

Junior Engineer Civil Mechanical and Electrical Examination 2023 Paper I

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|-----------|-----------------------------------------|
| Exam Date | 11/10/2023                              |
| Exam Time | 1:00 PM - 3:00 PM                       |
| Subject   | Junior Engineer 2023 Mechanical Paper I |

Section : General Intelligence and Reasoning

Q.1 In a certain code language, 'POLISH' is written as '89' and 'CLIP' is written as '72'. How will 'CONTROL' be written in that language?

- Ans
- ☒ 1. 89
  - ☒ 2. 92
  - ☒ 3. 106
  - ☒ 4. 99

Q.2 Select the option that is related to the third word in the same way as the second word is related to the first word. (The words must be considered as meaningful English words and must not be related to each other based on the number of letters/number of consonants/vowels in the word)

Organise : Jumble :: Overseas : ?

- Ans
- ☒ 1. Abroad
  - ☒ 2. Foreign
  - ☒ 3. Domestic
  - ☒ 4. Alien

Q.3 Which letter cluster will replace the question mark (?) to complete the given series?

JIVC, DEXH, XAZM, ?

- Ans
- ☒ 1. RWCR
  - ☒ 2. RXCR
  - ☒ 3. RWBR
  - ☒ 4. RXBR

Q.4 Arrange the following words in a logical and meaningful order.

- 1. chapter
- 2. sentence
- 3. letter
- 4. phrase
- 5. word

- Ans
- ☒ 1. 3, 4, 5, 2, 1
  - ☒ 2. 3, 4, 2, 1, 5
  - ☒ 3. 3, 4, 5, 1, 2
  - ☒ 4. 3, 5, 4, 2, 1

Q.5 Select the option that is related to the third term in the same way as the second term is related to the first term and the sixth term is related to the fifth term.

56 : 14 :: 88 : ? :: 32 : 11

- Ans
- ☒ 1. 15
  - ☒ 2. 18
  - ☒ 3. 28
  - ☒ 4. 23

Q.6 Maanvi cycles X km towards the north from her home and then turns right and cycles Y km to reach Point A. She then turns left and cycles for X+Y km to reach her shop. If she cycled for a total of 12 km from her home to her shop, what is the distance between Point A and her shop?

- Ans
- ☒ 1. 7 km
  - ☒ 2. 4 km
  - ☒ 3. 3 km
  - ☒ 4. 6 km

Q.7 Select the correct combination of mathematical signs to sequentially replace the \* signs and balance the given equation.  
 $13 * 64 * 2 * 8 * 11 = 18$

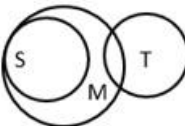
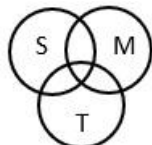
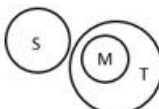
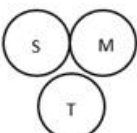
- Ans ☒ 1.  $\times \div + -$   
☒ 2.  $+ \times \div -$   
☒ 3.  $\times \div - +$   
☒ 4.  $+ - \times \div$

Q.8 Which of the following numbers will replace the question marks (?) in the given series?  
 523, 513, ?, 496, ?, 483, 478, 474

- Ans ☒ 1. 509, 490  
☒ 2. 504, 489  
☒ 3. 510, 490  
☒ 4. 500, 488

Q.9 Select the Venn diagram that best illustrates the relationship between the following classes.

Sisters, Mothers, Teachers

- Ans ☒ 1.   
☒ 2.   
☒ 3.   
☒ 4. 

Q.10 Select the option that is related to the fifth term in the same way as the second term is related to the first term and the fourth term is related to the third term.  
 $18 : 52 :: 8 : 22 :: 12 : ?$

- Ans ☒ 1. 34  
☒ 2. 28  
☒ 3. 38  
☒ 4. 43

Q.11 In a certain code language, 'CROSS' is written as '66' and 'CHART' is written as '90'. How will 'SYMBOL' be written in that language?

- Ans ☒ 1. 82  
☒ 2. 88  
☒ 3. 76  
☒ 4. 93

Q.12 If '+' means '-', '-' means 'x', 'x' means '÷', '÷' means '+', then what will come in place of the question mark (?) in the following equation?  
 $11 - 42 \times 6 \div 69 + 27 = ?$

- Ans ☒ 1. 127  
☒ 2. 131  
☒ 3. 106  
☒ 4. 119

Q.13 Select the combination of letters that when sequentially placed in the blanks of the given series, will complete the series.

R \_ML\_P\_P \_ \_NPR \_ML\_P\_P\_LN \_

- Ans
- ✓ 1. PNRMLPNRMP
  - ✗ 2. NPRMLNPRMP
  - ✗ 3. PNMRLPNMRP
  - ✗ 4. PNRMPLNRPM

Q.14 '5 FSH' is related to '10 HUJ' in a certain way. In the same way, '8 STH' is related to '16 UVJ'. Which of the following is related to '12 PEP' using the same logic?

- Ans
- ✗ 1. 18 NCN
  - ✗ 2. 24 MCM
  - ✗ 3. 24 NCN
  - ✓ 4. 6 NCN

Q.15 Select the correct mirror image of the given combination when the mirror is placed at 'PQ' as shown.

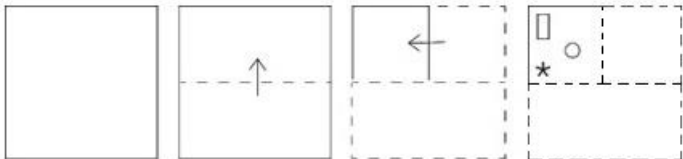
FYU2VD  
P ————— Q

- Ans
- ✗ 1. DV5UYF
  - ✗ 2. EYU2VD
  - ✗ 3. FAYU5VD
  - ✓ 4. EAYU5VD

Q.16 In a certain code language, "CTA" is coded as "1203" and "RXB" is coded as "22418". How will "MQV" be coded in that language?

- Ans
- ✗ 1. 211419
  - ✗ 2. 201614
  - ✓ 3. 221713
  - ✗ 4. 211812

Q.17 A paper is folded and cut as shown below. How will it appear when unfolded?



- Ans
- ✗ 1.
  - ✗ 2.
  - ✗ 3.
  - ✓ 4.

Q.18 Select the option that represents the correct order of the given words as they would appear in an English dictionary.  
1. Manager  
2. Maintain  
3. Malice  
4. Match  
5. Mark

- Ans ☒ 1. 1, 2, 3, 4, 5  
☒ 2. 2, 3, 1, 4, 5  
☒ 3. 2, 3, 1, 5, 4  
☒ 4. 1, 5, 3, 4, 2

Q.19 Which of the following option figures will complete the pattern in the figure given below?



- Ans ☒ 1.
- ☒ 2.
- ☒ 3.
- ☒ 4.

Q.20 Which of the following numbers will replace the question mark (?) in the given series?  
143, 153, 146, ?, 142, 152

- Ans ☒ 1. 144  
☒ 2. 156  
☒ 3. 145  
☒ 4. 155

Q.21 Select the option that represents the correct order of the given words as they would appear in an English dictionary.  
1. Demography  
2. Denial  
3. Demonstrate  
4. Dense  
5. Demolish

- Ans ☒ 1. 1, 5, 3, 4, 2  
☒ 2. 1, 5, 2, 3, 4  
☒ 3. 1, 5, 3, 2, 4  
☒ 4. 1, 3, 5, 2, 4

Q.22 Select the option that is related to the fourth term in the same way as the first term is related to the second term and the fifth term is related to the sixth term.

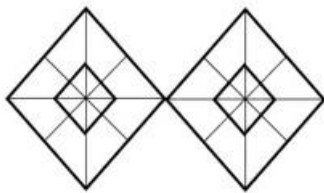
529 : 21 :: ? : 19 :: 841 : 27

- Ans
- ☒ 1. 484
  - ☒ 2. 361
  - ☒ 3. 441
  - ☒ 4. 402

Q.23 Select the option that represents the letters which, when sequentially placed from left to right in the blanks below, will complete the letter series.  
\_ EN \_ \_ AE \_ DR \_ E

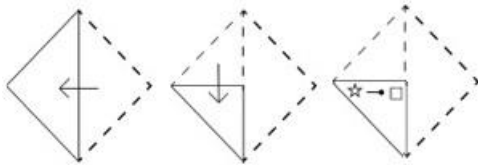
- Ans
- ☒ 1. ADRNA
  - ☒ 2. NRADA
  - ☒ 3. RNADA
  - ☒ 4. DNAAR

Q.24 How many squares are there in the given figure?



- Ans
- ☒ 1. 22
  - ☒ 2. 18
  - ☒ 3. 16
  - ☒ 4. 20

Q.25 A paper is folded and cut as shown below. How will it appear when unfolded?



- Ans
- ☒ 1.
  - ☒ 2.
  - ☒ 3.
  - ☒ 4.

Q.26 8 friends, Abhay, Bala, Chan, Dev, Emran, Fanny, Geeta and Hema are sitting around a square table such that four of them sit at the corners and the other four sit at the exact centre of the sides. Those sitting at the corners are facing outside while those sitting at the centre of the sides are facing the centre. Dev is sitting third to the right of Geeta and is facing the centre. Emran is third to the left of Chan who is not sitting at the centre of the sides. Only one person sits between Emran and Fanny. Fanny is not Chan's neighbour. Hema is sitting facing the centre. Abhay is not Fanny's neighbour.  
Who is sitting third to the right of Chan?

- Ans
- ☐ 1. Emran
  - ☐ 2. Bala
  - ☐ 3. Geeta
  - ☒ 4. Fanny

Q.27 Pointing towards a person in a photograph, a man, Rahul, said, "He is the father of my father's daughter's daughter." How is the person in the photograph related to Rahul?

- Ans
- ☐ 1. Sister's son
  - ☐ 2. Brother
  - ☒ 3. Sister's husband
  - ☐ 4. Son

Q.28 Select the set in which the numbers are related in the same way as are the numbers of the following sets.

(NOTE: Operations should be performed on the whole numbers, without breaking down the numbers into its constituent digits. Eg. 13 – Operations on 13 such as adding/subtracting/multiplying etc. to 13 can be performed. Breaking down 13 into 1 and 3 and then performing mathematical operations on 1 and 3 is not allowed)

(5, 4, 33)

(7, 3, 55)

- Ans
- ☐ 1. (14, 5, 260)
  - ☐ 2. (8, 12, 78)
  - ☒ 3. (11, 7, 135)
  - ☐ 4. (9, 4, 98)

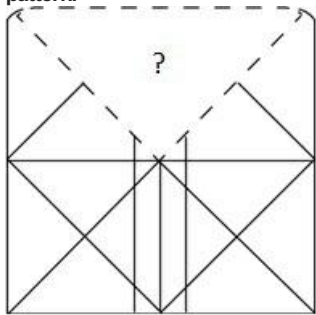
Q.29 There are seven family members Q, R, S, T, U, V and W. Each are of different ages. R is elder than only three other members. S is younger than V but elder than W, who is the youngest among all. Q is elder than R but younger than U. U is not the eldest among all. How many family members are there between Q and W?

- Ans
- ☐ 1. 1
  - ☐ 2. 4
  - ☒ 3. 3
  - ☐ 4. 2

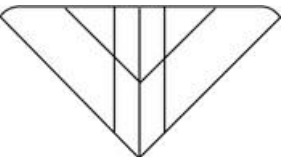
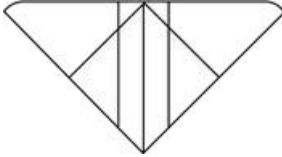
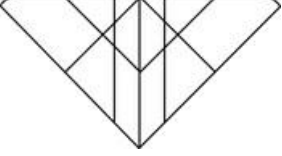
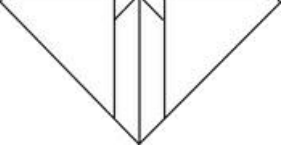
Q.30 'NEST' is related to 'PHUW' in a certain way based on the English alphabetical order. In the same way, 'PWSR' is related to 'RZUU'. Which of the following is related to 'MORG' using the same logic?

- Ans
- ☐ 1. KLOD
  - ☐ 2. KLPE
  - ☐ 3. KLQD
  - ☒ 4. KLPD

Q.31 Select the figure from the options that can replace the question mark (?) and complete the pattern.



Ans

1. 
- ✗
2. 
- ✓
3. 
- ✗
4. 
- ✗

Q.32 Select the option that is related to the third word in the same way as the second word is related to the first word. (The words must be considered as meaningful English words and must not be related to each other based on the number of letters/number of consonants/vowels in the word)

Ink : Pen :: Paint : ?

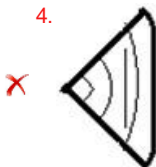
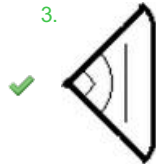
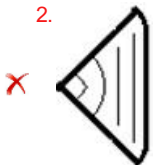
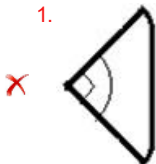
Ans

- ✗ 1. Art
- ✓ 2. Brush
- ✗ 3. Paper
- ✗ 4. Sketch

Q.33 Select the figure from the options that can replace the question mark (?) and complete the given pattern.



Ans



Q.34 Select the letter-cluster from among the given options that can replace the question mark (?) in the following series.

ICMS, KDOT, ?, OFSV, QGUW

Ans

- ✓ 1. MEQU
- ✗ 2. LEQU
- ✗ 3. MERU
- ✗ 4. MESU

Q.35 Select the correct option that indicates the arrangement of the following words in a logical and meaningful order.

1. Infant
2. Adolescent
3. Toddler
4. Adult
5. Embryo

Ans

- ✗ 1. 53142
- ✗ 2. 13254
- ✗ 3. 14532
- ✓ 4. 51324

Q.36 Select the correct mirror image of the given combination when the mirror is placed at MN as shown below.



- Ans
- ☒ 1. K % 2 e n 2 Q
  - ☒ 2. K % 2 e n 2 Q
  - ☒ 3. K % 2 e n 2 Q
  - ☒ 4. K % 2 e n 2 Q

Q.37 Select the option in which the given figure is embedded (rotation is NOT allowed).



- Ans
- ☒ 1.
  - ☒ 2.
  - ☒ 3.
  - ☒ 4.

Q.38 Select the set in which the numbers are related in the same way as are the numbers of the following set.  
(NOTE: Operations should be performed on the whole numbers, without breaking down the numbers into its constituent digits. E.g. 13 – Operations on 13 such as adding /subtracting/multiplying etc. to 13 can be performed. Breaking down 13 into 1 and 3 and then performing mathematical operations on 1 and 3 is not allowed.)

(7, 340, 3)  
(4, 63, 1)

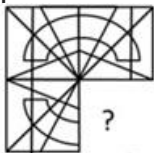
- Ans
- ☒ 1. (3, 23, 4)
  - ☒ 2. (2, 6, 1)
  - ☒ 3. (3, 56, 7)
  - ☒ 4. (9, 34, 1)

Q.39 Six friends are sitting in a circle facing the centre. Sumit sits second to the right of Amit. Karan is an immediate neighbour of Param. Tony sits third to the right of Amit. Dharam is an immediate neighbour of Amit and Sumit. Karan sits second to the right of Sumit.

Who sits to the immediate left of Amit?

- Ans
- ☒ 1. Tony
  - ☒ 2. Param
  - ☒ 3. Karan
  - ☒ 4. Dharam

Q.40 Select the figure which will replace the question mark (?) in the given figure to complete the pattern.



- Ans
- ☒ 1.
  - ☒ 2.
  - ☒ 3.
  - ☒ 4.

Q.41 A is the mother of B.  
B is the husband of C.  
D is the father-in-law of C.  
How is A related to D?

- Ans
- ☒ 1. Sister
  - ☒ 2. Wife
  - ☒ 3. Father
  - ☒ 4. Mother

Q.42 Select the number from among the given options that can replace the question mark (?) in the following series.  
4, 80, 159, 244, 338, ?

- Ans
- ☒ 1. 433
  - ☒ 2. 434
  - ☒ 3. 443
  - ☒ 4. 444

Q.43 Two statements are given followed by two conclusions numbered I and II. Assuming the statements to be true, even if they seem to be at variance with commonly known facts, decide which of the conclusions logically follow(s) from the statements.

Statements:  
All clothes are jeans.  
All jeans are shirts.

Conclusions:  
I. All clothes are shirts.  
II. At least some shirts are jeans.

- Ans
- ☒ 1. Only conclusion I follows
  - ☒ 2. Both conclusions I and II follow
  - ☒ 3. Only conclusion II follows
  - ☒ 4. Neither conclusion I nor II follows

Q.44 Select the word-pair in which the two words are related in the same way as are the two words in the given pair.  
(The words must be considered as meaningful English words and must not be related to each other based on the number of letters/number of consonants/vowels in the word.)  
Propagate : Disseminate

- Ans ☒ 1. Sublime : Divine  
☐ 2. Sacred : Profane  
☐ 3. Prompt : Quash  
☐ 4. Rapidity : Inertia

Q.45 Point G is 9 m to the west of Point H. Point B is 10 m to the north of Point H. Point A is 18 m to the west of Point B. Point C is 28 m to the north of Point A. Point C is 23 m to the west of Point D. Point E is 18 m to the south of Point D. Point F is 5 m to the west of Point E. What is the distance between Point H and Point F?

- Ans ☒ 1. 20 m  
☐ 2. 10 m  
☐ 3. 15 m  
☐ 4. 18 m

Q.46 In a certain code language, 'CARRY' is coded as YRUAC and 'HUMAN' is coded as NAPUH. How will 'NIGHT' be coded in that language?

- Ans ☐ 1. THKIN  
☐ 2. TGHIN  
☒ 3. THJIN  
☐ 4. TGHNI

Q.47 Which two signs should be interchanged to make the given equation correct?  
 $9 \times 182 + 14 \div 67 - 33 = 151$

- Ans ☐ 1. + and -  
☐ 2. x and +  
☐ 3. - and x  
☒ 4. ÷ and +

Q.48 Which letter cluster will replace the question mark (?) to complete the given series?  
LDL, NHJ, PLH, RPF, ?

- Ans ☐ 1. STC  
☒ 2. TTD  
☐ 3. TSD  
☐ 4. SSD

Q.49 Which two signs should be interchanged to make the given equation correct?  
 $36 - 5 + 240 \div 6 \times 17 = 203$

- Ans ☐ 1. + and +  
☐ 2. x and +  
☐ 3. + and -  
☒ 4. - and x

Q.50 Select the word-pair in which the two words are related in the same way as are the two words in the given pair.  
Yarn : Fabric

- Ans ☒ 1. Brick : Wall  
☐ 2. Petrol : Car  
☐ 3. Lock : Key  
☐ 4. Poem : Poet

Section : General Awareness

Q.1 In January 2023, who among the following has been appointed as the new Vice-Chief of the Indian Air Force?

- Ans ☒ 1. AP Singh  
☐ 2. Nagesh Kapoor  
☐ 3. Sandeep Singh  
☐ 4. Rakesh Kumar Singh Bhadauria

**Q.2** The best-known \_\_\_\_\_ ruler was Prithviraja III who was defeated by an Afghan ruler Sultan Muhammad Gori in 1192.

- Ans**
- ☐ 1. Pala
  - ☐ 2. Rashtrakuta
  - ☒ 3. Chahamana
  - ☐ 4. Pratihara

**Q.3** According to the Census of India 2011, what was the percentage of Sikh communities in the total population in India?

- Ans**
- ☒ 1. 1.7%
  - ☐ 2. 14.2%
  - ☐ 3. 0.4%
  - ☐ 4. 79.8%

**Q.4** Which of the following Articles of the Constitution of India mentions about the abolition of untouchability?

- Ans**
- ☐ 1. Article 28
  - ☐ 2. Article 21
  - ☐ 3. Article 16
  - ☒ 4. Article 17

**Q.5** Which of the following classical dance styles is inscribed on the Gopuram of Chidambaram temple?

- Ans**
- ☐ 1. Kathak
  - ☐ 2. Kuchipudi
  - ☐ 3. Mohiniyattam
  - ☒ 4. Bharatnatyam

**Q.6** Who classified Indian society into seven classes?

- Ans**
- ☐ 1. Strabo
  - ☒ 2. Megasthenes
  - ☐ 3. Pliny
  - ☐ 4. Arian

**Q.7** Which of the following is an aspartic acid-containing dipeptide sweetener?

- Ans**
- ☐ 1. Sucralose
  - ☒ 2. Alitame
  - ☐ 3. Acesulfame K
  - ☐ 4. Saccharin

**Q.8** Chhajju Khan is one of the founder of which Gharana?

- Ans**
- ☒ 1. Bhendi Bazaar Gharana
  - ☐ 2. Agra Gharana
  - ☐ 3. Lucknow Gharana
  - ☐ 4. Mewati Gharana

**Q.9** Which of the following is a common condition that develops when a sticky substance called plaque builds up inside your arteries, causing them to harden and narrow?

- Ans**
- ☐ 1. Hypervitaminosis
  - ☐ 2. Hyperaldosteronism
  - ☒ 3. Atherosclerosis
  - ☐ 4. Multiple sclerosis

**Q.10** Which of statement is NOT correct regarding the earthquake waves?

- Ans**
- ☐ 1. P-waves move faster and are the first to arrive at the surface.
  - ☐ 2. P-waves are called the primary waves.
  - ☐ 3. S-waves is that they can travel only through solid materials.
  - ☒ 4. P-wave can travel through only solid and liquid mediums but not gaseous mediums.

Q.11 What is the respective percentage of CO<sub>2</sub>, N<sub>2</sub>, and O<sub>2</sub> in the atmosphere?

- Ans ☒ 1. CO<sub>2</sub> = 0.03%, N<sub>2</sub> = 68.08%, O<sub>2</sub> = 30.95%
- ☒ 2. CO<sub>2</sub> = 0.04%, N<sub>2</sub> = 78.08%, O<sub>2</sub> = 20.95%
- ☒ 3. CO<sub>2</sub> = 0.04%, N<sub>2</sub> = 20.95%, O<sub>2</sub> = 78.08%
- ☒ 4. CO<sub>2</sub> = 0.08%, N<sub>2</sub> = 70.08%, O<sub>2</sub> = 29.95%

Q.12 In March 2023, which of the following organisations launched Mission 'Har Payment Digital'?

- Ans ☒ 1. National Stock Exchange of India Ltd.
- ☒ 2. State Bank of India
- ☒ 3. Reserve Bank of India
- ☒ 4. Calcutta Stock Exchange Ltd.

Q.13 Which of the following is NOT a commodity money?

- Ans ☒ 1. Silver
- ☒ 2. Copper
- ☒ 3. Utensils
- ☒ 4. Gold

Q.14 How much of global trade is carried out through the sea route?

- Ans ☒ 1. 60%
- ☒ 2. 90%
- ☒ 3. 70%
- ☒ 4. 80%

Q.15 Which of the following instruments did Sheik Chinna Moulana, a famous instrumentalist from India, play?

- Ans ☒ 1. Nadhaswaram
- ☒ 2. Midangam
- ☒ 3. Ghatam
- ☒ 4. Violin

Q.16 Which of the following is NOT listed in Fundamental Duties?

- Ans ☒ 1. To promote the spirit of common dissonance
- ☒ 2. To safeguard public property and abjure violence
- ☒ 3. To value and preserve the rich heritage
- ☒ 4. To protect and to improve the natural environment

Q.17 Which team won the 2022 Durand Cup?

- Ans ☒ 1. Goa FC
- ☒ 2. Mumbai City FC
- ☒ 3. ATK Mohun Bagan
- ☒ 4. Bengaluru Football Club

Q.18 Martyrdom of revolutionary \_\_\_\_\_ took place on 27 February, 1931.

- Ans ☒ 1. Bhagat Singh
- ☒ 2. Batukeshwar Dutt
- ☒ 3. Chandrashekhar Azad
- ☒ 4. Sachindranath Sanyal

Q.19 Beta-carotene, lycopene, lutein and selenium are examples of:

- Ans ☒ 1. antioxidants
- ☒ 2. immunosuppressants
- ☒ 3. sources of Vitamin C
- ☒ 4. anti-coagulants

Q.20 Name the Government scheme aimed to benefit women entrepreneurs from backward backgrounds or poor backgrounds.

- Ans
- ☒ 1. Pradhan Mantri Matru Vandana Yojana
  - ☒ 2. Mahila Samridhi Yojana
  - ☒ 3. Ujjawala
  - ☒ 4. Beti Bachao Beti Padhao

Q.21 Which of the following statements is INCORRECT about migration in India?

- Ans
- ☒ 1. Migration does not depend on social factors.
  - ☒ 2. Migration may be rural to urban.
  - ☒ 3. It may be urban to rural areas.
  - ☒ 4. Migration has pull and push factors.

Q.22 If one goes from Rajasthan in the west to Orissa in the east, what is the correct order of Peninsulas one will come across?

- 1) Marwar Plateau
- 2) Malwa Plateau
- 3) Chhota Nagpur Plateau
- 4) Chhattisgarh Plateau

- Ans
- ☒ 1. 2-3-1-4
  - ☒ 2. 1-2-3-4
  - ☒ 3. 1-2-4-3
  - ☒ 4. 3-1-2-4

Q.23 Which of the following is/are responsible for nasal congestion?

- Ans
- ☒ 1. Tetracycline
  - ☒ 2. Tranquilizers
  - ☒ 3. Histamine
  - ☒ 4. Analgesics

Q.24 The 11<sup>th</sup> fundamental duty is related to \_\_\_\_\_.

- Ans
- ☒ 1. health
  - ☒ 2. culture
  - ☒ 3. education
  - ☒ 4. environment

Q.25 The Udyogmandal Canal is a part of which National Waterways?

- Ans
- ☒ 1. National Waterways 2
  - ☒ 2. National Waterways 1
  - ☒ 3. National Waterways 3
  - ☒ 4. National Waterways 4

Q.26 All England Championships is associated with \_\_\_\_\_.

- Ans
- ☒ 1. Tennis
  - ☒ 2. Cricket
  - ☒ 3. Table tennis
  - ☒ 4. Badminton

Q.27 Which cyber security measure involves verifying the identity of users before granting access to a system or network?

- Ans
- ☒ 1. Firewall configuration
  - ☒ 2. Regular software updates
  - ☒ 3. Network encryption
  - ☒ 4. Multi-factor authentication

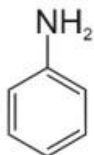
Q.28 Chilika Lake is a brackish water lagoon, spread over which districts of Odisha state?

- Ans
- ☒ 1. Angul, Cuttak and Puri
  - ☒ 2. Puri, Bhubaneswar and Khurda
  - ☒ 3. Puri, Cuttack and Ganjam
  - ☒ 4. Puri, Khurda and Ganjam

Q.29 When was the Indian Association founded?

- Ans
- ☐ 1. 1875
  - ☐ 2. 1874
  - ☒ 3. 1876
  - ☐ 4. 1871

Q.30 What is the name of the organic compound in the given figure?



- Ans
- ☐ 1. Cyclohexene
  - ☐ 2. Benzene
  - ☐ 3. Tropone
  - ☒ 4. Aniline

Q.31 One may be tempted to treat higher level of Gross Domestic Product (GDP) of a country as an index of greater well-being of the people of that country. But there are some reasons due to which this may not be correct. Which of the following is NOT one of these reasons?

- Ans
- ☒ 1. Level of political awareness
  - ☐ 2. Externalities
  - ☐ 3. Distribution of GDP
  - ☐ 4. Non-monetary exchanges

Q.32 Which element was proposed by Glenn T Seaborg in 1955 through the bombardment of a minute amount of a rare, radioactive isotope of Einsteinium with  $\alpha$ -particles in a 60-inch cyclotron?

- Ans
- ☒ 1. Mendelevium
  - ☐ 2. Lawrencium
  - ☐ 3. Neptunium
  - ☐ 4. Nobelium

Q.33 Identify the chemical formula for ethyne.

- Ans
- ☐ 1.  $\text{CH}_4$
  - ☐ 2.  $\text{C}_2\text{H}_6$
  - ☒ 3.  $\text{C}_2\text{H}_2$
  - ☐ 4.  $\text{C}_2\text{H}_5\text{OH}$

Q.34 Who was the leader of Kaira Satyagraha that was launched against the government?

- Ans
- ☐ 1. Baba Ramchandra
  - ☒ 2. Mahatma Gandhi
  - ☐ 3. Sardar Patel
  - ☐ 4. NG Ranga

Q.35 The Constitution (87<sup>th</sup> Amendment) Act, 2003 provided for the delimitation of the constituencies on the basis of the census of \_\_\_\_\_.

- Ans
- ☐ 1. 1991
  - ☒ 2. 2001
  - ☐ 3. 1981
  - ☐ 4. 1971

Q.36 What is Petrology?

- Ans
- ☐ 1. Science of gases
  - ☒ 2. Science of rocks
  - ☐ 3. Science of minerals
  - ☐ 4. Science of metals

Q.37 Darshana Jhaveri and Devjani Chaliha are best known for their contributions to which of the given styles of Indian dance?

- Ans ☒ 1. Manipuri  
☐ 2. Kuchipudi  
☐ 3. Kathak  
☐ 4. Bharatanatyam

Q.38 According to the Centre for Monitoring Indian Economy (CMIE), in which state of India was the unemployment rate recorded as 34.5% as of April 2022?

- Ans ☐ 1. Maharashtra  
☐ 2. Assam  
☐ 3. Andhra Pradesh  
☒ 4. Haryana

Q.39 As on 1st February 2023, who among the following is the Chairperson of the National Disaster Management Authority (NDMA)?

- Ans ☒ 1. Narendra Modi  
☐ 2. Amit Shah  
☐ 3. Droupadi Murmu  
☐ 4. Rajnath Singh

Q.40 Article \_\_\_\_\_ of the Constitution of India states that the Chief Minister shall be appointed by the Governor.

- Ans ☐ 1. 165  
☐ 2. 161  
☒ 3. 164  
☐ 4. 163

Q.41 Which of the following pairs of coast and the state in which it is located is INCORRECT?

- Ans ☐ 1. Konkan coast – Maharashtra  
☐ 2. Kathiawar coast – Gujarat  
☒ 3. Malabar coast – Tamil Nadu  
☐ 4. Gaon coast – Karnataka

Q.42 When did 5G services begin to be offered in India?

- Ans ☐ 1. 28 September 2022  
☐ 2. 19 September 2021  
☒ 3. 1 October 2022  
☐ 4. 10 August 2021

Q.43 As per Finance Bill 2023, eligible start-ups will be able to set off and carry forward losses incurred during their first ten years of incorporation, even if there has been a change in shareholding, if all shareholders continue during the relevant period. The previous time limit of seven years has been increased to \_\_\_\_\_.

- Ans ☒ 1. 10 years  
☐ 2. 13 years  
☐ 3. 15 years  
☐ 4. 12 years

Q.44 The total number of persons awarded under Jeevan Raksha Padak Series of Awards-2022, which was announced by the President of India on 25th January 2023, stood at \_\_\_\_\_.

- Ans ☐ 1. 63  
☒ 2. 43  
☐ 3. 33  
☐ 4. 53

Q.45 As per the Budget 2022 announcement, a \_\_\_\_\_ income tax will be applied on earnings from virtual digital assets like cryptocurrencies.

- Ans
- ☐ 1. 25%
  - ☐ 2. 15%
  - ☒ 3. 30%
  - ☐ 4. 40%

Q.46 Which of the following metals is present in nature in its free state?

- Ans
- ☐ 1. Zinc
  - ☐ 2. Magnesium
  - ☒ 3. Platinum
  - ☐ 4. Calcium

Q.47 Which of the following are NOT antimicrobial drugs?

- Ans
- ☐ 1. Disinfectants
  - ☐ 2. Antiseptics
  - ☐ 3. Antibiotics
  - ☒ 4. Antacids

Q.48 Most of the crops being cereals, required approximately \_\_\_\_\_ of dietary water footprint.

- Ans
- ☐ 1. 28%
  - ☐ 2. 83%
  - ☒ 3. 50%
  - ☐ 4. 74%

Q.49 Which of the following classical dancers won the Padma Shri award in 2022 for the dance form of Kuchipudi?

- Ans
- ☐ 1. Hema Malini
  - ☐ 2. Sujata Mohapatra
  - ☒ 3. Gaddam Padmaja Reddy
  - ☐ 4. Birju Maharaj

Q.50 Which of the following protocols is used by email clients to send email to mail servers?

- Ans
- ☐ 1. POP3
  - ☐ 2. TCP/IP
  - ☒ 3. SMTP
  - ☐ 4. IMAP

Section : General Engineering Mechanical

Q.1 The pressure at the inlet of a refrigerant compressor is called \_\_\_\_\_.

- Ans
- ☐ 1. discharge pressure
  - ☐ 2. critical pressure
  - ☒ 3. suction pressure
  - ☐ 4. back pressure

Q.2 A centrifugal pump is running at the speed of 1000 rpm against a head of 40 m. If its speed is changed to 3000 rpm, then it will work against a head of:

- Ans
- ☒ 1. 360 m
  - ☐ 2. 120 m
  - ☐ 3. 40 m
  - ☐ 4. 80 m

Q.3 For internal laminar flow, the variation of shear stress in the radial direction is:

- Ans
- ☒ 1. linear
  - ☐ 2. exponential
  - ☐ 3. hyperbolic
  - ☐ 4. parabolic

**Q.4** The expansion process in a vapour compression refrigeration cycle is a/an \_\_\_\_\_.

- Ans**
- ☒ 1. isenthalpic process
  - ☐ 2. constant volume process
  - ☐ 3. reversible isothermal process
  - ☐ 4. isentropic process

**Q.5** In a lubrication method, the oil is kept in the crank case sump and it is splashed by using the end of a connecting rod to various components of the engine. This method is called \_\_\_\_\_.

- Ans**
- ☐ 1. sump lubrication
  - ☒ 2. splash lubrication
  - ☐ 3. pressure lubrication
  - ☐ 4. pump lubrication

**Q.6** Select the correct statement of Lami's theorem.

- Ans**
- ☐ 1. If three forces are non-coplanar, then each force is directly dependent on sine of the angle between the other two forces.
  - ☒ 2. If three forces acting on a body are said to be in equilibrium, then each force is directly dependent on sine of the angle between the other two forces.
  - ☐ 3. If two forces are in equilibrium, then each force is directly proportional to sine of the angle between them.
  - ☐ 4. If three forces are not in equilibrium, then each force is inversely proportional to sine of the angle between the other two forces.

**Q.7** Which of the following is NOT a component of the water-cooling system with radiator?

- Ans**
- ☐ 1. Thermostat
  - ☒ 2. Condenser
  - ☐ 3. Fan
  - ☐ 4. Centrifugal pump

**Q.8** Which of the following statements is correct for compressibility?

- Ans**
- ☒ 1. Compressibility is reciprocal of bulk modulus
  - ☐ 2. Compressibility is square of bulk modulus
  - ☐ 3. Compressibility is equal to bulk modulus
  - ☐ 4. Compressibility is square root of bulk modulus

**Q.9** The Energy Gradient line will \_\_\_\_\_.

- Ans**
- ☐ 1. coincide with Hydraulic Gradient line
  - ☐ 2. coincide with pipe axis
  - ☒ 3. lie above the Hydraulic Gradient line
  - ☐ 4. lie below the Hydraulic Gradient line

**Q.10** There are two horizontal pipes in which water is flowing. If we have to find the pressure difference between these two horizontal pipes using an inverted manometer, and two manometric fluids with specific gravities of 13.5 and 0.9 are available, then which manometric fluid will be appropriate?

- Ans**
- ☒ 1. Fluid with the specific gravity of 0.9
  - ☐ 2. Fluid with the specific gravity of 13.5
  - ☐ 3. Both the fluids can be used
  - ☐ 4. Cannot be predicted

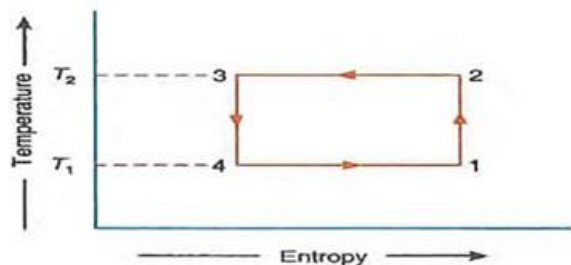
**Q.11** Find the enthalpy of 1 kg of dry and saturated steam at 10 bar if sensible heat at 10 bar is 762.8 kJ/kg and latent heat of evaporation at 10 bar is 2015.3 kJ/kg.

- Ans**
- ☒ 1. 2778.1 kJ
  - ☐ 2. 762.8 kJ
  - ☐ 3. 1252.5 kJ
  - ☐ 4. 2015.3 kJ

Q.12 The value of enthalpy of vaporisation approaches to zero on the saturation curve of water on a temperature entropy diagram:

- Ans ☒ 1. above critical point  
☒ 2. at critical point  
☒ 3. below critical point  
☒ 4. never approaches to zero

Q.13 The following Temperature – Entropy diagram represents a Refrigeration system operates on the reversed Carnot cycle. The higher temperature of the refrigerant in the system is 35°C and the lower temperature is -15°C. What will be the C.O.P?



- Ans ☒ 1. 5.16  
☒ 2. 3.45  
☒ 3. 2.75  
☒ 4. 4.82

Q.14 The position of centre of pressure depends on which of the following?

- Ans ☒ 1. Surface tension of fluid  
☒ 2. Velocity of liquid  
☒ 3. Weight of the object immersed in liquid  
☒ 4. Location of object from the free surface

Q.15 The enthalpy of water is considered as 'zero' at \_\_\_\_\_.

- Ans ☒ 1. 37°C  
☒ 2. 4°C  
☒ 3. 0.01°C  
☒ 4. 100°C

Q.16 In an ammonia vapour compression system, the pressure in the evaporator is 2 bar. Ammonia at exit is 0.85 dry and at entry its dryness fraction is 0.19. During compression, the work done per kg of ammonia is 150 kJ. The latent heat and specific volume at 2 bar are 1325 kJ/kg and 0.58 m<sup>3</sup>/kg, respectively. What will be its C.O.P?

- Ans ☒ 1. 6.74  
☒ 2. 4.34  
☒ 3. 5.83  
☒ 4. 3.82

Q.17 Which of the following is the correct relation for specific speed of turbine?

- Ans ☒ 1. Specific speed is directly proportional to head under which the turbine is working  
☒ 2. Specific speed is directly proportional to square of the head under which the turbine is working  
☒ 3. Specific speed is directly proportional to square root of shaft power  
☒ 4. Specific speed is directly proportional to shaft power

Q.18 The ratio of the energy received by the steam to the energy supplied by the fuel to produce steam in a steam boiler is known as \_\_\_\_\_.

- Ans ☒ 1. actual evaporation  
☒ 2. equivalent evaporation  
☒ 3. boiler efficiency  
☒ 4. boiler horsepower

Q.19 The duplex feed pump is:

- Ans ☒ 1. Double-acting reciprocating pump  
☒ 2. Single-acting reciprocating pump  
☒ 3. Axial-flow pump  
☒ 4. Centrifugal pump

Q.20 The frictional resistance in a turbulent flow is independent of the \_\_\_\_\_.

- Ans ☒ 1. density of fluid  
☒ 2. surface roughness  
☒ 3. velocity of fluid  
☒ 4. pressure

Q.21 For the same compression ratio, which of the following processes will require the least compression work?

- Ans ☒ 1. Polytropic process  
☒ 2. Adiabatic process  
☒ 3. Isothermal process  
☒ 4. Isochoric process

Q.22 The mass of water evaporated per unit mass of fuel burnt is termed as \_\_\_\_\_ steam boilers.

- Ans ☒ 1. equivalent evaporation in  
☒ 2. actual evaporation in  
☒ 3. boiler performance of  
☒ 4. boiler efficiency of

Q.23 Match the following.

| Halocarbon Refrigerants | Examples |
|-------------------------|----------|
| 1. Halons               | a. R-32  |
| 2. CFCs                 | b. R-22  |
| 3. HFCs                 | c. R-11  |
| 4. HCFCs                | d. R-10  |

- Ans ☒ 1. 1-d; 2-c; 3-b; 4-a  
☒ 2. 1-a; 2-c; 3-d; 4-b  
☒ 3. 1-d; 2-a; 3-c; 4-b  
☒ 4. 1-d; 2-c; 3-a; 4-b

Q.24 A rectifier is fitted in an ammonia absorption plant to:

- Ans ☒ 1. only remove the unwanted water vapour by cooling the vapour mixture  
☒ 2. remove the unwanted water vapour by cooling the vapour mixture and condensing the water vapour  
☒ 3. remove the unwanted water vapour by heating the vapour mixture  
☒ 4. superheat ammonia vapour

Q.25 Choose the correct mathematical relation of absolute pressure.

- Ans ☒ 1.  $P_{abs} = P_{atm} / P_{guage}$   
☒ 2.  $P_{abs} = P_{atm} + 2P_{guage}$   
☒ 3.  $P_{abs} = P_{atm} + P_{guage}$   
☒ 4.  $P_{abs} = P_{atm} - P_{guage}$

Q.26 Pressure head of a fluid represents:

- Ans ☒ 1. energy per unit volume  
☒ 2. energy per unit length  
☒ 3. energy per unit mass  
☒ 4. energy per unit weight

Q.27 The behaviour of a material at different stages of loading is represented by a diagram called the \_\_\_\_\_ diagram.

- Ans
- ☐ 1. circumferential stress
  - ☐ 2. iron carbon
  - ☐ 3. hysteresis
  - ☒ 4. stress strain

Q.28 Which of the following machining operations is NOT related to turning?

- Ans
- ☐ 1. Boring
  - ☐ 2. External threading
  - ☐ 3. Facing
  - ☒ 4. Shaping

Q.29 Which of the following statements is INCORRECT?

- Ans
- ☒ 1. The value of dryness fraction is greater than 1 for superheated steam condition.
  - ☐ 2. The value of dryness fraction is 1 for saturated steam condition.
  - ☐ 3. The value of dryness fraction always lies between 0 and 1.
  - ☐ 4. The value of dryness fraction is 0 for saturated water condition.

Q.30 For hydraulic turbines, the ratio of overall efficiency and mechanical efficiency is called \_\_\_\_\_.

- Ans
- ☐ 1. volumetric efficiency
  - ☒ 2. hydraulic efficiency
  - ☐ 3. cannot be predicted
  - ☐ 4. frictional power

Q.31 The Molten metal is used in \_\_\_\_\_ process

- Ans
- ☐ 1. Deep Drawing
  - ☐ 2. Forging
  - ☒ 3. Casting
  - ☐ 4. Machining

Q.32 The speed ratio of a compound gear train is defined as \_\_\_\_\_.

- Ans
- ☐ 1.  $\frac{\text{Speed of last follower}}{\text{Speed of first driver}}$
  - ☐ 2.  $\frac{\text{Product of number of teeth on driver shafts}}{\text{Product of number of teeth on driven shafts}}$
  - ☒ 3.  $\frac{\text{Product of number of teeth on driven shafts}}{\text{Product of number of teeth on driver shafts}}$
  - ☐ 4.  $\frac{\text{Product of speed of followers}}{\text{Product of speed of drivers}}$

Q.33 Which of the following is the correct statement relating to the centre of pressure on an immersed surface?

- Ans
- ☐ 1. It is the point where the normal pressure acts.
  - ☒ 2. It is the point where the resultant pressure acts.
  - ☐ 3. It is the point where the weight of the body and resultant pressure acts.
  - ☐ 4. It is the point where the weight of body acts.

Q.34 According to the American Society of Mechanical Engineers (ASME), the evaporation of 15.63 kg of water at 100°C per hour from 100°C feedwater in a steam boiler is known as \_\_\_\_\_.

- Ans
- ☐ 1. equivalent evaporation
  - ☐ 2. boiler efficiency
  - ☐ 3. actual evaporation
  - ☒ 4. boiler horsepower

Q.35 In the thermodynamic system, the primary driving force for mass transfer is \_\_\_\_\_.

- Ans
- ☐ 1. pressure difference
  - ☐ 2. mass difference
  - ☐ 3. temperature difference
  - ☒ 4. concentration difference

Q.36 The property of tool material to retain its hardness at elevated temperature is known as:

- Ans
- ☐ 1. Plasticity
  - ☐ 2. Toughness
  - ☒ 3. Red hardness
  - ☐ 4. Elasticity

Q.37 What is the hydraulic radius for a circular pipe running full?

- Ans
- ☒ 1.  $0.25d$
  - ☐ 2.  $d$
  - ☐ 3.  $0.5d$
  - ☐ 4.  $0.75d$

Q.38 Which of the following is a water-tube boiler?

- Ans
- ☒ 1. Babcock & Wilcox boiler
  - ☐ 2. Cornish boiler
  - ☐ 3. Lancashire boiler
  - ☐ 4. Cochran boiler

Q.39 Due to the refinement of grains, mechanical properties such as toughness, ductility, elongation and reduction in the area are improved in \_\_\_\_\_ process

- Ans
- ☐ 1. Cold working
  - ☒ 2. Hot working
  - ☐ 3. Joining
  - ☐ 4. Forming

Q.40 An oil of specific gravity 0.8 is flowing through a pipe. A differential manometer is connected at the two points, say A and B, and shows a difference in the mercury level as 20 cm. What will be the difference between the pressures at the two points?  
Take density of mercury =  $13600 \text{ kg/m}^3$  and  $g = 10 \text{ m/s}^2$ .

- Ans
- ☐ 1.  $25.6 \text{ N/m}^2$
  - ☐ 2.  $1280 \text{ kN/m}^2$
  - ☒ 3.  $25.6 \text{ kN/m}^2$
  - ☐ 4.  $2560 \text{ N/m}^2$

Q.41 Which of the following statements is true for a throttling process?

- Ans
- ☐ 1. It is an isentropic process.
  - ☐ 2. It is a reversible process.
  - ☒ 3. It is a constant enthalpy process.
  - ☐ 4. It is an isothermal process.

Q.42 The highest temperature during the cycle, in a vapour compression refrigeration system, occurs after:

- Ans
- ☒ 1. compression
  - ☐ 2. expansion
  - ☐ 3. evaporation
  - ☐ 4. condensation

Q.43 Flow process is used for which of the following systems?

- Ans
- ☒ 1. Open system
  - ☐ 2. Both open and closed systems
  - ☐ 3. Isolated system
  - ☐ 4. Closed system

Q.44 Vapour pressure is primarily associated with which phenomenon?

- Ans ☒ 1. Cavitation  
☐ 2. Surging  
☐ 3. Capillarity  
☐ 4. Water hammering

Q.45 In an I.C. engine, when the primary circuit in the coil ignition system breaks, the voltage produced across the secondary terminal is in the range of \_\_\_\_\_.

- Ans ☒ 1. 8000 V to 12,000 V  
☐ 2. 2000 V to 5000 V  
☐ 3. 80 V to 120 V  
☐ 4. 800 V to 1200 V

Q.46 For a two-stage reciprocating air compressor, the section pressure is 1.6 bar and the delivery pressure is 40 bar. What is the value of the ideal intercooler pressure (in bar)?

- Ans ☐ 1. 9  
☒ 2. 8  
☐ 3. 20.8  
☐ 4. 4.56

Q.47 What will be the mass density of one litre of a fluid which weighs 9.81 N? (Take  $g = 9.81 \text{ m/sec}^2$ )

- Ans ☒ 1. 1000 kg/m<sup>3</sup>  
☐ 2. 100 gm/cm<sup>3</sup>  
☐ 3. 100 kg/m<sup>3</sup>  
☐ 4. 1000 gm/cm<sup>3</sup>

Q.48 An engine is working with temperature limits of 29°C and 229°C. It receives 1000 kW and rejects 429 kW of heat. Possible cycle executed by the engine is

- Ans ☐ 1. Carnot cycle  
☐ 2. Reversible cycle  
☐ 3. Irreversible cycle  
☒ 4. Impossible cycle

Q.49 The mass flow is same at inlet and outlet in case of \_\_\_\_\_.

- Ans ☐ 1. closed system  
☐ 2. isolated system  
☐ 3. non-steady flow process  
☒ 4. steady flow process

Q.50 If a turbine is working under different heads, the behaviour of the turbine can be easily determined from the values of \_\_\_\_\_.

- Ans ☐ 1. blade angles  
☐ 2. number of vanes  
☐ 3. size of runner  
☒ 4. unit quantities

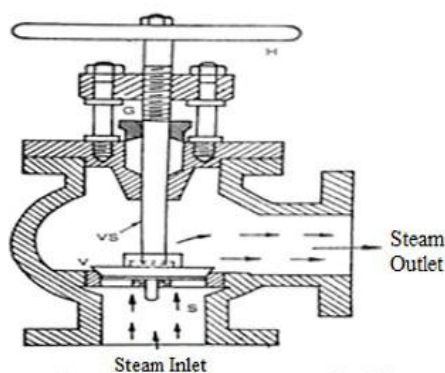
Q.51 Which turbine is suitable where a large discharge at low head is available?

- Ans ☐ 1. Turgo turbine  
☐ 2. Francis turbine  
☐ 3. Pelton turbine  
☒ 4. Kaplan turbine

Q.52 If  $Q_1$  is the heat rejected to the source and  $Q_2$  is the heat extracted from the sink, the coefficient of performance (COP) of a heat pump is given by \_\_\_\_\_.

- Ans
- ☒ 1.  $\frac{Q_1 - Q_2}{Q_2}$
  - ☒ 2.  $\frac{Q_1 - Q_2}{Q_1}$
  - ☒ 3.  $\frac{Q_1}{Q_1 - Q_2}$
  - ☒ 4.  $\frac{Q_2}{Q_1 - Q_2}$

Q.53 Following figure shows which of the following parts of a steam generator?



- Ans
- ☒ 1. Feed check valve
  - ☒ 2. Steam stop valve
  - ☒ 3. Safety valve
  - ☒ 4. Blow-off cock

Q.54 A piezometer is connected to a point in a pipe to measure the pressure of water flowing through it. If the piezometer reads 0.4 m, what will be the gauge pressure at that point? Take atmospheric pressure = 101325 pascals and  $g = 10 \text{ m/s}^2$ .

- Ans
- ☒ 1. 97325 pascals
  - ☒ 2. 105325 pascals
  - ☒ 3. 40 kilopascals
  - ☒ 4. 4000 pascals

Q.55 Which of the following is NOT a type of wet sump lubrication system?

- Ans
- ☒ 1. Pressure lubrication system
  - ☒ 2. Mist lubricating system
  - ☒ 3. Pump lubrication system
  - ☒ 4. Splash lubrication system

Q.56 The correct relation between the modulus of elasticity (E) and modulus of rigidity (G) is: Given,  $\mu$  = Poisson's ratio.

- Ans
- ☒ 1.  $G = 4E(1 + \mu)$
  - ☒ 2.  $E = 2G(1 + \mu)$
  - ☒ 3.  $E = 4G(1 + \mu)$
  - ☒ 4.  $G = 2E(1 + \mu)$

Q.57 \_\_\_\_\_ is a metalworking process which is an example of forging.

- Ans
- ☒ 1. Welding
  - ☒ 2. Casting
  - ☒ 3. Upsetting
  - ☒ 4. Extrusion

Q.58 In a steam boiler, the actual evaporation is 8 kg of steam per kg of fuel burnt. The heat supplied per kg of water is 2500 kJ/kg. Higher calorific value of fuel is 25,000 kJ/kg. What is the boiler efficiency?

- Ans
- ☐ 1. 0.25
  - ☐ 2. 0.75
  - ☐ 3. 0.10
  - ☒ 4. 0.80

Q.59 A heat engine operates between a source at 600 K and a sink at 300 K. What is the maximum possible efficiency of the engine according to the Kelvin-Planck statement of the second law of thermodynamics?

- Ans
- ☐ 1. 67%
  - ☐ 2. 25%
  - ☒ 3. 50%
  - ☐ 4. 33.3%

Q.60 The speed ratio for an impulse turbine can be taken as \_\_\_\_\_.

- Ans
- ☐ 1. 0.3
  - ☐ 2. 0.75
  - ☒ 3. 0.45
  - ☐ 4. 0.6

Q.61 The friction experienced by the body when the body tends to move is known as:

- Ans
- ☐ 1. dynamic friction
  - ☐ 2. rolling friction
  - ☒ 3. static friction
  - ☐ 4. sliding friction

Q.62 A seamless pipe having a diameter of 600 mm and thickness of 9 mm, contain the fluid under a pressure of 4 MPa, find the longitudinal stress developed in the pipe.

- Ans
- ☐ 1. 88.8 Mpa
  - ☐ 2. 77.7 Mpa
  - ☒ 3. 66.6 Mpa
  - ☐ 4. 133.3 Mpa

Q.63 Under steady state operation of a cone clutch, if semi-cone angle ( $\alpha$ ) decreases then \_\_\_\_\_.

- Ans
- ☐ 1. does not affect the axial force
  - ☐ 2. the axial force increases
  - ☐ 3. the torque produced by clutch decreases
  - ☒ 4. the torque produced by clutch increases

Q.64 The pressure responsive element in the Bourdon tube pressure gauge is made of \_\_\_\_\_.

- Ans
- ☐ 1. cast iron
  - ☐ 2. Inconel
  - ☐ 3. aluminium
  - ☒ 4. bronze

Q.65 In air-conditioning of aeroplanes, using air as a refrigerant, the cycle used is:

- Ans
- ☐ 1. reversed Joule cycle
  - ☐ 2. reversed Carnot cycle
  - ☐ 3. reversed Otto cycle
  - ☒ 4. reversed Brayton cycle

Q.66 If the mechanical efficiency and hydraulic efficiency of a turbine are 60% and 70%, respectively, then what will be the overall efficiency of the turbine?

- Ans
- ☐ 1. 65%
  - ☒ 2. 42%
  - ☐ 3. 60%
  - ☐ 4. 70%

Q.67 If the specific weight of a fluid is  $19620 \text{ N/m}^3$ , then what will be its specific volume in  $\text{m}^3/\text{kg}$ ? (Take  $g = 9.81 \text{ m/sec}^2$ )

- Ans
- ☐ 1.  $5 \times 10^{-5}$
  - ☐ 2.  $0.5 \times 10^{-5}$
  - ☒ 3.  $0.5 \times 10^{-3}$
  - ☐ 4.  $5 \times 10^{-3}$

Q.68 The net effect of superheating after compression in vapour compression refrigeration cycle is to have:

- Ans
- ☐ 1. decrease in refrigeration capacity
  - ☒ 2. low C.O.P
  - ☐ 3. decrease in refrigeration effect
  - ☐ 4. high C.O. P

Q.69 Natural draft cooling towers are also known as \_\_\_\_\_.

- Ans
- ☒ 1. atmospheric cooling towers
  - ☐ 2. mechanical draft cooling towers
  - ☐ 3. automatic spray cooling towers
  - ☐ 4. artificial cooling towers

Q.70 Choose the correct option related to lathe turning operation.

- Ans
- ☐ 1. Tool will rotate
  - ☒ 2. Work piece will rotate
  - ☐ 3. Both tool and work piece will rotate
  - ☐ 4. Both tool and work piece will not rotate

Q.71 Generation of steam in a boiler is an example of an \_\_\_\_\_.

- Ans
- ☐ 1. isochoric process
  - ☒ 2. isobaric process
  - ☐ 3. isothermal process
  - ☐ 4. adiabatic process

Q.72 Francis turbine is as example of:

- Ans
- ☐ 1. axial flow turbine
  - ☒ 2. mixed flow turbine
  - ☐ 3. impulse turbine
  - ☐ 4. radial flow turbine

Q.73 What will be the absolute pressure (approximately) at a point 3 m below the free surface of a liquid having a density of  $1530 \text{ kg/m}^3$ , if the atmospheric pressure is equivalent to 750 mm of mercury? (The specific gravity of mercury is 13.6 and density of water is  $1000 \text{ kg/m}^3$ ,  $g = 9.81 \text{ m/sec}^2$ )

- Ans
- ☒ 1.  $1,45,090 \text{ N/m}^2$
  - ☐ 2.  $1,00,250 \text{ N/m}^2$
  - ☐ 3.  $95,648 \text{ N/m}^2$
  - ☐ 4.  $78,560 \text{ N/m}^2$

Q.74 Which thermodynamic property of steam does NOT change in throttling calorimeter?

- Ans
- ☐ 1. Entropy
  - ☒ 2. Enthalpy
  - ☐ 3. Pressure
  - ☐ 4. Temperature

Q.75 The function of condenser in refrigeration cooling system is \_\_\_\_\_.

- Ans
- ☐ 1. to convert liquid refrigerant into vapour refrigerant
  - ☐ 2. to give external work to the system
  - ☒ 3. to reject heat out of the system
  - ☐ 4. to give heat into the system

Q.76 Which of the following does NOT describe the Diesel cycle?

- Ans
- ☐ 1. High compression ratio
  - ☐ 2. No spark plug needed
  - ☒ 3. Constant volume heat addition
  - ☐ 4. Limited maximum temperature

Q.77 In the shaping process, the cutting tool moves \_\_\_\_\_.

- Ans
- ☐ 1. in a parabolic motion
  - ☐ 2. in a circular motion
  - ☐ 3. in an elliptical motion
  - ☒ 4. in a straight line

Q.78 The point at which all the three phases – solid, liquid, and vapour co-exist in equilibrium in a p-T diagram is known as \_\_\_\_\_.

- Ans
- ☒ 1. triple point
  - ☐ 2. melting point
  - ☐ 3. critical point
  - ☐ 4. boiling point

Q.79 When any gas is heated at constant pressure, its change in volume varies directly with change in absolute temperature. This law is known as \_\_\_\_\_.

- Ans
- ☐ 1. Boyle's law
  - ☒ 2. Charles' law
  - ☐ 3. Joule's law
  - ☐ 4. Avogadro's law

Q.80 Which of following losses fall into the category of major losses?

- Ans
- ☐ 1. Head loss due to sudden contraction
  - ☐ 2. Head loss due to sudden enlargement
  - ☐ 3. Head loss due to bend of pipe
  - ☒ 4. Head loss due to friction

Q.81 The flow through a capillary tube is an example of \_\_\_\_\_ flow.

- Ans
- ☐ 1. turbulent
  - ☒ 2. laminar
  - ☐ 3. compressible
  - ☐ 4. transition

Q.82 In a mechanical draught system, draught is produced by a \_\_\_\_\_.

- Ans
- ☐ 1. chain grate stoker
  - ☐ 2. pump
  - ☒ 3. blower
  - ☐ 4. chimney

Q.83 An air standard diesel cycle working with a compression ratio of 13 and cut off takes places at 5 % of the stroke volume. The value of cut off ratio will be

- Ans
- ☐ 1. 1.9
  - ☒ 2. 1.6
  - ☐ 3. 1.3
  - ☐ 4. 2.3

Q.84 The dimensional formula of specific gravity is given by:

- Ans
- ☐ 1.  $M^2L^{-3}T^0$
  - ☐ 2.  $M^1L^{-3}T^{-2}$
  - ☒ 3.  $M^0L^0T^0$
  - ☐ 4.  $M^1L^{-3}T^0$

Q.85 A cyclic heat engine of thermal efficiency 80% does 60 kJ of work per cycle. The heat rejected per cycle will be equal to \_\_\_\_\_.

- Ans
- ☒ 1. 1.48 kJ
  - ☒ 2. 15 kJ
  - ☒ 3. 20 kJ
  - ☒ 4. 75 kJ

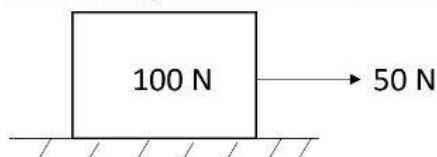
Q.86 Which of the following statements is correct about a working engine?

- Ans
- ☒ 1. Operation of the flywheel is continuous, whereas operation of the governor is more or less intermittent.
  - ☒ 2. Operation of the governor is continuous, whereas operation of the flywheel is more or less intermittent.
  - ☒ 3. Operation of both the flywheel and the governor is continuous.
  - ☒ 4. Operation of both the flywheel and the governor is intermittent.

Q.87 A Carnot cycle operates between two temperatures  $T_1$  and  $T_2$ . The efficiency of the cycle is given by  $\eta = (T_1 - T_2) / T_1$ . Which of the following statements is correct?

- Ans
- ☒ 1. The efficiency of the Carnot cycle depends on the working substance used.
  - ☒ 2. The efficiency of the Carnot cycle is always equal to that of any other heat engine operating between the same two temperatures.
  - ☒ 3. The efficiency of the Carnot cycle is always less than that of any other heat engine operating between the same two temperatures.
  - ☒ 4. The efficiency of the Carnot cycle is always greater than that of any other heat engine operating between the same two temperatures.

Q.88 A body of weight 100 N is lying on a rough horizontal surface, and the horizontal force of 50 N is applied on the body as shown in the figure, which is just enough to move the body. What will be the coefficient of friction?



- Ans
- ☒ 1. 0.5
  - ☒ 2. 0.4
  - ☒ 3. 0.3
  - ☒ 4. 0.6

Q.89 The term  $\rho V^2/2$  used in Bernoulli theorem is basically:

- Ans
- ☒ 1. hydrostatic pressure
  - ☒ 2. stagnation pressure
  - ☒ 3. dynamic pressure
  - ☒ 4. static pressure

Q.90 The cyclic integral of  $Q/T$  for a reversible cycle is equal to zero. This statement is known as \_\_\_\_\_.

- Ans
- ☒ 1. Clausius theorem
  - ☒ 2. Carnot theorem
  - ☒ 3. the principle of Carathéodory
  - ☒ 4. Rankine theorem

Q.91 The value of atmospheric pressure in bar is \_\_\_\_\_.

- Ans
- ☒ 1. 1.01325
  - ☒ 2. 0.9874
  - ☒ 3. 2.01324
  - ☒ 4. 1.5643

Q.92 Which impellers are more likely to be clogged if stringy material or solids are pumped?

- Ans ☒ 1. Closed impeller  
☐ 2. Open impeller  
☐ 3. Cannot be predicted  
☐ 4. Semi-open impeller

Q.93 Which of the following statements is true regarding vapour-compression refrigeration system (VCRS)?

- Ans ☐ 1. Power consumption of VCRS with air cooled condenser is less as compared to that of VCRS with water cooled condenser.  
☐ 2. Power consumption of VCRS with air cooled condenser may be lesser or greater than that of VCRS with water cooled condenser.  
☒ 3. Power consumption of VCRS with air cooled condenser is more as compared to that of VCRS with water cooled condenser.  
☐ 4. VCRS with both water cooled and air cooled condenser will require same power for same refrigeration effect.

Q.94 What is the function of the transfer port inside the engine?

- Ans ☐ 1. It is used to transfer unburnt fuel to the exhaust port.  
☐ 2. It is the port through which scavenging of the gases takes place.  
☒ 3. It is used to move charge from the crankcase to the cylinder head portion.  
☐ 4. It is the port through which the engine gets the fuel.

Q.95 In a steam boiler, an economiser is used for heating of \_\_\_\_\_.

- Ans ☐ 1. flue gases  
☐ 2. air  
☐ 3. fuel  
☒ 4. feedwater

Q.96 The energy loss caused by abrupt enlargement is expressed by:

- Ans ☐ 1.  $\left(\frac{V_1 - V_2}{g}\right)^2$   
☐ 2.  $\left(\frac{V_1 - V_2}{2}\right)^2$   
☐ 3.  $\left(\frac{V_1 - V_2}{2g}\right)^2$   
☒ 4.  $\left(\frac{V_1 - V_2}{\sqrt{2g}}\right)^2$

Q.97 The air pre-heater increases the temperature of \_\_\_\_\_ before it/they enter(s) the furnace.

- Ans ☒ 1. air  
☐ 2. feedwater  
☐ 3. fuel  
☐ 4. flue gases

Q.98 Which of the following milling operations is used to produce a flat surface parallel to the axis of rotation of the cutter?

- Ans ☐ 1. Profile milling  
☐ 2. End milling  
☐ 3. Face milling  
☒ 4. Plain milling

Q.99 Which of the following air-cooled condensers are used only in small capacity applications such as domestic refrigerators and room air conditioners?

- Ans ☐ 1. Remote air-cooled condensers  
☒ 2. Natural convection air-cooled condensers  
☐ 3. Shell and coil condensers  
☐ 4. Base mounted air-cooled condensers

**Q.100** Which of the following statements is true about a four-stroke engine in comparison to a two-stroke engine?

- Ans**    1. Thermal efficiency and part-load efficiency of a four-stroke engine are better than those of a two-stroke engine.
-  2. A four-stroke engine only uses the diesel cycle, while a two-stroke engine only uses the Otto cycle.
-  3. Volumetric efficiency of a four-stroke engine is comparatively low, due to less power output.
-  4. Owing to one power stroke in two revolutions, a lighter flywheel is required.
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