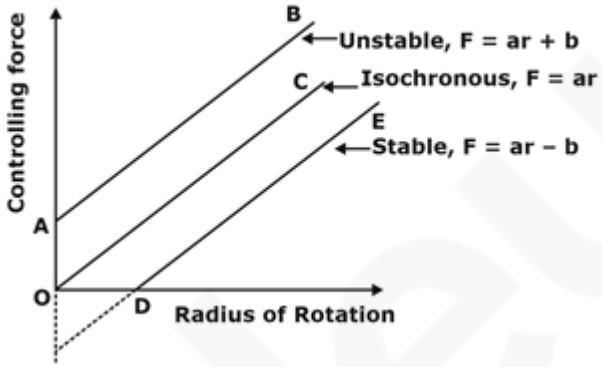
A. stable
B. unstable
C. isochronous
D. hunt

Ans. B

Sol. When the relation F_c = a.r + b is satisfied for a spring controlled governor.

This type of governor is known as unstable

For stable F_c=ar-b, For isochronous F_c=ar



124. The cyclic integral of (δQ – δW) for a process is

A. positive
B. negative
C. zero
D. unpredictable

Ans. D

Sol. For a cycle $\oint (dQ - dW) = 0$

for a process

$\oint (dQ - dW) = \Delta E$

125. A ton of refrigeration is equivalent to

A. 3.5 kJ/min
B. 3.5 kW/hr
C. 210 kJ/min
D. 210 kJ/sec

Ans. C

Sol. Capacity of refrigeration unit is generally defined in ton of refrigeration.

A ton of refrigeration is defined as "the quantity of heat to be removed in order to form one ton (1000 kg) of ice at 0 °C in 24 hrs, from liquid water at 0 °C.

This is equivalent to

3.5 kJ/s or (3.5 kW) or 210 kJ/min.

126. The diesel engine and Otto engine has same compression ratio r. The cut-off ratio of diesel engine is S. The air-std efficiency of these cycles will be equal when

A. $s^\gamma - \gamma(s-1) + \gamma = 0$ B. $s^\gamma - \gamma(s-1) + 1 = 0$

C. $s^\gamma - \gamma(s-1) - 1 = 0$ D. $s^\gamma - (s-1) - \gamma = 0$

Ans. C

Sol. $\eta_{Otto} = \eta_{Diesel}$

$$1 - \frac{1}{r^{\gamma-1}} = 1 - \frac{(S^\gamma - 1)}{\gamma r^{\gamma-1}(S-1)}$$

$s^\gamma - 1 = \gamma(s - 1)$

$s^\gamma - 1 - \gamma(s - 1) = 0$

127. In a machine shop, pins of 15 mm diameter are produced at a rate of 900 per month and the same is consumed at a rate of 400 per month. The production and consumption continue simultaneously till the maximum inventory is reached. Then inventory is allowed to reduce to zero due to consumption. The lot size of production is 800. If backlog is not allowed, the maximum inventory level is _____.

A. 445 B. 500

C. 545 D. 700

Ans. A

Sol. Production rate (p) =900/month

demand rate (d)=400/month

Economic order quantity (Q)=800

Maximum inventory $(M) = \left(1 - \frac{d}{p}\right)Q$

$$M = \left(1 - \frac{400}{900}\right) \times 800$$

M= 444.44

128. At a self service store, a cashier can serve a customer in 30 seconds. On an average 15 customers arrive every 10 minute. If the inter arrival pattern is as per exponential distribution and also service pattern as per exponential distribution, the probability that the cashier would be idle is _____.

A. 0.75 B. 0

C. 0.25 D. 0.5

Ans. C

Sol. Customer arrival rate: $(\lambda) = \frac{15}{10} / \text{min} = \frac{15 \times 60}{10} / \text{hour}$

λ = 90/hour

Service rate $(\mu) = \frac{1}{30}$ / seconds $= \frac{3600}{30}$ / hour

μ = 120 /hour

Probability the cashier will be working $(\rho) = \frac{90}{120} = 0.75$

Probability the cashier will be idle = 1-0.75=0.25

129. While working between temperatures 550 K and 300 K, the entropy change experienced by the Carnot engine during heat addition is 1 kJ/K, the efficiency of Carnot engine is _____.

A. 100 B. 150

C. 300 D. 250

Ans. D

Sol. T_L = 300K, T_H = 550K

ΔS = 1kJ/K

$Q_H = T_H \Delta S = 550 \times 1 = 550$ kJ

$Q_L = T_L \Delta S = 300 \times 1 = 300$ kJ

$W_{net} = Q_H - Q_L = 550 - 300 = 250$ kJ

130. In an assembly line, when the work station times are unequal, the overall production rate of an assembly line is determined by the:

A. Average of all station time

B. Fastest station time

C. Slowest station time

D. Average of slowest and fastest station times

Ans. C

Sol. Whenever the workstation times are unequal, the overall production rate of an assembly line is determined by the slowest station time.

131. Wall thickness of a cylindrical shell of 800 mm internal diameter and 2m long is 10 mm .If the shell is subjected to an internal pressure of 1 .5 Mpa. Find the maximum intensity of shear stress induced in Mpa. Consider the cylindrical shell to be thin cylinder and circumferential stress remains constant along the wall thickness.

A. 30 B. 33

C. 43 D. 20

Ans. A

Sol. As the cylinder is thin cylinder. so maximum shear stress is given by

$$\tau_{mx} = \frac{Pd}{4t}$$

$$\tau_{mx} = \frac{1.5 \times 800}{4 \times 10} = 30 \text{ Mpa}$$

132. If the diameter of the hole is subject to considerable variation, then for locating in jigs and fixtures, the pressure type of locator used is _____.

A. conical locator
B. cylindrical locator
C. diamond pin locator
D. Vee locator

Ans. A

Sol.

- Conical locator is used for locating the workpieces having cylindrical hole in the workpiece.
- A conical locator is considered as superior as it has a capacity to accommodate a slight variation in the hole diameter of the component without affecting the accuracy of location.

133. An example of a water tube boiler is a:

A. Locomotive boiler
B. Lancashire boiler
C. Babcock-Wilcox boiler
D. Cochran boiler

Ans. C

Sol. If water passes through the tubes and hot gases surround the tubes, then it is called a water tube boiler. Eg. Babcock and Wilcox boiler.

134. During a thermodynamic process, 84 kJ of heat flows into the system and the work done by the system is 32 kJ. The increase in thermal energy of the system is.

A. +52 kJ
B. −52 kJ
C. +116 kJ
D. −116 kJ

Ans. A

Sol. From first law of thermodynamics

dQ = du + dw

84 = du + 32

du = 52 kJ

135. If a heat engine produces work without the consumption of energy, then what kind of machine is this?

A. Perpetual motion machine of first kind (PMM1)
B. Perpetual motion machine of second kind (PMM2)
C. Perpetual motion machine of third kind (PMM3)
D. None of these

Ans. A

Sol. this kind of device is impossible.PMM1 is a hypothetical engine which develops work without receiving the heat energy.

It violates first and second law of thermodynamics.

136. In investment casting which material is used for making patterns_____?

A. Expanded polystyrene
B. urethanes
C. wax
D. rubber

Ans. C

Sol.

- Investment casting is a manufacturing process in which a wax pattern is coated with a refractory ceramic material.
- Once the ceramic material is hardened its internal geometry takes the shape of the casting and wax is melted out. Now molten metal is poured into the cavity, where wax pattern existed, and it solidifies within the ceramic mold.

137. Heat is conducted through a 10 cm thick wall. Thermal conductivity of the wall is 0.3 W/mk when the temperature difference across the wall is 20°C, what is the rate of heat conducted through wall per m^2 ?

A. 30 W/ m^2 B. 26.5 W/ m^2

C. 40 W/ m^2 D. 60 W/ m^2

Ans. D

Sol. Given,

kwall = 0.3W/m-K

ΔT = 20°C, b = 10cm = 0.1m

$$Q = kA\frac{\Delta T}{v} \Rightarrow k\frac{\Delta T}{b}$$

$$q = 0.3 \times \frac{20}{0.1} = 60\ W/m^2$$

138. When path of approach and path of recess are of half of their maximum possible values, then arc of contact will be

A. {(R + r) sin θ}/2 B. {(R + r) tan θ}/2

C. (R + r) sin θ D. (R + r) tan θ

Ans. B

Sol. Maximum value of path of contact = R sin θ + r sin θ

Actual value of path of contact = (R sin θ + r sin θ)/2

= (R sin θ + r sin θ)/2cosθ

Arc of contact = (Actual value of path of contact)/ cos θ

Arc of contact = {(R + r) tan θ}/2

139. What is Gibbs phase rule for metallurgical system?

A. P+F = C – 1 B. P+F = C + 1

C. P + F = C – 2 D. P + F = C + 2

Ans. B

Sol. Since Gibbs Phase rule:

P+F = C + 2

But, in metallurgy systems, pressure is constant. Thus,

Gibbs phase rule for metallurgical systems: P+F = C + 1 .

140. A single V-groove weld loaded by the tensile force of 50kN. The length of the weld is 40mm long, having average normal stress 90MPa. For compressive loading, the weld throat is _____.

A. 0.1 mm
B. 1.4 mm
C. 0.0138 mm
D. 2.12 mm

Ans. C

Sol. Given : F = 50kN

L = 40 mm

σ = 90MPa

Weld Throat is given by: $\sigma = \frac{F}{hl}$

$90\times10^6 = \frac{50\times10^3}{h\times0.04}$

h = 0.0138 mm

141. A cylindrical member of cross sectional area 450mm^2 and length 250mm is cooled by 15℃ is restricted at all of its ends. The material of construction is Steel of Elastic Modulus 200GPa and coefficient of thermal expansion is 12.5×10^{-6}/℃. The stress (in MPa) experienced by the member is_____.

A. 20.0
B. 22.5
C. 37.5
D. 40.0

Ans. C

Sol. Thermal Stress is given by:

$\sigma_{th} = \alpha.\Delta T.E$

$\sigma_{th} = 12.5\times10^{-6}\times(15)\times200\times10^9$

σ_{th} = 37.5MPa (Tensile in nature)

142. A rectangular bar made of steel is 2m long and 12mm thick. The rod is subjected to an axial tensile load of 50kN. The width of the rod varies from 70mm at one end to 30mm at other end. Find the extension of rod if E= 2×10^5 N/ mm^2.

A. 0.84mm
B. 0.88mm
C. 0.91mm
D. 0.94mm

Ans. B

Sol. Given:

Width at bigger end (a) = 70mm

Width at smaller end(b) =30mm

Length(L) =2000mm

Axial load(P) = 50kN= 50000N

Thickness (t) = 12mm

This is case of uniformly tapering rectangular bar

Let dL be the extension in the rod

$$\Delta L = \frac{pL}{Et(a-b)}\ln\frac{a}{b} = \frac{50000\times 2000}{2\times 10^5\times 12(70-30)}\ln\frac{70}{30}$$

ΔL= 0.88mm

143. Gas turbine works on:

A. Brayton cycle
B. Carnot cycle
C. Rankine cycle
D. Erricsson cycle

Ans. A

Sol. Gas Turbine works on principle of Brayton cycle.

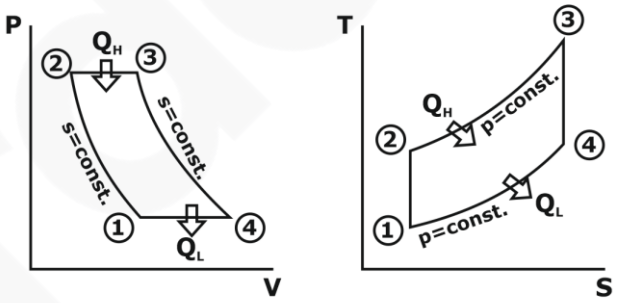
Ideal Brayton cycle:

1. isentropic compression process – ambient air is drawn into the compressor, where it is pressurized.

2. isobaric heat addition process – the compressed air then runs through a combustion chamber, where fuel is burned, heating that air—a constant-pressure process, since the chamber is open to flow in and out.

3. isentropic expansion process – the heated, pressurized air then gives up its energy, expanding through a turbine (or series of turbines). Some of the work extracted by the turbine is used to drive the compressor.

4. isobaric heat rejection process – heat rejection (in the atmosphere).



144. Calculate the required punching force if punching is done on a sheet 6.5mm thickness & round hole of radius 1cm, if the yield strength in shear is 240MPa.

A. 88 kN
B. 98 kN
C. 89 kN
D. 78 kN

Ans. B

Sol. Given,

r = 1cm =10mm,

t = 6.5mm

S_{su} = 240MPa

$F = S_{su}\pi dt = S_{su}2\pi rt$

$F = 240\times2\pi\times10\times6.5$

F = 98,020N = 98.0kN *Ans.*

145. In an orthogonal cutting, operation, uncut chip thickness= 0.32mm, shear plane angle (ϕ)= 30 ° , shear velocity= 2.2 m/s . Then, the strain rate is _____.

A. 1437.5 s^{-1} B. 2875 s^{-1}

C. 3437 s^{-1} D. 4837.5 s^{-1}

Ans. C

Sol. Shear strain rate

$$\dot{\gamma} = \frac{\text{Shear velocity } (V_s)}{\text{Thickness of shear zone } (t_s)}$$

$$\text{Strain rate} = \frac{V_s}{\frac{t_i}{\sin\phi}}$$

$$\text{Strain rate} = \frac{2.2}{\frac{0.32\times10^{-3}}{\sin30^\circ}} = 3437.5\ s^{-1}$$

146. The usual ratio of return and forward stroke in shaper is _____.

A. 2 : 1 B. 1 : 2

C. 2 : 3 D. 3 : 2

Ans. C

Sol.

- Shaper works on quick return mechanism which means return stroke is faster than forward stroke.
- It is also termed as quick return ratio (R).
- $R = \frac{\text{time of return stroke}}{\text{time of forward stroke}}$. It is usually taken in the 2:3 ratio.

147. A 100 gram bullet is fired from 2kg shot gun with a velocity of 300 m/s. The magnitude of recoil velocity of gun is

A. 10 m/s B. -10 m/s

C. 15 m/s D. -15 m/s

Ans. C

Sol. given ,

mass of bullet,m_1 = 100gm, mass of gun,m_2= 2kg

velocity of bullet = 300m/s

magnitude of recoil velocity of gun is V_2

$$V_2 = \frac{m_1}{m_2} v_1 \Rightarrow \frac{0.1}{2} \times 300$$

V_2 = 15 m/s

148. Which of the given statements are incorrect for the radiation?

(i) Radiation is the transfer of heat by electromagnetic waves

(ii) Thermal radiation takes place at after a certain temperature for every body

(iii) Radiation needs some medium to travel

(iv) Maximum value of absorptivity is 0.5

A. i and iii

B. i,ii and iii

C. ii, iii, and iv

D. all of the above

Ans. C

Sol. Radiation needs NO medium to travel. Thermal radiation is emitted by everybody at a temperature above 0 K. Maximum value of absorptivity is 1.

149. The solder in soldering process is _____.

A. a filler metal used

B. a joining metal that is to be joined

C. the flux used

D. the soldering iron used to heat the joining metals

Ans. A

Sol.

- The filler metal used to fill the gap between joining pieces is called solder.
- Solder is usually made up of a Tin (Sn)- Copper (Cu) alloy.

150. The rise or depression of liquid in a tube due to surface tension with increase in size of tube will

A. increase

B. remain unaffected

C. may increase or decrease depending on the characteristics of liquid

D. decrease

Ans. D

Sol. capillary rise or depression is given by

$$h = \frac{4\sigma \cos\theta}{\rho g d}$$

$$h \propto \frac{1}{d}$$

thus, With an increase in size of tube, the rise or depression of liquid in the tube due to surface tension will Decrease.

151. Number of independent elastic constants for homogenous, isotropic material is _____.

A. 9 B. 3

C. 2 D. 21

Ans. C

Sol. Number of independent elastic constants for homogenous, isotropic material is 2.

152. What is the full form of the term ADP employed in air conditioning?

A. Apparatus dew point B. Adiabatic dew point

C. Ambient design point D. Air conditioning design point

Ans. A

Sol. ADP means Apparatus dew point temperature.

ADP is the effective surface temperature of the cooling coil.

153. The torque exerted on the crank-shaft of a two-stroke engine is T = 10000 + 2000 sin 2θ + 1000 cos 2θ N-m (where x is angular displacement). Mass moment of inertia of flywheel is 200 kg-m^2. If the resisting torque is constant, Determine angular acceleration of the flywheel when crank angle is 30°.

A. 8.18 rad/s^2 B. 11.16 rad/s^2

C. 15.36 rad/s^2 D. 19.52 rad/s^2

Ans. B

Sol. times period of given T - θ diagram = π

$$T_{mean} = \frac{1}{\pi}\int_0^{\pi} 10000 + 2000\sin 2\theta + 1000\cos 2\theta.d\theta$$

T_{mean} = 10000 N-m

$(T - T_{mean})_{\theta=30^o} = I\ \alpha$

2000 sin 60° + 1000 cos 60° = 200 α

α = 11.16 rad/ s^2

154. Vehicle manufacturing assembly line is an example of _____.

A. product layout B. process layout

C. manual layout D. fixed layout

Ans. A

Sol.

- In product layout the required tools and supplies are located at each section of the assembly line, based on where the product is in production.
- This is common in auto manufacturing where the car being made is moved down the line and stops at stations where different things are assembled.

155. The number of instantaneous centre of a mechanism is 28. What will be the degree of freedom of the mechanism if one of the link is fixed and assuming there is 5 lower pair and 2 higher pair.

A. 8 B. 9

C. 6 D. 2

Ans. B

Sol. Number if I centre $\frac{n(n-1)}{2} = 28$

$n(n-1) = 56$

So $n = 8$

Now the degree of freedom is

$F = 3(N-1) - 2L - H$

$F = 3(8-1) - 2 \times 5 - 2$

$F = 9$

156. Which of the following is correct about progressive dies _____.

A. Cutting and forming operation are combined and carried out in single operation.

B. Two or more cutting operations can be performed in progressive dies.

C. Work-piece moves from one station to other with separate operation performed at each operation.

D. All of these

Ans. C

Sol.

- Progressive die performs two or more operations in sheet metal forming at two or more station for each press stroke and the part is made progressively.
- The sheet is fed from one station to next where different operations are performed on different stations.

157. Which of the following is not true for the Standard Vapour Compression Refrigeration System (VCRS)

A. Process 1-2: Isentropic compression of saturated vapour in compressor

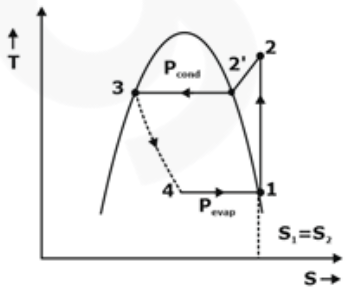
B. Process 2-3: Isobaric heat rejection in condenser

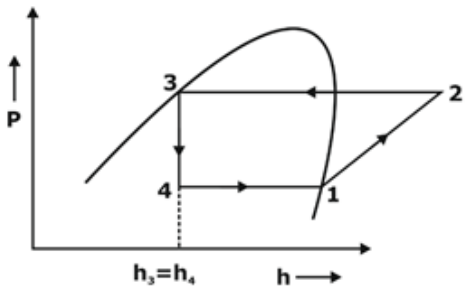
C. Process 3-4: Isenthalpic expansion of saturated liquid in expansion device

D. Process 4-1: Isothermal heat extraction in the evaporator

Ans. D

Sol.





Standard Vapour Compression Refrigeration System (VCRS)

Process 1-2: Isentropic compression of saturated vapour in compressor

Process 2-3: Isobaric heat rejection in condenser

Process 3-4: Isenthalpic expansion of saturated liquid in expansion Device

Process 4-1: Isobaric heat extraction in the evaporator.

158. In a single-channel queuing model, the customer arrival rate is 12 per hour and the waiting time in queue is 2.5 minute. The proportion of time that a server actually spends with customers is

A. 33.33% B. 50%

C. 66.67% D. 75%

Ans. B

Sol. Given, arrival rate, $\lambda = 12$ per hr

Waiting time in queue, $W_q = 2.5$ min $= 1/24$ hr

$$W_q = \frac{\rho^2}{(1-\rho)\lambda} = \frac{1}{24}$$

ρ = traffic intensity or the proportion of time that a server actually spends with customers

$$\frac{\rho^2}{(1-\rho)\times 12} = \frac{1}{24}$$

$2\rho^2 + P - 1 = 0$

$2\rho^2 + 2\rho - \rho - 1 = 0$

$\rho = -1$ (not possible)

$$\rho = \frac{1}{2} = 0.5 = 50\%$$

159. Which is not a part of petrol engine?

A. Valve mechanism B. Fuel injector

C. Induction coil D. Air filter

Ans. C

Sol. fuel injection is used in petrol engine and induction coil is not used in petrol engines

160. Effect of refrigeration can be produced by

A. By melting of a solid B. By sublimation of a solid

C. By evaporation of a liquid D. All of the above

Ans. D

Sol. Refrigeration is the science of the producing and maintaining temperature below that of the surrounding atmosphere.

Production of refrigeration:

(a) in melting of a solid, heat will be absorbed by the solid from the surroundings thus the temperature of the surrounding will decrease.

(b) By sublimation of a solid

(c) In evaporation of a liquid it will absorb the energy to reduce the temperature the surrounding.

161. The feed of a tool with nose diameter = 2 mm, is 4 mm. Find peak to valley height of the rou _____.

A. 2 mm
B. 0.5 mm
C. 1 mm
D. 8 mm

Ans. A

Sol. Since maximum roughness height is given by:

$$h_{max} = \frac{f^2}{8R}$$

where R is tool radius.

f is feed of the tool.

Here, f=4mm, R=2/2 =1 mm

Therefore, $h_{max} = \frac{4^2}{8 \times 1} = 2mm$

Hence, peak to valley height is 2 mm.

162. In a three stage compressor, if the pressure at the entry of first and third stage are 1 bar and 16 bar, then the delivery pressure at the third stage will be

A. 1 bar
B. 16 bar
C. 64 bar
D. 256 bar

Ans. C

Sol. Given,

P_1 = 1bar , P_3 = 16bar

P_4 = ?

In a multi stage compressor

$$\frac{P_2}{P_1} = \frac{P_3}{P_2} = \frac{P_4}{P_3}$$

$$\text{So, taking } \frac{P_2}{P_1} = \frac{P_3}{P_2}$$

$(P_2)^2 = 1 \times 16$

$P_2 = 4$

Now taking $\frac{P_3}{P_2} = \frac{P_4}{P_3}$

$P_4 = \frac{(P_3)^2}{P_2}$

$P_4 = \frac{256}{4} = 64$ bar

Hence, the correct answer is option (C).

163. A rigid wheel 1.5m in diameter is to be provided with a thin steel tyre. The minimum diameter(m) of the tyre, if the stress in tyre is not to exceed 140 MN/m^2 is? Take E of the tyre material as 200 GN/m^2.

A. 1.19 B. 1.49

C. 1.99 D. 2.5

Ans. B

Sol. Let the diameter of rigid wheel and least diameter if steel tyre be D and d respectively,

Strain in tyre = $\frac{\pi D - \pi d}{\pi d}$ (this is due to extension in tyre as it covers wheel)

$= \frac{D - d}{d}$

Stress in tyre, $\sigma = \frac{D - d}{d} \times E$

$\Rightarrow 140 \times 10^6 = \frac{1.5 - d}{d} \times 200 \times 10^9$

$\Rightarrow 1.0007d = 1.5$

$\Rightarrow d = 1.49m$

164. A diatomic gas undergoes an adiabatic process in which its pressure is increased by 1 % then the volume decreases by:

A. 100 % B. 0.71 %

C. 1.4% D. 50%

Ans. B

Sol. For an adiabatic process we know,

$PV^\gamma = c$

Taking log both sides we get, $\log(P) + \gamma \log(V) = \log(c)$

Differentiating both sides we get,

$\frac{dP}{P} = -\gamma \frac{dV}{V}$

We know that $\frac{dP}{P} = \frac{1}{100}$

Also for diatomic gas, $\gamma = 1.4$

So $\frac{dV}{V} = -\frac{1}{1.4} = -0.714\%$

165. Age hardening is related to _____.

A. Duralumin
B. Brass
C. Copper
D. Silver

Ans. A

Sol.

- Age hardening is a heat treatment technique mostly used to increase the yield strength of non-ferrous alloys such as aluminum, magnesium, nickel, titanium, and some steels and stainless steels.
- Duralumin is Anuminum alloy, thus age hardening is used for it.

166. A brass billet is to be extruded from its initial diameter of 100 mm to a final diameter of 50 mm. The working temperature of 700°C and the extrusion constant is 250 MPa. The force required for extrusion is.

A. 5.44 MN
B. 2.75 MN
C. 1.36 MN
D. 0.36 MN

Ans. B

Sol. Extrusion force (F) is given by:

$$F = kA_0 \ln \frac{A_0}{A_f}$$

Where:

k = extrusion constant

A_0 = original (Initial) area

Af = Final area

Thus, $F = k \times \frac{\pi}{4} d_o^2 \ln\left(\frac{d_o}{d_f}\right)^2$

$$F = 250 \times \frac{\pi}{4} \times 0.1^2 \times \ln\left(\frac{0.1}{0.05}\right)^2$$

F = 2.72 MN

167. In case of a two dimensional flow the components of velocity are given by u = ax; u = ay, the streamlines will consist of a series of

A. circular arcs
B. parabolic arcs
C. straignt line passing through origin
D. straignt line not passing through origin

Ans. C

Sol. Given,

$u = ax,\ v = ay$

stream line equation

$$\frac{dy}{dx} = \frac{v}{u} = \frac{ay}{ax} = \frac{y}{x}$$

$$\frac{dy}{y} = \frac{dx}{x} \Rightarrow \ln y = \ln x + \ln c$$

$\ln y = \ln cx$

$y = cx$

thus stream lines will be straight passing through origin

168. Work study is concerned with _____.

A. Improving present method and finding standard time

B. Motivation of workers

C. Improving production capability

D. Improving production planning and control

Ans. A

Sol.

- Work study uses techniques like method study and work measurement to understand human work potential in terms of time spend on completing a task, and looking at ways to make the task simpler and easy.
- It's purpose is to increase productivity and efficiency.

169. Arc blow occurs in _____.

A. arc welding when reverse polarity is used.

B. gas cutting

C. arc welding when straight polarity is used.

D. welding stainless steel

Ans. C

Sol. **Arc Blow:**

- Arc blow is the undesirable effect of arc stream wandering from it's intended path and it is deflected forward or backward from the direction of travel.
- It is due to magnetic fields produced into the workpiece.
- During the straight polarity arc welding, arc blow occurs.

170. Margin of safety is equal to _____.

A. Actual sales – Sales at Breakeven point

B. Actual sales + Sales at Breakeven point

C. Actual sales x Sales at Breakeven point

D. Actual sales / Sales at Breakeven point

Ans. A

Sol.

- The term margin of safety indicates the amount of sales that are above the break-even point.
- Margin of safety = Actual sales – Sales at Breakeven point

171. Which one of the following assumptions of Bernoulli's theorem is not correct?

A. Flow should be steady
B. Flow should be irrotational
C. The fluid is compressible
D. Flow should be frictionless

Ans. C

Sol. Assumption in bernoulli's equations are

(i) flow should be steady

(ii) fluid must be non viscous

(iii) fluid must be irrotational

(iv) fluid must be incompressible

172. For the following linear programming problem:

Maximize $Z = 4x_1 + 6x_2$

Subjected to constraints

$2x_1 + 3x_2 \leq 50$

$2x_1 + 5x_2 \leq 100$

$x_1 \geq 0, x_2 \geq 0$

The solution to the problem is _____.

A. Unbounded
B. Unique
C. No solution
D. Infinite

Ans. D

Sol. Slope of Objective function (Z) and are constraint is same. Therefore, solution to the problem is infinite.

173. Select the cases where the tension on a weight is 0

i. A lift is moving down with 'g' acceleration

ii. A lift is moving up with 'g' retardation

iii. A lift is moving down with 'g' acceleration

A. i and ii
B. i and iii
C. ii and iii
D. all of these

Ans. A

Sol. tension in string is given by

$T_{\text{moving downward}} = m(a - g)$

$T_{\text{moving upward}} = m(a + g)$

Tension T=0 for a weight, in two cases:

A lift is moving down with 'g' acceleration, i.e. a = g

and a lift is moving up with 'g' retardation i.e. a = -g

174. A dummy activity is used in PERT network to describe _____.

A. precedence relationship
B. necessary time delay
C. resource restriction
D. resource idleness

Ans. A

Sol.

- An activity, which is used to maintain the predefined precedence relationship only during the construction of the project network is called a dummy activity.

175. A CNC milling machine has to cut a straight slot of 20 mm width and 4 mm depth by a cutter of diameter 15 mm between points (5,5) and (20, 20). The feed rate used for milling is 30 mm/min. Milling time for the slot (in seconds) is _____?

A. 34.32
B. 42.42
C. 45.65
D. 36.54

Ans. B

Sol. Total machining length (L) = $\{(20-5)^2 + (20-5)^2\}^{1/2}$ = 21.21 mm

Feed rate (v) = 30 mm/min

$$\text{Milling time } (t_m) = \frac{L}{fN} = \frac{L}{v}$$

where: f = feed in (mm/rev)

$$t_m = \frac{21.21}{30} = 0.707 \text{ min}$$

Thus, $t_m = 60 \times 0.707 = 42.42$ seconds

176. Atmospheric pressure is 101.325 kPa. Height of water column from the mean sea level equivalent to an absolute pressure of 140 kPa is

A. 14.27 m
B. 3.94 m
C. 4.27 m
D. 13.94

Ans. B

Sol. $P_{atm} + P_{gauge} = P_{abs}$

$$101.325 + \frac{\rho g h}{1000} = 140$$

$$\frac{1000 \times 9.81 \times h}{1000} = 38.675$$

h = 3.94 m

177. In Annealing cooling is done in which of the following medium?

A. Air
B. Water
C. Oil
D. Furnace

Ans. D

Sol.

- Cooling rate is slow during annealing and hence furnace cooling is done.
- Annealing is used to impart softness on steel which increases the ductility of steel.

178. Which of the following is true forRefrigerants

A. In Room Air-Conditioner refrigerant is CHClF2 (mono-chloro – difluoro methane), also called Freon 22 or R22.

B. In the Domestic Refrigerator refrigerant is R12**,** CCl2F2 (dicholoro – difluoro methane)

C. Freons are responsible for the depletion of ozone layer by chlorine atoms in the upper atmosphere (stratosphere).

D. All of these

Ans. D

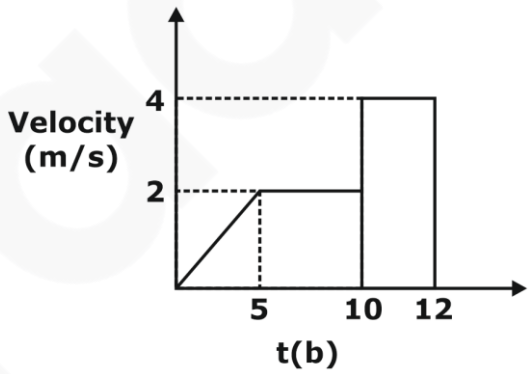
Sol. In Room Air-Conditioner refrigerant is $CHClF_2$ (mono-chloro – difluoro methane), also called Freon 22 or R-22**.**

• In the Domestic Refrigerator refrigerant is R-12, CCl_2F_2 (dicholoro – difluoro methane)

• Freons are responsible for the depletion of ozone layer by chlorine atoms in the upper atmosphere (stratosphere).

• Because of the problem of ozone layer depletion R-11, R-12, R-113, R-115 and R-502, all CFCs are being phased out.

179. Given below is the velocity-time graph of a traveling body. What is the distance traveled till time t=11 seconds?



A. 23 m B. 20 m

C. 19 m D. 21 m

Ans. C

Sol. The area of the v-t graph gives the total distance traveled by the body

so, distance traveled by the body till 11 seconds is

$$S = \frac{1}{2} \times 5 \times 2 + 2 \times (10 - 5) + 4 \times 1$$

S = 19 m

180. A medium carbon steel workpiece is turned on a lathe at 50 m/min cutting speed, 0.8 mm/rev feed and 1.5 mm depth of cut. What is the rate of metal removal?

A. 100 mm^3/min
B. 20000 mm^3/min
C. 60000 mm^3/min
D. Cannot be calculated with given data.

Ans. C

Sol. Material removal rate (MRR) in turning is given by:

MRR= f x V x d mm^3/min

where:

f = feed (in mm/rev)

V = cutting speed (in mm/min)

d = depth of cut (in mm)

Thus, MRR = $50 \times 10^3 \times 0.8 \times 1.5$

MRR = 60,000 mm^3/min

181. Morse test is carried out to determine ..... of an engine:

A. indicated power
B. frictinal power
C. brake power
D. All of the above

Ans. A

Sol. Morse test is carried out to determine indicated power of an IC engine. by calculating the indicated power we can also calculate frictional power loss.

182. Two tall buildings are 100 m apart. With what speed must a ball be thrown horizontally from the window 550 m above the ground in one building, so that it will enter a window 60 m above the ground in the other?

A. 5 m/s
B. 10 m/s
C. 20 m/s
D. 40 m/s

Ans. B

Sol. Net difference in height between the two buildings=550-60=490 m

Two equations

$u_x t=R=100$, and

$490=0.5x9.8xt^2$ = t = 10s

$u_x \times t=100$

$u_x \times 10=100$

u_x = 10m/s

Therefore, t=10 s, the speed in x direction is 10 m/s

183. A plate of thickness 0.001m, distant from a fixed plate , moves at 6cm/s and requires a shear force of 12 N/mm^2 to maintain this speed. The fluid viscosity is

A. 0.2 Poise
B. 0.1 Poise
C. 0.4 Poise
D. None of these

Ans. D

Sol. given,

shear stress, $\tau = 12N/m^2$,

velocity of the plate = 6cm/s = 0.06m/s

gap between plates = 0.0001m

$$\tau = \mu \frac{du}{dy}$$

$$12 = \mu \frac{0.06}{0.001}$$

$\mu = 0.2N - s/m^2$

184. In a 6×6 transportation problem, degeneracy would arise if the number of filled cells are _____.

A. equal to 36 B. more than 12

C. equal to 12 D. less than 11

Ans. A

Sol. In a n×n transportation problem, degeneracy will arise if the number of filled cells are less than n+n-1.

i.e Minimum no of filled cells required = 6 + 6 - 1 =11

185. Lorentz no. is

A. Ratio of Biot no and Fourier no

B. Ratio of thermal conductivity and electrical conductivity

C. Product of Biot no. and Fourier no.

D. Ratio of Grashof no and Prandtl no.

Ans. B

Sol. Ratio of thermal conductivity and electrical conductivity is known as Lorentz number.

186. If value of γ is zero in a polytropic process $PV^{\gamma} = C$, then the process is known as constant.

A. Volume B. Pressure

C. Temperature D. Entropy

Ans. B

Sol. If n = O, process is known as isobaric process.

Adiabatic index	Process
$\gamma = 1$	Isothermal
$\gamma = 0$	Constant pressure or isobaric
$\gamma = \gamma$	Adiabatic
$\gamma = \infty$	Constant volume or isochoric

187. Clinometer is related with _____.

A. Engineer's parallels
B. angle gauges
C. spirit level
D. bevel protractor

Ans. C

Sol.

- The clinometer is an optical device for measuring elevation angles above horizontal.
- A clinometer has a sighting tube with an angle scale reading from -90° to +90°, and a spirit level with a Vernier index that can be moved along the scale while the user looks through the sighting tube.

188. The number of possible sequence if 3 Jobs are assigned on 2 machines ?

A. 9
B. 6
C. 81
D. 36

Ans. D

Sol. Number of possible schedules in assignment problem having N Jobs, M Machines is $(n!)^m$
Therefore The number of possible sequence = $(3!)^2 = 36$

189. Rotary swaging process is used for _____.

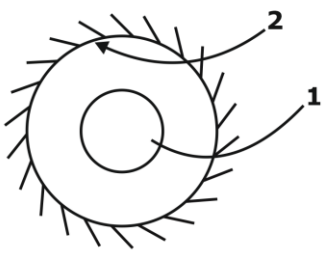
A. providing desired contour to sheet metal
B. manufacturing bolts and rivets
C. manufacturing seamless tubes
D. making gun barrels

Ans. D

Sol. **Rotary Swaging:**

- Rotary swaging process is usually a cold working process, used to reduce the diameter, produce a taper, or add point to a round workpiece.
- It belongs to the group of net-shape-forming processes.
- It also imparts internal shapes in hollow workpieces through the use of a mandrel such as gun barrels.

190. For a concentric sphere arrangement as shown, the surface areas are 200 sq. m and 350 sq. m. The view factor F_{22} is :



A. 1
B. 0
C. 0.57
D. 0.43

Ans. D

Sol. The view factor F_{12} for the sphere is 1

So, using reciprocity :

$$A_1F_{12} = A_2F_{21} \Rightarrow F_{21} = \frac{A_1}{A_2}$$

$$\text{And, } F_{21} + F_{22} = 1 \text{ so } F_{22} = 1 - \frac{A_1}{A_2}$$

= 0.43

191. Ring rolling is used _____.

A. to decrease the thickness and increase diameter

B. to increase the thickness of a ring

C. for producing a seamless tube

D. for producing large cylinder

Ans. A

Sol.

- In the ring rolling process, a thick ring is expanded into a large diameter ring with a reduced cross section.
- Ring rolling is mainly used for production of railway tyres, anti-friction bearing races, and a range of ring shaped components used in the automotive and aerospace industries.

192. Question If there are two materials A & B, for material "A", Young's modulus is twice the Shear modulus & for "B" Young's modulus is thrice the bulk modulus, then μ_A & μ_B respectively are

A. -1, - 0.5 B. -1, 0.5

C. 0,0 D. 0, -0.5

Ans. C

Sol. For A,

E = 2G(1+ μ)

For B,

E= 3K(1-2 μ)

$$\mu_A = \frac{E}{2G} - 1$$

$$\mu_B = \frac{1}{2}\left(1 - \frac{E}{3K}\right)$$

E = 2G for "A", μ_A= 0

E = 3K for "B" , μ_B= 0

193. Which of the following shows the range of poisson's ratio for isotropic elastic solid _____.

A. 1/4 < μ <1
B. 1/2 <μ< 1
C. 1/3 < μ< 3/2
D. 1/4 <μ<1/3

Ans. D

Sol. For isotropic elastic solid , the range of μ is from: 1/4 to 1/3.

194. A square full journal bearing of 100mm diameter is to support a radial load of 50kN at 600rpm. If it is to be operated at a sommerfield number of 0.08 with a diametral clearance of 0.4mm, the viscosity of oil in (Pa-s) will be _____.

A. 0.7
B. 0.6
C. 0.64
D. 0.8

Ans. C

Sol. Given data:

S = 0.08

L = d = 100mm

W =50000N

N =600rpm

c_d = 0.4 mm

Sommer field Number 'S' is given by:

$$S = \frac{\mu n_s}{\left(\frac{W}{ld}\right)} \times \left(\frac{r}{c}\right)^2$$

On substituting the values :

$$0.08 = \frac{\mu \times \frac{600}{60} \times 0.1 \times 0.1}{50 \times 10^3} \times \left(\frac{50}{0.2}\right)^2$$

μ = 0.64 Pa – s

195. A spring mass damper system, the mass is 5 kg and undamped natural frequency is 40 Hz. What is the value of critical damping coefficient?

A. 2514 N-s/m
B. 2717 N-s/m
C. 3316 N-s/m
D. 3712 N-s/m

Ans. A

Sol. $\omega_n = 2\pi f$

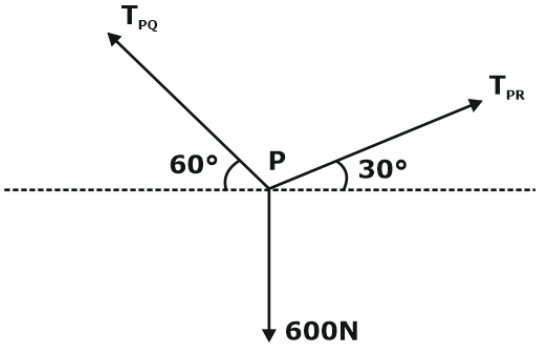
f= 40 Hz

$\omega_n = 2\times\pi\times40 = 80\pi$ rad/s

Critical damping coefficient, $C_c = 2m\omega_n = 2\times5\times80\pi = 800\pi$

C_c = 2514.27 N-s/m

196. If point P is in equilibrium under the action of applied forces, the value of tension T_{PQ} and T_{PR} are respectively.

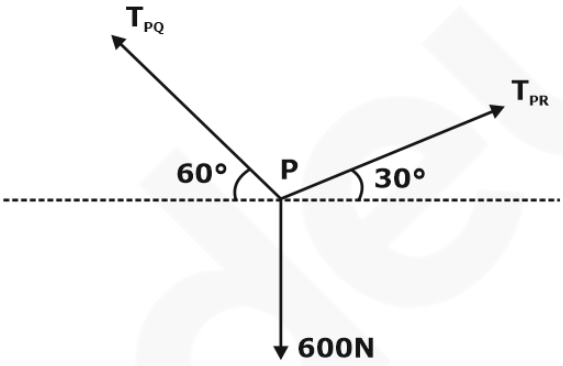


A. 520, 300 B. 300, 520

C. $250\sqrt{3}, 250\sqrt{3}$ D. $250, 250\sqrt{3}$

Ans. A

Sol.



By lami's theorem

$$\frac{T_{PQ}}{\sin 120} = \frac{T_{PR}}{\sin(90+60)} = \frac{600}{\sin(90)}$$

T_{PQ}= 519.61

T_{PR}= 300

197. A solid steel shaft transmits 50 KW of power at the frequency of (50/ π)Hz. The initial torque needed in the shaft is _____.

A. 812 N-m B. 678 N-m

C. 541 N-m D. 500 N-m

Ans. D

Sol. frequency (f) = (50/π)

angular velocity (ω) = 2 πf = 2 π× (50/π) = 100 rad/s

Given power (P) = 50×10^3 watt

P = T × ω

T = (P/ω) = $(50\times10^3)/100$ = 500 N-m

198. A long cylindrical bar subjected to a tensile load of 50 kN, undergoes a percentage elongation of 25 % in length. The area of cross section of the bar is 1000 mm^2. The value of true stress (in MPa) is:

A. 50 B. 62.5

C. 12.5 D. 37.5

Ans. B

Sol. $\text{engineering strain} = \frac{l_2 - l_1}{l_1} = \frac{1.25l - l}{l} = 0.25$

$$\text{engineering strain} = \frac{50000}{1000 \times 10^{-6}} = 50 \text{ MPa}$$

Also, True stress = engg. stress × (1 + engg. strain)

$\sigma_t = \sigma_0 \times (1 + e)$

True stress = 50 x (1 + 0.25) = 62.5 MPa

199. Two balls are moving in such direction that the angle between them is 60°. The two velocities are having magnitudes 10 m/s and 20 m/s respectively. Calculate the magnitude of resultant velocity(in m/s)

A. 30 B. 10

C. $\sqrt{700}$ D. none of the above

Ans. C

Sol. given,

u = 10m/s, v = 20m/s, angle between them is 60°

By using parallelogram law,

resultant will be given as

$$R = \sqrt{u^2 + v^2 + 2uv\cos\theta}$$

$$R = \sqrt{10^2 + 20^2 + 2 \times 10 \times 20\cos 60^\circ}$$

$$R = \sqrt{700}$$

200. Collapsible tooth paste tubes are manufactured by _____.

A. Direct extrusion B. Piercing

C. Impact extrusion D. Indirect extrusion

Ans. C

Sol.

- Impact extrusion is used for making the thin walled collapsible tubes such as toothpaste tubes, cans usually using soft materials such as aluminum, lead, tin.
- In impact extrusion, usually a small shot of solid material is placed in the die and is impacted by a ram, which causes cold flow of the material.

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Upcoming Mega Mock Challenge in May Month

SSC JE, UPPSC AE & VIZAG Steel MT 2020

Mechanical Engineering

Exam	Live Date	Syllabus	No. of Questions	Time
SSC JE	09 May 2020	Full Syllabus (Technical & Non-technical)	200	120
UPPSC AE Paper-1	16 May 2020	Full Syllabus (Technical & Non-technical: Hindi)	125	150
UPPSC AE Paper-2	23 May 2020	Full Syllabus (Technical & Non-technical: General Studies)	125	150
VIZAG Steel MT 2020	30 May 2020	Full Syllabus (Technical & Non-technical)	200	120

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