RRB ALP 2024 CBT 2

Assistant Loco Pilot · CEN 01/2024 · CBT 2 · Heat Engine Trade · Question Paper

English

All 4 Shifts (Sets) · Official Answer Key

About this Compilation

This booklet contains all **4 shift papers** of the **RRB ALP 2024 CBT 2 (Heat Engine)** examination in **English**, with the correct option marked as per the official answer key.

✓ Correct option (highlighted green)

How to use

- Use the **Index** page to jump directly to any set (clickable).
- Questions appear section by section in the order of the paper, numbered 1 onward.
- Diagram and wide-table questions appear at full width at the end of their section.
- The correct answer is highlighted in green with a tick.

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Index — All Sets (click to open)

Set 1 — 02 May 2025, 9:30 AM - 12:00 PM

Set 2 — 02 May 2025, 2:30 PM - 5:00 PM

Set 3 — 06 May 2025, 9:30 AM - 12:00 PM

Set 4 — 06 May 2025, 2:30 PM - 5:00 PM

Part A

100 Questions • Answer Key

Q1 Part A

Which of the following is NOT a valid representation of electrical power P in a circuit? (The current, potential difference and resistance are written symbolically as I, V and R, respectively.)

- A. $P = IR^2$ ✓
- B. $P = V^2/R$
- C. $P = I^2R$
- D. $P = VI$

Q2 Part A

Each of Preeti, Kiran, Grace, Ankit, Deepak, Nitin and Neelam has an exam on a different day of a week, starting from Monday and ending on Sunday of the same week. Preeti has an exam on Thursday. Only one person has an exam between Preeti and Nitin. Grace has exam on the day immediately before Nitin but not on a Monday. Only two people have exams between Grace and Deepak. Neelam's exam is on one of the days before Ankit's but on one of the days after Kiran's. Who among the following has an exam on Monday?

- A. Deepak
- B. Nitin
- C. Kiran ✓
- D. Neelam

Q3 Part A

Amit's income in 2019 was ₹27,000. He gets an increment of 10% every year. What was his income (in ₹) in 2021?

- A. 27,000
- B. 29,700
- C. 32,400
- D. 32,670 ✓

Q4 Part A

Use of energy-efficient machineries in industrial settings primarily helps _____.

- A. reduce industrial energy requirement and improve products' competitiveness. ✓
- B. decrease operational efficiency
- C. increase energy consumption and thereby product cost
- D. extend the lifespan of outdated equipment

Q5 Part A

In the following number-pairs, the second number is obtained by applying certain mathematical operations to the first number. Which numbers should replace X and Y so that the pattern followed by the two numbers on the left side of :: is same as that on the right side of ::?

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

X : 85 :: 36 : Y

- A. X = 42, Y = 71
- B. X = 43, Y = 77
- C. X = 42, Y = 73 ✓
- D. X = 44, Y = 73

Q6 Part A

Which of the following is the best way to identify workplace hazards?

- A. Ignoring small risks
- B. Waiting for an incident to occur
- C. Conducting regular safety inspections ✓
- D. Relying on employees to report accidents

Q7 Part A

Megha bought a bag for ₹1,271 after getting a discount of 18% on its marked price. Find the marked price of the bag.

- A. ₹1,550 ✓
- B. ₹1,650
- C. ₹1,350
- D. ₹1,450

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Q8 Part A

Which of the following ecosystems has very low temperatures and frozen soil?

A. Grassland

B. Tropical rainforest

C. Desert

D. Tundra ✓

Q9 Part A

The sum of the ages of Yash and his father is 90 years. When Yash is as old as his father's present age, he will be five times as old as his son Suraj's present age. Suraj will be 12 years older than Yash's present age, when Yash is as old as his father at present. How old is Suraj at present?

A. 15 years

B. 18 years

C. 12 years ✓

D. 16 years

Q10 Part A

Which of the following statements is correct about negative work done?

A. Work done is negative when the force and displacement are in the same direction.

B. Work done cannot be negative.

C. Work done is negative when the force is perpendicular to the displacement.

D. Work done is negative when the force acts opposite to the direction of displacement. ✓

Q11 Part A

Which of the following is the work done by the gravitational force on the object of mass 50 kg when the object is moved from one point to another point along a horizontal line ($g = 10\ m/s^2$)?

A. Zero ✓

B. 500 J

C. 50 J

D. −500 J

Q12 Part A

Based on the English alphabetical order, three of the following four letter-cluster pairs are alike in a certain way and thus form a group. Which letter-cluster pair DOES NOT belong to that group?
(Note: The odd one out is not based on the number of consonants/vowels or their position in the letter-cluster.)

A. GN – PV

B. AH – JR ✓

C. JQ – SY

D. HO – QW

Q13 Part A

Read the given statements and conclusions carefully. Assuming that the information given in the statements is true, even if it appears to be at variance with commonly known facts, decide which of the given conclusion(s) logically follow(s) from the statements.

Statements:
I. Some desks are tables.
II. All tables are cabinets.
III. All cabinets are beds.

Conclusions:
I. Some beds are tables.
II. All cabinets are desks.

A. Neither conclusion I nor conclusion II follows.

B. Both conclusions I and II follow.

C. Only conclusion II follows.

D. Only conclusion I follows. ✓

Q14 Part A

What is the average human body temperature?

A. 42°C

B. 40°C

C. 37°C ✓

D. 32°C

Q15 Part A

Potential energy belongs to which of the following categories of energy?

A. Heat energy

B. Light energy

C. Mechanical energy ✓

D. Chemical energy

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Q16 Part A

What is the total circuit resistance if it contains resistors 10 Ω, 20 Ω and 60 Ω, connected in parallel?

A. 60 Ω
B. 90 Ω
C. 20 Ω
D. 6 Ω ✓

Q17 Part A

Two resistors of resistance 20 Ω and 30 Ω are connected in series in a circuit. What is the current flow in the circuit if the voltage given is 250 V?

A. 5 A ✓
B. 20 A
C. 8 A
D. 12 A

Q18 Part A

What is the term used to describe organisms that produce their own food in an ecosystem?

A. Herbivores
B. Consumers
C. Producers ✓
D. Decomposers

Q19 Part A

What is the value of 10 km/hr in SI units?

A. 2.7 m/s ✓
B. 1000 m/s
C. 10 m/s
D. 0.16 m/s

Q20 Part A

The average of 5 results is 51 and that of the first 4 is 50. The 5th result is _____.

A. 55 ✓
B. 51
C. 50
D. 54

Q21 Part A

Which of the following statements is/are true about Functional Dimensions (F) in engineering drawing?

Statement 1: Functional Dimensions are essential to the function of the component or space.
Statement 2: Functional Dimensions are typically shown without limits.
Statement 3: Functional Dimensions are only shown for reference purposes.

A. Only statement 3 is true
B. Only statement 1 is true ✓
C. Only statements 2 and 3 are true
D. Only statements 1 and 2 are true

Q22 Part A

A cube with a mass of 5.74 g occupies a volume of 1.2 cm^3. The density (in g/cm^3) expressed with the correct number of significant figures is _____.

A. 4.8 ✓
B. 4.7833
C. 4.78
D. 4.783

Q23 Part A

What is the primary source of energy for most of the ecosystems?

A. Water
B. Soil
C. Wind
D. Sunlight ✓

Q24 Part A

Two plumbers, X and Y, are paid a total of ₹770 per day by their employer. If X is paid 140% of the sum paid to Y, then how much is Y paid (in ₹, rounded off to two decimal places) per day?

A. 320.83 ✓
B. 220.83
C. 270.83
D. 370.83

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Q25 Part A

What should come in place of the question mark (?) in the given alpha-numeric series?

G5, I10, L15, N20, Q25, S30, ?

A. W35
B. V40
C. U35
D. V35 ✓

Q26 Part A

Which of the following is a geometrical figure with a three-dimensional geometry that has eight vertices and six rectangular faces?

A. Cylinder
B. Cuboid ✓
C. Parallelogram
D. Pyramid

Q27 Part A

Ten people are sitting in two parallel rows with five people each in such a way that there is equal distance between adjacent persons.
In row I, A, B, C, D and E are seated and all of them are facing south.
In row II, R, S, T, U and V are seated and all of them are facing north.
Thus each person faces another person from the other row.
A sits at the extreme right end of their row and is facing U.
R sits at the centre of their row and is facing C. E sits between C and D and is facing T. S sits at the extreme right end of their row.

Who sits exactly opposite B?

A. U
B. V ✓
C. R
D. T

Q28 Part A

In a certain code language, 'BARE' is coded as '8264' and 'RIDS' is coded as '3587'. What is the code for 'R' in the given code language?

A. 6
B. 3
C. 5
D. 8 ✓

Q29 Part A

Which of the following will verify the credentials and documents of applicants uploaded on National Scholarship Portal?

A. Third party
B. National Scholarship Portal
C. Government
D. University/Institute in which applicant is studying ✓

Q30 Part A

The rate of doing work is known as _____.

A. kinetic energy
B. potential energy
C. power ✓
D. force

Q31 Part A

In the following series, only one letter-cluster is incorrect. Select the INCORRECT letter-cluster.

PCO MEM JGK GIJ DKG AME

A. AME
B. JGK
C. GIJ ✓
D. DKG

Q32 Part A

An ammeter of range 0 to 10 A shows a current of 7.5 A. If its true value is 6.2 A, the relative error is _____.

A. 17.33%
B. 13%
C. 20.96% ✓
D. 4.8%

Q33 Part A

Which of the following is NOT a benefit of use of mobile governance using ICT?

A. Increased transparency and accountability in the government
B. Increased efficiency in government processes
C. Reduced costs for the government ✓
D. Improved access to government services for citizens

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Q34 Part A

In a certain code language,

'A + B' means 'A is the mother of B',
'A − B' means 'A is the brother of B',
'A × B' means 'A is the wife of B' and
'A & B' means 'A is the father of B'.

How is E related to T if 'E & F + G − H × T'?

- A. Wife's mother's father ✓
- B. Wife's brother
- C. Wife's mother's brother
- D. Wife's father

Q35 Part A

Jaspreet deposited a sum of ₹58,550 at 20% rate of interest per annum, compounded annually. The total amount (in ₹) received by Jaspreet after 2 years will be:

- A. 84,312 ✓
- B. 83,876
- C. 84,735
- D. 84,700

Q36 Part A

Which of the following statements about geometric figures is/are true?

1. Geometric shapes are enclosed figures made by joining two or more points, lines, or curves.
2. Geometric shapes are always open-ended and made up of only straight lines.

- A. Both statements 1 and 2 are true
- B. Only statement 2 is true
- C. Neither statement 1 nor 2 is true
- D. Only statement 1 is true ✓

Q37 Part A

Which of the following letter-clusters should replace # and % so that the pattern and relationship followed between the letter-cluster pair on the left side of :: is the same as that on the right side of ::?

: HDI :: MIN : %

- A. # = JFK, % = KGL ✓
- B. # = JFI, % = KGL
- C. # = JFK, % = KHL
- D. # = JFK, % = KGM

Q38 Part A

An ammeter has 20 divisions between 0 A and 2 A. The least count of ammeter is _____.

- A. 0.2 A
- B. 1 A
- C. 0.1 A ✓
- D. 2 A

Q39 Part A

Refer to the following letter and symbol series and answer the question that follows. Counting to be done from left to right only.

(Left) ^ T J # * £ B L R Ω Y # E % S U $ K Q & (Right)

How many such letters are there, each of which is immediately preceded by a letter and also immediately followed by a symbol?

- A. Three
- B. One
- C. Four ✓
- D. Two

Q40 Part A

Which of the following orders of components is primarily responsible for executing instructions, storing permanent firmware, temporarily storing data during program execution and providing a platform for interconnecting hardware components on a computer motherboard?

- A. RAM - ROM - CPU - PCB
- B. CPU - ROM - RAM - PCB
- C. CPU - RAM - ROM - PCB ✓
- D. PCB - ROM - CPU - RAM

Q41 Part A

Which of the following is true?

- A. Both insulators and conductors allow heat to pass through them easily.
- B. Wood is a good conductor of heat.
- C. In a kitchen, aluminium vessels are used because aluminium is a good conductor of heat. ✓
- D. Plastic is a good conductor of heat.

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Q42 Part A

Which of the following statements regarding the use of a fire extinguisher is/are correct?
Statement 1: It is safe to attempt to extinguish any fire regardless of the presence of toxic smoke.
Statement 2: The P.A.S.S. technique, which stands for Pull, Aim, Squeeze and Sweep, is recommended for the effective use of a fire extinguisher.

- A. Only Statement 2 is correct. ✓
- B. Neither Statement 1 nor 2 is correct.
- C. Only Statement 1 is correct.
- D. Both Statements 1 and 2 are correct.

Q43 Part A

Which of the following best describes the primary function of a digital signature in electronic communication?

- A. It allows the recipient to edit the document before signing.
- B. It verifies the identity of the sender and ensures the integrity of the message. ✓
- C. It automatically archives all electronic documents for future reference.
- D. It encrypts the entire message content to ensure privacy.

Q44 Part A

Simplify 976 × 265 + 976 × 735.

- A. 752800
- B. 976000 ✓
- C. 658200
- D. 876000

Q45 Part A

Which of the following actions can help prevent slip and fall injuries?

- A. Walking on wet floors carefully
- B. Ignoring clutter in walkways
- C. Cleaning up spills immediately and using warning signs ✓
- D. Wearing loose footwear for comfort

Q46 Part A

Vijay rides a bicycle 10 m from home to his tuition, then 5 m to a shop. He travels back home the same way, covering the same distance. What is his total path length?

- A. 20 m
- B. 15 m
- C. 30 m ✓
- D. Zero

Q47 Part A

Which of the following devices is used to measure temperature?

- A. Thermometer ✓
- B. Hygrometer
- C. Odometer
- D. Voltmeter

Q48 Part A

Based on the English alphabetical order, three of the following four letter-clusters are alike in a certain way and thus form a group. Which letter-cluster DOES NOT belong to that group?
(Note: The odd one out is not based on the number of consonants/vowels or their position in the letter-cluster.)

- A. GMOT
- B. LRTY
- C. FLNS
- D. NTVB ✓

Q49 Part A

Four resistors of 4 ohm each are connected in parallel. Four such parallel combinations are then connected in series. The equivalent resistance is _____.

- A. 1 ohm
- B. 2 ohm
- C. 3 ohm
- D. 4 ohm ✓

Q50 Part A

A dozen pairs of jeans quoted at ₹3,520 are available at a discount of 35%. How many pairs of jeans can be bought for ₹572?

- A. 1
- B. 3 ✓
- C. 5
- D. 2

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Q51 Part A

In the following triad, each group of letters is related to the subsequent one following a certain logic. Select from the given options, the one which follows the same logic.

TERM–ERTM–TMRE

A. ZERO–EZRO–ZREO

B. WHEN–HWEN–WENH

C. USER–RESU–REUS

D. VICE–ICVE–VECI ✓

Q52 Part A

What should be done immediately after a fuel spillage in a workshop?

A. Use water to wash it away

B. Evacuate the area and contain the spill using absorbent materials ✓

C. Leave it unattended and inform the supervisor later

D. Cover it with plastic to prevent evaporation

Q53 Part A

Kinetic energy and potential energy together are called which form of energy?

A. Thermal

B. Mechanical ✓

C. Nuclear

D. Chemical

Q54 Part A

Ganpat starts from Point A and walks 18 m towards west. He takes a left turn, walks 32 m, takes a left turn, walks 26 m, turns left, walks 61 m and stops at Point B. Meena starts from Point Z, which is 22 m towards the east of Point A. She walks 42 m towards north, takes a right turn, walks 35 m, turns right and walks 13 m and stops at Point Y. What is the shortest distance between Point B and Point Y? (All turns are 90-degree turns only.)

A. 52 m

B. 57 m

C. 49 m ✓

D. 43 m

Q55 Part A

Match the columns.

Engineering Applications Type of Engineering Drawings
A) Plan, front elevation of homes to be built, foundation drawings P) Mechanical Engineering Drawings
B) Circuit diagrams and Electrical installation drawings Q) Electronics Engineering drawings
C) PCB tracks drawings R) Electrical Engineering drawings
D) Riveted joints and Welded joints S) Civil Engineering drawings

A. A-S ; B-R ; C-Q ; D-P ✓

B. A-S ; B-R ; C-P ; D-Q

C. A-P ; B-R ; C-Q ; D-S

D. A-S ; B-P ; C-Q ; D-R

Q56 Part A

The weight of an object on Earth is 60 N. What is its weight on the surface of the moon?

A. 10 N ✓

B. 60 N

C. 600 N

D. 6 N

Q57 Part A

If 50 : x :: x : 32, and x > 0, then find the value of x.

A. 45.8

B. 40.6

C. 40 ✓

D. 38.7

Q58 Part A

The average of three numbers is 20. If two numbers are 16 and 24, the third number is:

A. 22

B. 19

C. 21

D. 20 ✓

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Q59 Part A

In a certain code language, 'CARD' is coded as '8674' and 'MICE' is coded as '3517'. What is the code for 'C' in the given code language?

- A. 7 ✓
- B. 1
- C. 8
- D. 6

Q60 Part A

A copper spoon is dipped in hot water. What happens to its other end?

- A. It becomes hot by conduction. ✓
- B. It becomes cold by convection.
- C. It becomes cold by conduction.
- D. It becomes hot by convection.

Q61 Part A

Rinku riding his car covers 136 metres in 17 seconds. What is his speed (in km/hr)?

- A. 11.6
- B. 17
- C. 26
- D. 28.8 ✓

Q62 Part A

Convert 1 kilowatt hour (kW h) into joule.

- A. 1 kw h = 3.6×10^3 J
- B. 1 kw h = 3.6×10^7 J
- C. 1 kw h = 3.6×10^5 J
- D. 1 kw h = 3.6×10^6 J ✓

Q63 Part A

6 men or 5 women can complete a job in 7 days. 6 men work for 5 days and leave. The number of women required to complete the remaining work in 5 days is:

- A. 1
- B. 4
- C. 3
- D. 2 ✓

Q64 Part A

On which of the following factors does the resistivity of a conductor depend?

- A. Diameter of the conductor
- B. Area of the conductor
- C. Mass of the conductor
- D. Nature of the conductor ✓

Q65 Part A

According to the ISO-A size series, what is the designation of a trimmed sheet with dimensions 297 mm × 420 mm?

- A. A1
- B. A2
- C. A3 ✓
- D. A4

Q66 Part A

Which of the following statements is/are true?

Statement 1: Heat conductors allow heat to pass through them easily.
Statement 2: All plastics are good conductors of heat.

- A. Neither statement 1 nor 2
- B. Both statements 1 and 2
- C. Only statement 2
- D. Only statement 1 ✓

Q67 Part A

Which of the following is a supplementary protocol that allows non-ASCII data to be sent through e-mail?

- A. Multipurpose Internet Mail Extensions (MIME) ✓
- B. Mailing Lists
- C. DNS
- D. HTTPS

Q68 Part A

Which type of thermometer is used for measuring the internal temperature of ice?

- A. Digital thermometer
- B. Laboratory thermometer ✓
- C. Clinical thermometer
- D. Infrared thermometer

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Q69 Part A

Which of the following noise levels is considered potentially harmful to human health if experienced over extended periods?

A. 30 dB

B. 70 dB

C. 90 dB ✓

D. 50 dB

Q70 Part A

The area of a regular polygon with a side of 8 cm is 112 cm^2. If the perpendicular distance from the centre to the side of the polygon is 7 cm, then the number of sides of the polygon is:

A. 6

B. 5

C. 7

D. 4 ✓

Q71 Part A

Read the given statements and conclusions carefully. Assuming that the information given in the statements is true, even if it appears to be at variance with commonly known facts, decide which of the given conclusions logically follow(s) from the statements.

Statements:
Some bananas are litchis.
All litchis are kiwis.
Some kiwis are strawberries.

Conclusions:
1. All bananas being kiwis is a possibility.
2. All kiwis are litchis.

A. Neither conclusion 1 nor 2 follows

B. Only conclusion 1 follows ✓

C. Only conclusion 2 follows

D. Both conclusions 1 and 2 follow

Q72 Part A

What should come in place of the question mark (?) in the given series?

893 891 889 887 ? 883

A. 886

B. 986

C. 885 ✓

D. 985

Q73 Part A

In the SI system, which of the following options best describes the base quantities?

A. Length, mass, time ✓

B. Distance, speed, acceleration

C. Force, power, energy

D. Temperature, pressure, volume

Q74 Part A

The areas of three adjacent faces of a solid cuboid are 216 cm^2, 114 cm^2 and 19 cm^2. What is the volume (in cm^3) of the cuboid?

A. 955

B. 532

C. 684 ✓

D. 880

Q75 Part A

Two sets of numbers are given below. In each set of numbers, certain mathematical operation(s) on the first number result(s) in the second number. Similarly, certain mathematical operation(s) on the second number result(s) in the third number and so on. Which of the given options follows the same set of operations as in the given sets?

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

3 - 9 - 12 - 24; 4 - 16 - 20 - 40

A. 1 - 1 - 2 - 4 ✓

B. 9 - 2 - 11 - 24

C. 6 - 12 - 18 - 34

D. 7 - 49 - 56 - 122

Q76 Part A

A 280 m long train running at a speed of 72 km/hr passes a platform in 30 seconds. Find the length of the platform (in m).

A. 320 ✓

B. 335

C. 300

D. 280

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Q77 Part A

A fruit seller initially had some apples. He sold 40% of those and still had 300 apples. How many apples did he initially have?

A. 450

B. 750

C. 600

D. 500 ✓

Q78 Part A

In hot climate regions, the outer walls of the house are preferred to be white in colour because _____.

A. white colour reflects sunlight to make the interior of the house cool ✓

B. white colour looks good

C. white colour absorbs more sunlight to make the house bright

D. white colour makes the wall more durable

Q79 Part A

A, B, C, D, E and F live on six different floors of the same building. The lowermost floor in the building is numbered 1, the floor above it is numbered 2 and so on till the topmost floor is numbered 6. D lives on an odd-numbered floor but not 3. The sum of floors on which D and E live is 7. A lives immediately below C. F lives on the top floor. How many people live between E and F?

A. 2

B. 3 ✓

C. 4

D. 1

Q80 Part A

Which of the following is the safest method for disposing of toxic dust?

A. Sweeping it into open areas

B. Releasing it into the air for dilution

C. Using specialised hazardous waste disposal containers ✓

D. Dumping it in regular trash bins

Q81 Part A

Which of the following relations is NOT correct?

A. Electric Power = $(\text{Voltage})^2$ / Resistance

B. Electric Power = Voltage / Current ✓

C. Electric Power = Voltage × Current

D. Electric Power = $(\text{Current})^2$ × Resistance

Q82 Part A

Refer to the following letter and symbol series and answer the question that follows. Counting to be done from left to right only.

(Left) L R Ω Y A $ K ^ T J # Q & # E % S U * £ B (Right)

How many such symbols are there, each of which is immediately preceded by a vowel and also immediately followed by a letter?

A. Four

B. One

C. Two ✓

D. Three

Q83 Part A

How many base units are used to measure the physical quantities, according to SI units system?

A. 5

B. 7 ✓

C. 10

D. 4

Q84 Part A

What should come in place of the question mark (?) in the given series?

185 174 163 152 ? 130

A. 143

B. 144

C. 142

D. 141 ✓

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Q85 Part A

If $x^3 + y^3 = 16$ and $x + y = 4$, what is the value of xy?

A. 2

B. 3

C. 4 ✓

D. 0

Q86 Part A

In a hospital, the ratio between the number of doctors and the number of nurses was 1 : 3. When 12 new doctors joined the hospital and 24 nurses left the hospital, the ratio became 3 : 4. After the resignation of k more nurses from the hospital, the ratio becomes 1 : 1. Find the value of k.

A. 28

B. 26

C. 12 ✓

D. 24

Q87 Part A

Eight people are sitting in two parallel rows containing 4 people each in such a way that there is equal distance between adjacent persons. In row 1, A, B, C and D are seated, and all of them are facing south. In row 2, P, Q, R and S are seated, and all of them are facing north. Thus, each person faces another person from the other row. Only two people sit between P and Q. A faces the person sitting to the immediate left of P. R sits to the immediate left of S. D sits to the immediate right of C. Who among the following faces P?

A. B ✓

B. C

C. A

D. D

Q88 Part A

If 'A' stands for '÷', 'B' stands for '×', 'C' stands for '+' and 'D' stands for '−', what will come in place of the question mark (?) in the following equation?

38 C 32 A 4 D 5 B 7 = ?

A. 10

B. 11 ✓

C. 8

D. 9

Q89 Part A

A man purchased two varieties of pens at the rates of ₹8 for 9 pens and ₹8 per pen. If he purchased an equal number of pens of each of the two varieties and then sold all his pens at ₹6 per pen, what was his profit percentage?

A. 32%

B. 33%

C. 35% ✓

D. 45%

Q90 Part A

Which of the following expressions is NOT correct for electric power?

A. $P = \frac{V^2}{R}$

B. P = VI

C. $P = \frac{I^2}{R}$ ✓

D. 4. $P = I^2R$

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Q91 Part A

Work done is defined in science as _____.

A. 1. force × distance

B. $\frac{\text{force}}{\text{distance}}$

C. 3. force × displacement ✓

D. $\frac{\text{force}}{\text{displacement}}$

Q92 Part A

A cistern has two inlets I_1 and I_2. I_1 alone can fill it in 8 hours and I_2 in 4 hours. If both the inlets are open, what will be the time required to fill the cistern.

A. 2 hours

B. $4\frac{2}{3}$ hours

C. $2\frac{2}{3}$ hours ✓

D. $3\frac{2}{3}$ hours

Q93 Part A

A piece of rod $\frac{8}{9}$ metre long is broken into two pieces. If one piece is $\frac{1}{3}$ metre long, find the length (in m) of the other piece.

A. $\frac{7}{9}$

B. $\frac{5}{9}$ ✓

C. $\frac{2}{9}$

D. $\frac{4}{9}$

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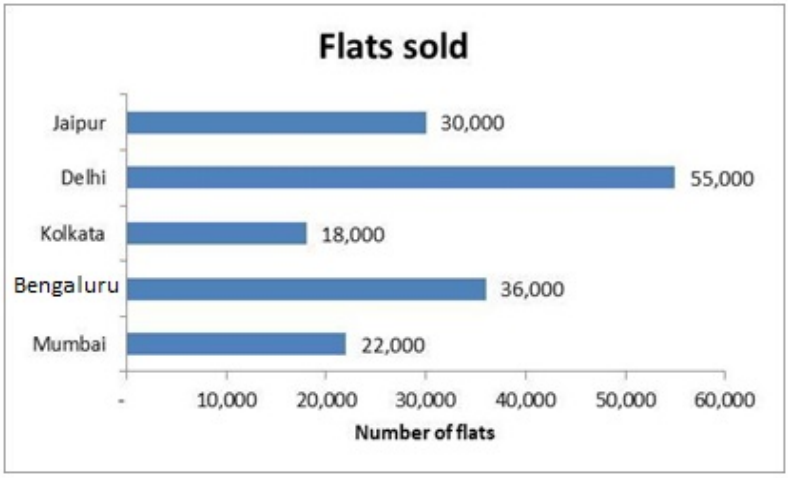
Q94 Part A

Study the given bar-graph and answer the question that follows.

The given bar-graph indicates the number of flats sold by a builder in five different cities in 2020.



The number of flats sold in Delhi is what percentage more than the number of flats sold in Mumbai?

A. 120%

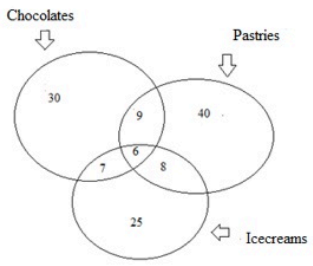
B. 75%

C. 125%

D. 150% ✓

Q95 Part A

Study the given diagram carefully and answer the question that follows. The numbers in different sections indicate the number of children preferring different desserts.



How many children prefer both pastries and ice creams but NOT chocolates?

A. 8 ✓

B. 7

C. 6

D. 9

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Q96 Part A

$$\frac{p^2 - n^2}{pn}$$

A. $\sin A . \cos A$ ✓

B. $\cot A . \cos A$

C. $\frac{\tan A}{\sec A}$

D. $= \cos A \ \mathrm{Cot} A$

Q97 Part A

From a rectangular cardboard sheet of length 46 m and breadth 8 m, three circular plates of radii 3 m, 2 m and 1 m are cut out. If the area of the remaining part of the cardboard sheet is equal to the area of a square, then find the length of each side of the square (use $\pi = \frac{22}{7}$).

A. 16 m

B. 20 m

C. 18 m ✓

D. 14 m

Q98 Part A

What does the symbol given below denote in a circuit diagram?

A. Variable resistor ✓

B. Resistor

C. Voltmeter

D. Voltage source

Q99 Part A

If $\frac{5}{9}$ of a number is 6 more than $\frac{1}{2}$ of the number, then what is the number?

A. 102

B. 104

C. 108 ✓

D. 106

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Q100 Part A

Find the value of $x^2 + y^2$, given the following.

$$x = 7 + \sqrt{5}, y = 7 - \sqrt{5}$$

A. 96

B. 108 ✓

C. 124

D. 137

Part B (Heat Engine)

75 Questions • Answer Key

Q101 Part B (Heat Engine)

What is the advantage of giving heat treatment to a material?

A. To decrease the melting point of the material

B. To increase the weight of the material

C. To change it from one element to another element

D. To make surgical knives of sharp edges ✓

Q102 Part B (Heat Engine)

For what purpose are pins and clips used in engineering drawings?

A. To transfer dimensions and dividing lines into a number of equal parts

B. To draw horizontal lines, parallel lines and to guide/hold the set squares

C. To fasten the drawing sheet on to the drawing board firmly so that it does not shake ✓

D. To support the drawing paper/tracing paper for making drawings

Q103 Part B (Heat Engine)

Which of the following files is used for filing narrow grooves and angles above 10°?

A. Knife-edge file ✓

B. Half round file

C. Square file

D. Triangular file

Q104 Part B (Heat Engine)

How are the steering arms set to achieve the Ackerman angle?

A. At right angle to spindle body

B. Slanted away from vehicle centre

C. Slanted towards vehicle centre ✓

D. Parallel to spindle body

Q105 Part B (Heat Engine)

In a lead-acid battery, what is the chemical composition of the material used for the positive plate during discharge?

A. Sulphuric acid (H_2SO_4)

B. Lead (Pb)

C. Lead dioxide (PbO_2) ✓

D. Lead sulfate ($PbSO_4$)

Q106 Part B (Heat Engine)

Rivets are typically made from what type of material?

A. Elastic materials

B. Brittle materials

C. Rigid materials

D. Ductile materials ✓

Q107 Part B (Heat Engine)

What is the use of a jack?

A. To lift and support a vehicle during repairs ✓

B. To provide additional braking power

C. To increase the vehicle's speed

D. To start the vehicle's engine

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Q108 Part B (Heat Engine)

Which of the following hand-operated drilling machines is used for drilling small diameter holes up to 6 mm?

A. Electric hand drill

B. Ratchet drilling machine

C. Breast drilling machine

D. Bevel gear type drilling machine ✓

Q109 Part B (Heat Engine)

Which of the following is an important safety measure during a power failure?

A. Using candles for lighting

B. Continuing to use equipment without verifying power status

C. Ensuring all machines and electrical equipment are turned off ✓

D. Ignoring alarm systems

Q110 Part B (Heat Engine)

If the current flowing through a conductor is 5 A and the resistance of the conductor is 10 ohms, what will be the voltage across the conductor, according to Ohm's Law?

A. 15 V

B. 50 V ✓

C. 5 V

D. 10 V

Q111 Part B (Heat Engine)

In an F-shaped combustion chamber, which of the following parts is generally NOT located on the extended side of the combustion chamber in a petrol engine?

A. Inlet valve

B. Spark plug

C. Outlet valve

D. Camshaft ✓

Q112 Part B (Heat Engine)

Which of the following materials CANNOT be welded using the CO_2 welding process?

A. Aluminium

B. Carbon steel

C. Magnesium ✓

D. Stainless steel

Q113 Part B (Heat Engine)

Which of the following is NOT the correct characteristic of an I-head combustion chamber used in a petrol engine?

A. I-head has higher surface to volume ratio and therefore there is a high amount of heat loss. ✓

B. I-head is superior to an L-head engine at high compression ratios.

C. I-head has a higher volumetric efficiency from larger valves or valve lifts.

D. I-head has less flame travel length and hence there is a greater freedom from knock.

Q114 Part B (Heat Engine)

Which type of gear applies in a car when the engine is running and the clutch is engaged, and the clutch shaft gear drives the drive gear of the lay shaft and thus lay shaft also rotates and the main shaft remains stationary as no gears in main shaft are engaged with lay shaft gears?

A. Top gear

B. First gear

C. Neutral gear ✓

D. Reverse gear

Q115 Part B (Heat Engine)

Oxidation in oxy-acetylene welding can lead to _____.

A. improved ductility

B. better weld appearance

C. porosity and oxide defects ✓

D. increased strength

Q116 Part B (Heat Engine)

The tandem master cylinder is also known as _____.

A. a dual-line brake ✓

B. an electric brake

C. a manual brake

D. a single-line brake

Q117 Part B (Heat Engine)

What is a key advantage of using MOSFETs in electronic circuits compared to other types of transistors?

A. High frequency response

B. High input impedance and low power consumption ✓

C. Ability to handle higher voltages and currents than BJTs

D. Ability to amplify both AC and DC signals

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Q118 Part B (Heat Engine)

A circular hole of radius 3 cm is cut from a rectangular sheet of dimensions 12 cm × 10 cm. Find the remaining area.

(Take π = 3.14)

A. 100 cm^2

B. 91.74 cm^2 ✓

C. 95.86 cm^2

D. 75.74 cm^2

Q119 Part B (Heat Engine)

What is the correct name of the top portion of the valve that interacts with the camshaft during operation of the engine?

A. Tip ✓

B. Puppet

C. Mushroom

D. Butterfly

Q120 Part B (Heat Engine)

What is the primary reason for electrical injuries when a person comes in contact with electrical equipment?

A. Electrical equipment is not properly grounded.

B. Current flows through the body causing harm. ✓

C. Devices are used for too long.

D. Electrical devices are too powerful.

Q121 Part B (Heat Engine)

When does a vacuum booster create a vacuum?

A. When the engine is off, and brake is applied

B. When the engine is running, and the brake is not applied ✓

C. When the fuel level is low

D. When the brake is applied

Q122 Part B (Heat Engine)

What is the main purpose of a carburetor in a gasoline engine?

A. Storing fuel for the engine

B. Atomising and vaporising ✓

C. Igniting the fuel-air mixture

D. Cooling the engine

Q123 Part B (Heat Engine)

A type of internal spring force expands a piston ring based on the design and properties of the material used. It is determined by _____.

A. forced piston ring gap

B. compressed spring ring gap

C. compressed ring gap

D. free piston ring gap ✓

Q124 Part B (Heat Engine)

What is the purpose of an emergency evacuation plan?

A. To ensure safe and orderly evacuation during emergencies ✓

B. To avoid safety drills

C. To increase productivity

D. To allow workers to leave early

Q125 Part B (Heat Engine)

In which part of the IC engine are the cylinder liners fitted?

A. Piston

B. Cylinder head

C. Cylinder block ✓

D. Crankcase

Q126 Part B (Heat Engine)

Non-functional dimensions are _____.

A. not essential for the function of the space or component ✓

B. essential for the function of the space or component

C. derived from the values of the related features of a drawing

D. directly derived from the values given on a drawing

Q127 Part B (Heat Engine)

What is the limiting value of compression ratio on which usually a petrol engine works?

A. Compression ratio = 6

B. Compression ratio = 8 ✓

C. Compression ratio = 22

D. Compression ratio = 14

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Q128 Part B (Heat Engine)

Which of the following organisations is responsible for enforcing workplace safety regulations in India?

A. World Health Organization (WHO)

B. Food and Drug Administration (FDA)

C. Directorate General of Factory Advice Service and Labour Institutes (DGFASLI) ✓

D. Environmental Protection Agency (EPA)

Q129 Part B (Heat Engine)

Why is it important for every person to follow safety procedures in the workplace?

A. To increase overall production efficiency

B. To minimise risks and avoid accidents ✓

C. To reduce operational costs significantly

D. To limit the need for frequent supervision

Q130 Part B (Heat Engine)

The unit for specific gravity is ____.

A. m/s^2

B. g/cm^3

C. kg/m^3

D. no unit (dimensionless) ✓

Q131 Part B (Heat Engine)

Arrange the following steps in the correct order to draw an equilateral triangle with each side of 35 mm.

1. Join CA and CB.
2. Draw a line and mark AB 35 mm as the side of the triangle.
3. With radius AB and center A and B, draw arcs cutting at C.
4. ABC is the required triangle.

A. 2, 3, 1, 4 ✓

B. 1, 2, 4, 3

C. 2, 1, 3, 4

D. 3, 2, 1, 4

Q132 Part B (Heat Engine)

What will happen if the new oil filter is not soaked in oil before installing it when changing the engine oil?

A. Filter clogs

B. Engine overheats

C. Engine noise increases

D. Oil level drops ✓

Q133 Part B (Heat Engine)

Which of the following instruments is used for the measurement of piston ring end gap in the cylinder?

A. Micrometer

B. Vernier caliper

C. Dial gauge

D. Feeler gauge ✓

Q134 Part B (Heat Engine)

After brazing, hammering the joint serves to _____.

A. reduce the melting point

B. increase the strength

C. check for leakages and remove flux ✓

D. improve the appearance

Q135 Part B (Heat Engine)

Which of the following vices consists of a handle and a small collet chuck at one end?

A. Hand vice

B. Pin vice ✓

C. Pipe vice

D. Toolmaker's vice

Q136 Part B (Heat Engine)

Which of the following statements is correct about engine valves?

A. The camshaft and its associated parts control the flame of sparks during ignition of the enigne.

B. The valve's head is perfectly positioned at a 30-45 degree angle that ideally fits with the valve seat, creating a firm seal. ✓

C. Valves with their conical shapes control the flow of the entry of gasses into an engine.

D. Poppet or mushroom valves are commonly found in two stroke engines for their remarkable features.

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Q137 Part B (Heat Engine)

A drawing instrument box is used to carry all _____ instruments.

- A. drawing ✓
- B. screening
- C. drilling
- D. casting

Q138 Part B (Heat Engine)

What is the main difference between a double piston with step bore and a double piston with straight bore wheel cylinder?

- A. The step bore has pistons with different diameters. ✓
- B. The step bore operates without hydraulic pressure.
- C. The step bore does not use brake shoes.
- D. The step bore uses a single piston.

Q139 Part B (Heat Engine)

Which of the following instruments works on the principle of the magnification of the small movement of the plunger or stylus that is converted into a rotary motion of the pointer on a circular scale?

- A. Pressure gauge
- B. Micrometer
- C. Vernier caliper
- D. Dial test indicator ✓

Q140 Part B (Heat Engine)

In what kind of applications are spot, seam, and projection welding frequently used?

- A. Joining thick steel plates
- B. Welding dissimilar metals
- C. Joining thin sheets in the manufacturing of vehicles and machinery ✓
- D. Creating intricate metal sculptures

Q141 Part B (Heat Engine)

A circuit consists of three resistors; 15 ohms, 10 ohms, and 20 ohms. The 15-ohm resistor is in series with the parallel combination of the 10-ohm and 20-ohm resistors. If a 24 V battery is applied across the circuit, what is the total current flowing through the circuit?

- A. 3.1 A
- B. 0.1 A
- C. 1.1 A ✓
- D. 2.1 A

Q142 Part B (Heat Engine)

A vital component of a car's clutch system positioned on the clutch housing, which slides along a hollow shaft and moves through the clutch fork aided by hydraulic or cable pressure, is known as:

- A. cushion spring
- B. clutch release bearing ✓
- C. lever
- D. fork arm

Q143 Part B (Heat Engine)

Which of the following type of lubricants are used as solid particles?

- A. Solid wax
- B. Grease
- C. Graphite ✓
- D. Silica

Q144 Part B (Heat Engine)

Which of the following steps is INCORRECT for micrometer adjustment?

- A. Insert the large end of wrench in the hole on the external cylinder.
- B. Use the wrench to rotate the cylinder until zero is aligned.
- C. Find set screw and loosen it.
- D. Open the micrometer using friction stop. ✓

Q145 Part B (Heat Engine)

In a diesel engine, heat is supplied at which of the following thermodynamic processes?

- A. At constant pressure process ✓
- B. At constant volume process
- C. At constant temperature process
- D. At adiabatic compression process

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Q146 Part B (Heat Engine)

When selecting a sheet size for an original drawing, what should be the primary consideration?

A. The standard size of the drawing office.

B. The clarity and resolution required. ✓

C. The orientation of the drawing (horizontal or vertical).

D. The size of the reproduction.

Q147 Part B (Heat Engine)

Which of the following options is correct when the pressure plate position is such that the cushion spring of clutch is NOT compressed?

A. It is in the engagement phase.

B. It is in the partial engagement phase.

C. The clutch is closed.

D. The clutch is open. ✓

Q148 Part B (Heat Engine)

Gaskets, seals and spacers are made using:

A. centre punch

B. hollow punch ✓

C. pin punch

D. prick punch

Q149 Part B (Heat Engine)

When using a multimeter to measure current, which of the following is correct?

A. The multimeter is connected directly to the power source.

B. The multimeter is connected in series with the load. ✓

C. The multimeter is connected only across resistive components.

D. The multimeter is connected in parallel with the load.

Q150 Part B (Heat Engine)

When measuring the resistance of a resistor using an ohmmeter, what does a reading of zero resistance indicate?

A. The resistor is functioning normally.

B. The resistor is open-circuited.

C. The resistor is short-circuited. ✓

D. The ohmmeter is malfunctioning.

Q151 Part B (Heat Engine)

Which of the following systems is used to transmit engine torque to the driving wheels to drive a vehicle on the road?

A. Transmission system ✓

B. Steering system

C. Differential gear mechanism

D. Four bar chain mechanism

Q152 Part B (Heat Engine)

Which of the following parts of a file is the part fitted to the tang for holding the file?

A. Tip or Point

B. Handle ✓

C. Edge

D. Tang

Q153 Part B (Heat Engine)

Which of the following types of lube oils are used in airline industries?

A. Grease and bee wax lubricants

B. Natural petroleum lubricants

C. Synthetic lubricants ✓

D. Biodiesel lubricants

Q154 Part B (Heat Engine)

Which of the following metals is NOT used for manufacturing of piston bearing?

A. Copper

B. Lead

C. Cast iron ✓

D. Silicon

Q155 Part B (Heat Engine)

What should you do to ensure your personal safety at work?

A. Wear personal protective equipment. ✓

B. Work in a hurry without checking equipment.

C. Ignore warning signs and instructions.

D. Take risks to finish tasks quickly.

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Q156 Part B (Heat Engine)

In a velocity-time graph, the negative slope represents _____.

- A. retardation ✓
- B. displacement
- C. acceleration
- D. distance

Q157 Part B (Heat Engine)

What should be done if oil or grease is found on the clutch lining?

- A. Clean with petrol
- B. Tighten the pressure spring
- C. Replace new lining ✓
- D. Apply more grease

Q158 Part B (Heat Engine)

Which of the following methods helps the easier assembly and disassembly by providing a more efficient way to fit the connecting rod around the crankshaft journal, particularly in tight engine compartment, in an internal combustion engine?

- A. Small end trimming linearly on a connecting rod
- B. Big end split orthogonally on a connecting rod
- C. Big end split obliquely on a connecting rod ✓
- D. Small end union linearly on a connecting rod

Q159 Part B (Heat Engine)

The percentage of energy loss per unit deformation from friction happening inside the rubber, which creates heat build-up in the rubber, and is measured as in terms of the temperature, is known as _____.

- A. creep
- B. resilience
- C. stress-strain test
- D. hysteresis ✓

Q160 Part B (Heat Engine)

Which of the following types of pliers is used to shape loops in wires and to form curves in light metal strips?

- A. Flat nose pliers
- B. Round nose pliers ✓
- C. Slip-joint pliers
- D. End cutting pliers

Q161 Part B (Heat Engine)

What is the result of not providing adequate ignition timing advance when using weak mixtures?

- A. Better fuel vaporisation
- B. Increased power output
- C. Lower fuel consumption
- D. Engine overheating and misfiring ✓

Q162 Part B (Heat Engine)

A tube-like structure lies between a piston and cylinder wall that regulates the flow of air and fuel inside the cylinder. This valve has a small hole in the side that promptly lines up with the hole of a cylinder. This valve is known as:

- A. butterfly valve
- B. sleeve valve ✓
- C. valve in form of port
- D. poppet valve

Q163 Part B (Heat Engine)

A mechanism that can split the power of a propeller shaft to the rear axle and produce variation in the speed of rear wheels when the vehicle takes a turn is called a/an:

- A. integral unit
- B. automatic clutch unit
- C. torque convertor
- D. differential unit ✓

Q164 Part B (Heat Engine)

Which of the following elements is used in lubrication oil as an anti-wear additive?

- A. Copper (Cu) ✓
- B. Barium (Ba)
- C. Boron (B)
- D. Calcium (Ca)

Q165 Part B (Heat Engine)

Which of the following designs have the advantage of effectively preventing contact slippage and axial misplacement of the connecting rod cover and connecting rod body?

- A. Straight cut design
- B. Oval cut design
- C. Obliquely cut design ✓
- D. Curvilinear cut design

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Q166 Part B (Heat Engine)

What is the main function of a master cylinder in a braking system?

- A. To build up hydraulic pressure to operate the brakes ✓
- B. To measure the brake fluid level
- C. To control the engine speed
- D. To absorb vibrations from the road

Q167 Part B (Heat Engine)

What is the name of the tool used for force amplification?

- A. Wheel
- B. Allen key
- C. Screw driver
- D. Lever ✓

Q168 Part B (Heat Engine)

According to BIS SP 46-2003, which of the following applications is correctly represented by a chain-thin line in engineering drawings?

- A. Center lines ✓
- B. Hidden edges
- C. Dimension lines
- D. Visible edges

Q169 Part B (Heat Engine)

The temperature of the air after compression stroke in a CI engine is:

- A. less than ambient temperature
- B. ambient temperature only
- C. high but not enough to ignite the fuel as spark plug is used to ignite the fuel
- D. high enough to auto-ignite the fuel without any external ignition source ✓

Q170 Part B (Heat Engine)

Which of the following statements is INCORRECT about the four-stroke diesel engine?

- A. Cycles in both petrol and diesel engines consist of suction, compression, ignition, expansion and exhaust.
- B. In C.I. engines, air-fuel mixture is sucked during the stroke and the fuel is injected in the cylinder near the end of the compression stroke. ✓
- C. In C.I. engines, only air is sucked during the stroke and the fuel is injected in the cylinder near the end of the compression stroke.
- D. The operation of C.I. engines (or diesel engines) is practically the same as those of S.I. engines.

Q171 Part B (Heat Engine)

What should be done if the air filter element of the dry-type air cleaner is clogged?

- A. Clean it with compressed air
- B. Wash it with detergent
- C. Inspect it visually
- D. Replace it ✓

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Q172 Part B (Heat Engine)

Based on the given diagram, identify the type of jack depicted.

A. Heavy duty bottle type hydraulic jack

B. Trolley type hydraulic jack

C. Light weight screw jack (manual type lifting jack) ✓

D. Axle stand

Q173 Part B (Heat Engine)

$\cos\theta$

A. $\frac{3}{5}$

B. $\frac{4}{5}$ ✓

C. $\frac{5}{4}$

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

Q174 Part B (Heat Engine)

Which of the following is the correct expression for power developed at the crankshaft in terms of mechanical efficiency?

Consider BP - brake power, IP - Indicated power

A. $BP = IP \times \text{Mechanial efficiency}$ ✓

B. $IP = \text{Mechanical efficiency} \times PB$

C. $BP = \frac{(\text{Mechanical efficiency} + IP)}{100}$

D. $BP = \frac{\text{Mechanical Efficiency}}{IP}$

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Q175 Part B (Heat Engine)

$$\left(\frac{3}{8}\right) + \left(\frac{5}{12}\right)$$

A. $\frac{17}{24}$

B. $\frac{19}{24}$ ✓

C. $\frac{8}{20}$

D. $\frac{7}{12}$

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Part A

100 Questions • Answer Key

Q1 Part A

The resistance of a particular material wire with length L and cross-sectional area A is 2 Ω. What would be the resistance of another wire of the same material having length 2L and area of cross-section A/2?

A. 1 Ω
B. 2 Ω
C. 8 Ω ✓
D. 4 Ω

Q2 Part A

If 46.4 : x :: x : 2.9, and x > 0, then find the value of x.

A. 15.6
B. 13.4
C. 11.6 ✓
D. 14.3

Q3 Part A

What is the first step in providing first aid for a minor burn?

A. Apply butter to the burn
B. Run cool water over the burn ✓
C. Cover the burn with a thick cloth
D. Pop any blisters that form

Q4 Part A

Which of the following is an example of preventive maintenance?

A. Using equipment until failure occurs
B. Conducting regular lubrication and inspections ✓
C. Waiting for a machine to break down before repairing it
D. Ignoring minor faults to save costs

Q5 Part A

The measures of two supplementary angles are in the ratio 3 : 7. Find the measure of the greater of the two angles.

A. 126° ✓
B. 54°
C. 180°
D. 144°

Q6 Part A

A, B, C, D, E, F and G are sitting around a circular table facing the centre. G is sitting second to the left of E. B is sitting third to the right of A. C is the immediate neighbour of both E and B. D is sitting to the immediate left of G. How many people are sitting between E and F when counted from the right of E?

A. Two ✓
B. One
C. Three
D. Four

Q7 Part A

A, B, C and D are four partners in a business. A's investment is two-thirds of D's investment. B and C invest equal amounts, and C's investment is half of D's investment. If they earn ₹137.6 lakh at the end of one year, then find the total share (in ₹ lakh) of A and B put together.

A. 60.2 ✓
B. 59.2
C. 63.2
D. 62.2

Q8 Part A

A rheostat in the electrical circuit is used to _____.

A. measure the voltage only
B. measure the current and voltage both
C. change the resistance in the circuit ✓
D. measure the current only

Q9 Part A

Based on the English alphabetical order, three of the following four letter-clusters are alike in a certain way and thus form a group. Which letter-cluster DOES NOT belong to that group?
(Note: The odd one out is not based on the number of consonants/vowels or their position in the letter-cluster.)

A. NQIL
B. RUNP ✓
C. BEWZ
D. WZRU

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Q10 Part A

A car starts from New Delhi and travels to Agra. The distance between the two cities is 300 km. The car travels back to New Delhi. What is the total distance travelled and the displacement of the car? (Assume the car reaches the same point and the route followed is exactly same for both travels.)

- **A.** Distance travelled is 600 km and displacement is 0 km ✓
- **B.** Distance travelled is 300 km and displacement is 0 km
- **C.** Distance travelled is 0 km and displacement is 0 km
- **D.** Distance travelled is 0 km and displacement is 600 km

Q11 Part A

Which ICT (Information and Communication Technology) service is commonly used for activities like railway reservation in e-Governance?

- **A.** Web portals ✓
- **B.** Online payment gateways
- **C.** Email services
- **D.** Social media platforms

Q12 Part A

Refer to the following letter and symbol series and answer the question that follows. Counting to be done from left to right only.

(Left) ^ T J # L R Ω Y # % S U $ E K Q & * £ B (Right)

How many such symbols are there, each of which is immediately preceded by a symbol and also immediately followed by a letter?

- **A.** One
- **B.** Two ✓
- **C.** Three
- **D.** Four

Q13 Part A

Read the given statements and conclusions carefully. Assuming that the information given in the statements is true, even if it appears to be at variance with commonly known facts, decide which of the given conclusion(s) logically follow(s) from the statements.

Statements:
Some cats are rats.
All bats are tables.
All rats are bats.

Conclusions:
(I): Some cats are bats.
(II): All bats are rats.

- **A.** Only conclusion (I) follows. ✓
- **B.** Both conclusions (I) and (II) follow.
- **C.** Only conclusion (II) follows.
- **D.** Neither conclusion (I) nor (II) follows.

Q14 Part A

What should come in place of the question mark (?) in the given series?

67 106 88 127 109 148 ?

- **A.** 117
- **B.** 108
- **C.** 130 ✓
- **D.** 126

Q15 Part A

A train goes from A to B at a speed of 40 km/hr and returns from B to A by the same route at 10 km/hr. The average speed (in km/hr) of the train during the two-way journey is:

- **A.** 16 ✓
- **B.** 19
- **C.** 14
- **D.** 15

Q16 Part A

The list price of an article is ₹5,100 and a discount of 32% is offered on the list price. What additional discount per cent on the already discounted price must be offered to a customer to bring the net selling price to ₹1,734?

- **A.** 46%
- **B.** 49%
- **C.** 55%
- **D.** 50% ✓

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Q17 Part A

A, B, C, D, E and F live on six different floors of the same building. The lowermost floor in the building is numbered 1, the floor above it is numbered 2 and so on till the topmost floor, which is numbered 6. F lives on an even-numbered floor but not on floor 6. The sum of the floors on which D and F live is 9. The sum of the floors on which F and B live is 5. E lives immediately below C. How many people live between D and E?

A. 1

B. 2 ✓

C. 4

D. 3

Q18 Part A

A, B, C, D, E, F and G are sitting around a circular table facing the centre. Only two people sit between G and C when counted from the left of C. F sits third to the left of E. B sits to the immediate right of E. B sits second to the left of G. D is an immediate neighbour of F.
How many people sit between A and C when counted from the right of C?

A. 1

B. 4

C. 2 ✓

D. 3

Q19 Part A

In a rare coin collection, there was one gold coin for every five non-gold coins. Then, 18 more gold coins were added to the collection, after which the ratio of gold coins to non-gold coins became 5 : 7. How many coins in all are now there in the collection?

A. 75

B. 45

C. 55

D. 60 ✓

Q20 Part A

There is a rectangular sheet whose dimensions are 15.2 cm ± 0.1 cm in length and 9.1 cm ± 0.1 cm in width. What is the error in the estimation of the area of the rectangular sheet?

A. 5 cm^2

B. 13 cm^2

C. 0.3 cm^2

D. 2 cm^2 ✓

Q21 Part A

In a project involving the design of a pipeline for a building, which technical drawings would need to be referenced together?

A. Electrical and Electronics

B. Mechanical and Electrical

C. Civil and Electronics

D. Mechanical and Civil ✓

Q22 Part A

A man purchased two varieties of apples at the rate of ₹4 for 5 apples and ₹4 per apple, respectively. If he purchased an equal number of apples of each variety and then sold all the apples at ₹3 per apple, what will be his profit percentage?

A. 0.24%

B. 0.25% ✓

C. 0.23%

D. 0.2%

Q23 Part A

Reeta invests a certain sum of money at a certain rate of simple interest per annum, and the interest she gets is equal to one-fourth of the sum invested. If the time period (in years) of investment is equal to the percentage rate of interest per annum, for how many years did Reeta invest the sum of money?

A. 7

B. 5 ✓

C. 6

D. 4

Q24 Part A

Which of the following statements is correct?

A. On increasing the length of the conductor, resistance is decreased.

B. On increasing the length of the conductor, resistance is increased. ✓

C. On increasing the thickness of the conductor, resistance is increased.

D. On increasing the length of the conductor, resistance remains unchanged.

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Q25 Part A

Which of the following letter-clusters should replace # and % so that the pattern and relationship followed between the letter-cluster pair on the left side of :: is the same as that on the right side of ::?

: EAG :: IEK : %

A. # = FBH, % = HDI

B. # = FBH, % = HEJ

C. # = FBH, % = HDJ ✓

D. # = FBG, % = HDJ

Q26 Part A

How does the thermal pollution of water affect the water quality?

A. Increases pH of water

B. Oxygen level in water gets reduced ✓

C. Sediments get settled soon

D. Alters the colour of water

Q27 Part A

If a ball is thrown upwards, the work done by the gravitational force on the ball is _____.

A. zero

B. negative ✓

C. positive

D. independent of the displacement of the ball

Q28 Part A

Which of the following options represents the equation for work done?

A. Work done = force − displacement

B. Work done = force / displacement

C. Work done = force × displacement ✓

D. Work done = force + displacement

Q29 Part A

Calculate the kinetic energy of a body of mass 10 kg moving with a uniform velocity of 5 m s^{-1}.

A. 120 J

B. 50 J

C. 125 J ✓

D. 25 J

Q30 Part A

The resistivity of a conductor depends on the _____.

A. material ✓

B. potential difference across conductor

C. cross-sectional area

D. length of conductor

Q31 Part A

In a certain code language,
'A × B' means 'A is the son of B',
'A − B' means 'A is the brother of B',
'A + B' means 'A is the wife of B' and
'A % B' means 'A is the father of B'.

How is M related to T if 'M × N − P % S + T'?

A. Wife's mother's brother

B. Wife's mother's brother's son

C. Wife's father's brother's son ✓

D. Wife's father's brother

Q32 Part A

In this question, two statements I and II have been given. These statements may be independent causes or effects of independent causes or a common cause. One of the statements may be the effect of the other statement. Read both the statements carefully and select the correct answer.

I. The local river's water levels have reached an all-time low this summer, disrupting water supply to the nearby towns.
II. Several power plants in the region have reported reduced electricity production due to insufficient water for cooling processes.

A. Both I and II are effects of independent causes.

B. II is the cause and I is its possible effect.

C. Both I and II are independent causes.

D. I is the cause and II is its possible effect. ✓

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Q33 Part A

Which of the following statements are true regarding general safety in the workshop?
Statement 1: Use any available tool for the job, even if it is not the correct one.
Statement 2: Keep the tools in their proper place after use.
Statement 3: Clean the machine while it is still running.
Statement 4: Replace worn-out or damaged tools immediately.

A. Statements 1 and 2 are true.
B. Statements 1 and 3 are true.
C. Statements 3 and 4 are true.
D. Statements 2 and 4 are true. ✓

Q34 Part A

An 8 Ω resistor generates 200 J of heat every second. What is the potential difference across the resistor?

A. 10 V
B. 20 V
C. 30 V
D. 40 V ✓

Q35 Part A

Which of the following units are used to measure only fundamental physical quantities?

A. Neither base nor derived units
B. Base units ✓
C. Derived units
D. Both base and derived units

Q36 Part A

In a certain code language, 'GIFT' is coded as '8264' and 'FEAR' is coded as '3527'. What is the code for 'F' in the given code language?

A. 2 ✓
B. 6
C. 5
D. 3

Q37 Part A

Find the four-digit dividend of 21, 42, 147 and 105 that will give the remainder 14, 35, 140 and 98, respectively.

A. 8813 ✓
B. 8019
C. 8034
D. 8816

Q38 Part A

5 men or 9 women can do a job in 9 days. 5 men work for 7 days and leave. The number of women required to complete the remaining work in 9 days is:

A. 2 ✓
B. 1
C. 4
D. 5

Q39 Part A

Which of the following fundamental quantities are used to express any mechanical quantity?

A. Length, time and energy
B. Length, mass and time ✓
C. Length, mass and speed
D. Mass, time and force

Q40 Part A

What is the typical range of wind speed (in m/s) required for the efficient operation of most commercial wind turbines?

A. 12 - 25 m/s
B. 0 - 2 m/s
C. 3 - 5 m/s
D. 5 - 15 m/s ✓

Q41 Part A

In a certain code language, 'while you wait' is coded as 'ns bg sp' and 'why wait now' is coded as 'kc rw bg'. How is 'wait' coded in the given language?

A. kc
B. ns
C. bg ✓
D. sp

Q42 Part A

A bulb is connected across a battery of 10 V for 20 seconds. If a current of 2 A flows through it, calculate the heat energy generated by the bulb.

A. 200 J
B. 120 J
C. 100 J
D. 400 J ✓

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Q43 Part A

Mechanical energy is the sum of _____.

A. electrical energy and light energy

B. chemical energy and electrical energy

C. potential energy and kinetic energy ✓

D. heat energy and chemical energy

Q44 Part A

What is the normal range of temperature for a healthy human body in Kelvin?

A. (283.15-323.15) K

B. (308.15-315.15) K ✓

C. (301.15-323.15) K

D. (293.15-323.15) K

Q45 Part A

A class of 30 students appeared in a test. The average score of 12 students is 68, and that of the rest is 70. What is the average score of the class?

A. 68.2

B. 70.2

C. 67.2

D. 69.2 ✓

Q46 Part A

What should come in place of the question mark (?) in the given series?

197 112 189 129 181 146 173 163 ?

A. 165 ✓

B. 156

C. 144

D. 153

Q47 Part A

If the arithmetic mean of A and B is 70 and the arithmetic mean of B and C is 110, what is the value of C − A?

A. 90

B. 60

C. 70

D. 80 ✓

Q48 Part A

Which of the following correctly identifies the main components of a standard email structure?

A. Subject Line, Recipient Address, Message Body and Signature ✓

B. Username, Password, Message Body and Signature

C. Header, Body, Footer and Encryption Key

D. Recipient Address, CC, BCC and Attachment

Q49 Part A

How many folds is/are required to fold an A2 size drawing sheet (420 mm × 594 mm), according to BIS SP: 46-2003?

A. 2 folds

B. 1 fold

C. 4 folds

D. 3 folds ✓

Q50 Part A

If a force of 6 N is applied on a body, which is displaced through 2 m in the direction of the force, the work done is found to be _____.

A. 3 J

B. 4 J

C. 10 J

D. 12 J ✓

Q51 Part A

Select the option that is true regarding the following two statements labelled Assertion (A) and Reason (R).

Assertion (A): It is safe to work under a suspended load if you are in a hurry.
Reason (R): Never exceed the safe working load (SWL) of the equipment you are using.

A. Assertion (A) is false, but Reason (R) is true. ✓

B. Assertion (A) is true, but Reason (R) is false.

C. Both (A) and (R) are true, and (R) is the correct explanation of (A).

D. Both (A) and (R) are true, but (R) is not the correct explanation of (A).

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Q52 Part A

In the following series, only one letter-cluster is incorrect. Select the INCORRECT letter-cluster.

INK KPJ MRI OTH QWG SXF

- A. QWG ✓
- B. SXF
- C. MRI
- D. OTH

Q53 Part A

Neha swims in a pool that is 50 metres long. She covers 100 metres in 1 minute by swimming from one end of the pool to the other and back along the same straight path. Find her average velocity (in m/s).

- A. 0 m/s ✓
- B. 2.5 m/s
- C. 3.2 m/s
- D. 1.7 m/s

Q54 Part A

Generally, what is the process of heat transfer in liquids?

- A. Both conduction and radiation
- B. Convection ✓
- C. Conduction only
- D. Radiation only

Q55 Part A

SI unit of luminous intensity is ____.

- A. candela ✓
- B. mole
- C. metre
- D. watt

Q56 Part A

Identify the correct pair of Personal Protective Equipment (PPE) categories based on the nature of the hazard.

- A. Non-respiratory: Safety goggles, Respiratory: Safety gloves
- B. Non-respiratory: Nose mask, Respiratory: Safety boots
- C. Non-respiratory: Ear plugs, Respiratory: Safety shoes
- D. Non-respiratory: Safety helmet, Respiratory: Nose mask ✓

Q57 Part A

In the following number-pairs, the second number is obtained by applying certain mathematical operations to the first number. Which numbers should replace X and Y so that the pattern followed by the two numbers on the left side of :: is same as that on the right side of ::?

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

X : 179 :: 22 : Y

- A. X = 15, Y = 223
- B. X = 16, Y = 222
- C. X = 18, Y = 219 ✓
- D. X = 16, Y = 219

Q58 Part A

Which of the following features is NOT available in Google Docs?

- A. Insert images
- B. Comment on text
- C. Create tables
- D. Track changes ✓

Q59 Part A

Kaushik starts from Point A and walks 32 m towards the east. He takes a right turn, walks 16 m and then takes a right turn, walks 14 m, reaches Point B and stops. Chitra starts from Point Z which is 60 m towards the east of Point A. She walks 18 m towards north, takes a right turn, walks 19 m, turns right and walks 65 m, turns right and walks 61 m and stops at Point Y. What is the shortest distance between Point B and Point Y? (All turns are 90 degree turns only.)

- A. 33 m
- B. 31 m ✓
- C. 29 m
- D. 25 m

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Q60 Part A

Which of the following statement(s) is/are true regarding electrical safety practices?

1. It is safe to plug multi-outlet bars into other multi-outlet bars as long as the total load does not exceed the rated capacity of the outlets.
2. Electrical equipment should not be used near wet surfaces or when your hands are wet, and power cords should be protected by avoiding placement under rugs or mats.

A. Only Statement 1 is true.
B. Only Statement 2 is true. ✓
C. Both Statements 1 and 2 are true.
D. Neither Statement 1 nor 2 is true.

Q61 Part A

In the following triad, each group of letters is related to the subsequent one following a certain logic. Select from the given options, the one which follows the same logic.

GRAND–GRNAD–DNARG

A. MINOR–MOINR–RNOIM
B. INDEX–DEXIN–XDEIN
C. NIGHT–NGHIT–THGIN
D. FRUIT–FRIUT–TIURF ✓

Q62 Part A

Two sets of numbers are given below. In each set of numbers, certain mathematical operation(s) on the first number results in the second number. Similarly, certain mathematical operation(s) on the second number results in the third number and so on. Which of the given options follows the same set of operations as in the given sets?

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

68 – 136 – 121 – 363; 29 – 58 – 43 – 129

A. 35 – 70 – 55 – 165 ✓
B. 73 – 146 – 114 – 228
C. 13 – 26 – 46 – 138
D. 42 – 84 – 74 – 222

Q63 Part A

Determine the energy of an object with a mass of 5 kg at a height of 8 metres above the ground. Assume the value of 'g' as 9.8 m s^{-2}.

A. 392 J ✓
B. 300 J
C. 784 J
D. 400 J

Q64 Part A

A person saves 10% of his monthly income. If his monthly income increases by 30%, then he saves 20% more than the previous savings. The percentage increase in his expenditure, correct to two places after decimal, is _____.

A. 37.33%
B. 24.89%
C. 40.44%
D. 31.11% ✓

Q65 Part A

Which of the following letter-number clusters will replace the question mark (?) in the given series?

6S, 24T, 12V, 48Y, 24C, ?

A. 96H ✓
B. 96I
C. 96G
D. 60H

Q66 Part A

Which of the following factors affect(s) the resistance of a wire?

A. The length, cross-sectional area and material of the wire ✓
B. Only material of the wire
C. Only length and cross-sectional area of the wire
D. Only length of the wire

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Q67 Part A

The sum of the ages of a grandfather, his son, and his grandson is 128 years. The grandfather is twice as old as his son, and the son is five times as old as the grandson. Determine the age (in years) of the grandson.

A. 6

B. 8 ✓

C. 7

D. 9

Q68 Part A

Which of the following is commonly used to treat drinking water?

A. Acid neutralisation

B. Chlorination ✓

C. Oil filtration

D. Incineration

Q69 Part A

The areas of three adjacent faces of a solid cuboid are 190 cm^2, 285 cm^2 and 150 cm^2. What is the volume (in cm^3) of the cuboid?

A. 2716

B. 3076

C. 2896

D. 2850 ✓

Q70 Part A

Based on the English alphabetical order, three of the following four letter-cluster pairs are alike in a certain way and thus form a group. Which letter-cluster pair DOES NOT belong to that group?
(Note: The odd one out is not based on the number of consonants/vowels or their position in the letter-cluster.)

A. DJ – BT ✓

B. MS – KB

C. TZ – RI

D. WC – UL

Q71 Part A

The resistance of a uniform metallic conductor depends on its:

A. melting point only

B. length, area of cross-section, and nature of its material ✓

C. area of cross-section only

D. length only

Q72 Part A

The dimension of surface tension is _____.

A. ML^0T

B. ML^2T^{-2}

C. MLT^{-2}

D. ML^0T^{-2} ✓

Q73 Part A

Refer to the following letter and symbol series and answer the question that follows. Counting to be done from left to right only.

(Left) ^ T J # L R Ω Y # E % S U $ K Q & * £ B (Right)

How many such symbols are there each of which is immediately preceded by a letter and also immediately followed by another symbol?

A. One ✓

B. Two

C. Three

D. Four

Q74 Part A

Samir takes 6 days to complete a piece of work, while Tanvir can complete it in 8 days. If Amir also joins them, together, the trio can complete the entire work in 3 days. If a total sum of ₹2,400 is to be paid for the job, how much will Amir receive for his contribution?

A. ₹300 ✓

B. ₹430

C. ₹250

D. ₹340

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Q75 Part A

What is the recommended action before replacing a fuse?

A. Wear a safety belt.

B. Use rubber gloves.

C. Switch off circuit. ✓

D. Stand on a stool.

Q76 Part A

An auto A covers a distance in 2 hours at the speed of 42 km/hr. Another auto B covers twice the distance covered by A in 5 hours. What is the speed of auto B (in km/hr)?

A. 31.2

B. 36.3

C. 34.2

D. 33.6 ✓

Q77 Part A

What will come in place of the question mark (?) in the following equation, if '+' and '−' are interchanged and '×' and '÷' are interchanged?

9 ÷ 5 + 70 × 7 − 11 = ?

A. 45

B. 44

C. 46 ✓

D. 47

Q78 Part A

The body of the cooking vessel is of metal and handles are of plastic because _____.

A. metal is a good conductor of heat and plastic is an insulator ✓

B. both metal and plastic are insulators

C. metal is an insulator and plastic is a good conductor of heat

D. both metal and plastic are good conductors of heat

Q79 Part A

Which of the following statements is correct?

A. There is no method to convert temperature from one temperature scale to another.

B. The normal human body temperature is 45°C.

C. Laboratory thermometer is used to measure human body temperature.

D. The normal human body temperature is 98.6°F. ✓

Q80 Part A

What is the most effective way to avoid mechanical hazards when operating large and dangerous machines?

A. Employee physical fitness training only

B. Machine redesign to eliminate hazards

C. Proper training and experience ✓

D. Regular machine maintenance only

Q81 Part A

A product, whose MRP is ₹1,590, is sold for ₹835 by a wholesale shop owner. What is the percentage of discount given by him (nearest to its integer)?

A. 49%

B. 46%

C. 47% ✓

D. 45%

Q82 Part A

For a given potential difference (V), current (I) and resistance (R) across a conductor, Ohm's law is represented as:

A. V = I + R

B. V = I − R

C. I = VR

D. V = IR ✓

Q83 Part A

Given below are two statements numbered I and II. These statements may be independent causes or effects of independent causes or a common cause. One of the statements may be the effect of the other statement. Read both the statements carefully and select the correct answer.

Statements:

I. Traffic police has issued a traffic advisory regarding the diversion of traffic for the next two days due to closure of Raj Bhavan Road.

II. The Municipal Corporation is planning to repair the pot holes in Raj Bhavan Road tomorrow.

A. II is the cause and I is its possible effect. ✓

B. I is the cause and II is its possible effect.

C. Both I and II are independent causes.

D. Both I and II are effects of independent causes.

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Q84 Part A

The value of 32 − 4 [4 + 5 (4 − 4 (6 − 2) + 4) − 18] ÷ 6 is:

A. 58
B. 68 ✓
C. 60
D. 56

Q85 Part A

Which of the following is NOT a heat insulator?

A. Silver ✓
B. Plastic
C. Wool
D. Rubber

Q86 Part A

Which of the following processes is primarily responsible for heat loss from a hot utensil?

A. Radiation ✓
B. Conduction
C. Absorption
D. Convection

Q87 Part A

Which chemical process involves replacing the R group of an alcohol with the R' group of an ester to produce biodiesel from vegetable oils?

A. Transesterification ✓
B. Fermentation
C. Distillation
D. Polymerisation

Q88 Part A

Each of I, J, K, L, U, V and W has an exam on a different day of a week, starting from Monday and ending on Sunday of the same week. Only two people have the exam before V. Only one person has the exam after L. Only three people have the exam between V and I. Only one person has the exam between J and K. W has the exam immediately before J. Who among the following has the exam on Friday?

A. W
B. U ✓
C. V
D. I

Q89 Part A

Which of the following terms describes the process of the gradual increase in the average temperature of the Earth's atmosphere, due to the greenhouse effect caused by increased levels of carbon dioxide, CFCs and other pollutants?

A. Global warming ✓
B. Ozone depletion
C. Deforestation
D. Acid rain

Q90 Part A

Which of the following materials serves as a heat insulator?

A. Silver
B. Copper
C. Plastic ✓
D. Aluminium

Q91 Part A

Find the least number which when divided by 5, 6 and 7 leaves remainders 4, 5 and 6.

A. 207
B. 208
C. 209 ✓
D. 210

Q92 Part A

How many fundamental units are there in the SI system?

A. 5
B. 14
C. 7 ✓
D. 10

Q93 Part A

What is an appropriate way to handle a misunderstanding in an online conversation?

A. Ignoring the conversation
B. Blocking the person immediately
C. Addressing the misunderstanding politely and privately ✓
D. Publicly shaming the other person

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Q94 Part A

A fruit seller had some apples. He sold 40% of the apples and now has 840 apples. How many apples did he originally have?

A. 1260

B. 2100

C. 1800

D. 1400 ✓

Q95 Part A

What is the primary purpose of information kiosks set up by the government?

A. To offer citizens easy access to information and services such as bill payments, registrations and public information ✓

B. To enable government employees to monitor social media activities of citizens

C. To allow citizens to participate in online gaming competitions

D. To provide free food and beverages to citizens

Q96 Part A

Study the table given below and answer the following question.

	Number of mangoes sold on		
	Monday	Tuesday	Wednesday
Shop X	58	19	25
Shop Y	42	34	30

If one mango was sold for ₹80 by shop Y on Tuesday, what was the amount received by shop Y on Tuesday?

A. ₹2,620

B. ₹2,780

C. ₹2,560

D. ₹2,720 ✓

Q97 Part A

By how much is 60% of 45 greater than $\frac{4}{5}$ of 25?

A. 7 ✓

B. 5

C. 1

D. 4

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Q98 Part A

In ΔPQR, $\angle Q = 90°$. If $\tan R = \frac{1}{2}$, then what is the value of $\frac{\sec P(3\cos R - \sin P)}{4\operatorname{cosec} R\,(4\sin R - \cos P)}$?

A. $-\frac{1}{3}$

B. $\frac{1}{3}$ ✓

C. $-\frac{8}{7}$

D. $\frac{8}{7}$

Q99 Part A

Simplify the following expression.

$(x-y-z)^2-(x+y+z)^2$

A. −4y (x + z)

B. −4x (y + z) ✓

C. −4 (xy + yz + zx)

D. −4z (x + y)

Q100 Part A

A cylindrical tank of diameter 14 m contains water up to the depth of 6 m. What is the total area of wetted surface? $\left(\text{Use } \pi = \frac{22}{7}\right)$

A. 414 m^2

B. 412 m^2

C. 416 m^2

D. 418 m^2 ✓

Part B (Heat Engine)

75 Questions • Answer Key

Q101 Part B (Heat Engine)

A torsion bar is a steel bar operated by:

A. both compressive stress and twisting stress

B. both tensile and compressive stresses

C. both shear strain and longitudinal strain

D. both twisting and shear stresses ✓

Q102 Part B (Heat Engine)

Which of the following statements is NOT correct about the steering system in vehicles?

A. It should multiply the turning effort applied on the steering wheel by the driver.

B. It should minimise the turning effort applied on the steering wheel by the driver by use of overdamped damper. ✓

C. The function of the steering system is to convert the rotary movement of the steering wheel into the angular turn of the front wheels.

D. It should not transmit the shocks of the road surface encountered by wheels to the driver hands.

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Q103 Part B (Heat Engine)

What happens when a tyre is under-inflated?

A. The tyre grips the road better.

B. The centre of the tyre wears out faster.

C. The tyre remains unaffected.

D. The tyre wears out faster at the edges. ✓

Q104 Part B (Heat Engine)

A device operates at 240 V and consumes 480 W of power. What is the current flowing through the device?

A. 2 A ✓

B. 1 A

C. 1.5 A

D. 2.5 A

Q105 Part B (Heat Engine)

Which of the following is a fundamental unit?

A. newton

B. metre ✓

C. pascal

D. watt

Q106 Part B (Heat Engine)

Which of the following types of shafts allows easy implementation of a 4 valve per cylinder configuration?

A. Single overhead cam setup

B. Dual overhead cam setup ✓

C. Crankshaft of multicylinder engine setup

D. Cam and follower rocker arm setup

Q107 Part B (Heat Engine)

Where is the secondary filter installed in the fuel system?

A. Before the fuel tank

B. Inside the fuel tank

C. On the outlet side of the primary filter ✓

D. After the feed pump

Q108 Part B (Heat Engine)

What is waste?

A. Natural resources for living organisms

B. Valuable substances for agriculture

C. Useful materials for industries

D. Unwanted or unusable materials ✓

Q109 Part B (Heat Engine)

What happens when the accelerator pedal is pressed in the main circuit of a carburetor?

A. Vacuum decreases

B. Throttle opens ✓

C. Air velocity decreases

D. Main jet closes

Q110 Part B (Heat Engine)

Pencils are rated in engineering drawings based on the _____.

A. hardness or softness of the lead ✓

B. colour of the lead

C. durability of the lead

D. shape of the lead

Q111 Part B (Heat Engine)

Which of the following parts of a hammer-head is used for shaping and forming work like riveting and bending?

A. Face

B. Eyehole

C. Pein ✓

D. Cheek

Q112 Part B (Heat Engine)

What is the chemical effect that occurs in a battery during the charging process of a Lead Acid battery?

A. Lead reacts with sulphur to form lead sulphate

B. Water dissociation into hydrogen and oxygen

C. Lead sulphate decomposes into lead and sulphuric acid ✓

D. Sulphuric acid dissociates into hydrogen and sulphate ions

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Q113 Part B (Heat Engine)

A constant mesh gearbox usually comes with how many manual transmission configurations?

- A. It comes with a 5-speed 1-reverse manual transmission configuration.
- B. It comes with a 4-speed 1-reverse manual transmission configuration. ✓
- C. It comes with a 3-speed 1-reverse manual transmission configuration.
- D. It comes with a 6-speed 1-reverse manual transmission configuration.

Q114 Part B (Heat Engine)

What happens when the brake pedal is pressed in a pedal-assisted type brake?

- A. The power cylinder is activated. ✓
- B. The engine shuts down.
- C. The clutch is released.
- D. The accelerator is engaged.

Q115 Part B (Heat Engine)

Which of the following is an example of a p-type semiconductor?

- A. Silicon doped with phosphorus
- B. Silicon doped with arsenic
- C. Silicon doped with boron ✓
- D. Germanium doped with phosphorus

Q116 Part B (Heat Engine)

The exhaust gases in a two stroke engine are driven out by:

- A. fresh charge of fuel entering the cylinder nearly at the end of the compression stroke
- B. fresh air entering the casing nearly at the end of the suction stroke
- C. fresh charge of fuel entering the cylinder nearly at the end of the working stroke ✓
- D. left out charge of fuel from exhaust entering the cylinder nearly at the end of the working stroke

Q117 Part B (Heat Engine)

As per the SAE viscosity rating, which of the following numbers reflects thicker oil that better resists viscosity breakdown in the summer season?

- A. 0W to 5W
- B. −6W to −70W
- C. 100W to 160W
- D. 40W to 50W ✓

Q118 Part B (Heat Engine)

Why is it important to follow proper disposal procedures for industrial waste?

- A. To allow waste to decompose anywhere
- B. To reduce the number of trash bins needed
- C. To save time and effort in sorting waste
- D. To comply with environmental regulations and reduce pollution ✓

Q119 Part B (Heat Engine)

A type of chamber in which the combustion space is essentially a single cavity with little restriction on one part of the chamber to the other, and hence with no large difference in pressure between parts of the chamber during the combustion process is known as:

- A. air-cell combustion chamber
- B. open combustion chamber ✓
- C. pre-combustion chamber
- D. shallow depth combustion chamber

Q120 Part B (Heat Engine)

What does an optical pyrometer measure?

- A. The relative density of liquids
- B. The temperature of the surface ✓
- C. The volume of liquids
- D. The pressure of gases

Q121 Part B (Heat Engine)

Which of the following statements is correct about a protractor?

Statements:

1. A protractor can be used to measure angles from both sides.
2. A protractor is typically made of a rigid metal material.

- A. Neither statement is true
- B. Only statement 2 is true
- C. Only statement 1 is true ✓
- D. Both statements are true

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Q122 Part B (Heat Engine)

Which of the following punches is used to make deeper witness marks on scribed lines and make it easier for the drill to start correctly?

A. Solid punch

B. Centre punch ✓

C. Pin punch

D. Prick punch

Q123 Part B (Heat Engine)

The brake pedal transfers the driver's applied force to which component that initiates hydraulic pressure?

A. Brake shoes via pressure fluid

B. Master cylinder through mechanical linkage ✓

C. Wheel cylinder through direct linkage

D. Brake drum by hydraulic compression

Q124 Part B (Heat Engine)

When did India implement the Hazardous Wastes (Management and Handling) Rules to regulate the disposal and handling of hazardous waste?

A. 1987

B. 2000

C. 1989 ✓

D. 1982

Q125 Part B (Heat Engine)

In engineering drawing, what is defined as the path of a moving point with no thickness?

A. Angle

B. Curve

C. Point

D. Line ✓

Q126 Part B (Heat Engine)

What is meant by relining of a clutch plate?

A. Cleaning the clutch plate with petrol

B. Tightening the pressure spring

C. Replacing the entire clutch assembly

D. Replacing the worn-out friction material on the clutch plate ✓

Q127 Part B (Heat Engine)

What type of bearing is fitted into the connecting rod, allowing the gudgeon pin to provide bearing for the oscillating small end of the connecting rod?

A. Needle bearing ✓

B. Tapper roller bearing

C. Journal bearing

D. Ball bearing

Q128 Part B (Heat Engine)

The filler material used in brazing is commercially known as _____.

A. alloy

B. flux

C. spelter ✓

D. solder

Q129 Part B (Heat Engine)

Which of the following methods is implemented for locking a semi floating type piston pin?

A. Riveting

B. Gluing

C. Screw ✓

D. Welding

Q130 Part B (Heat Engine)

Which of the following parts of an engine adjusts the opening times of the valves to suit all operating conditions and ensures ideal charge cycles within a wide range of engine speeds and loads?

A. Rocker arm

B. Crankshaft

C. Camshaft ✓

D. Crank

Q131 Part B (Heat Engine)

Why are metal dispersants or detergents used as additives in lubrication oil?

A. These are used to control the formation of sedimentation of particles throughout the system

B. These are used to control bubbles formation and mist throughout the system

C. These are used to control viscosity index and wax formation throughout the system at high temperature

D. These are used to control deposit formation throughout the system ✓

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Q132 Part B (Heat Engine)

What is the blade length of the T1 'T' square, as per IS:1360-1989?

A. 500 mm

B. 1500 mm

C. 700 mm

D. 1000 mm ✓

Q133 Part B (Heat Engine)

What causes impurities in diesel fuel to settle in a sedimentation-type filter?

A. Magnetic properties of impurities

B. Higher temperature of impurities

C. Higher inertia of impurities ✓

D. Lower density of impurities

Q134 Part B (Heat Engine)

In which part of the IC engine does a piston move during operation?

A. Cylinder head

B. Cylinder liner ✓

C. Sump

D. Crankcase

Q135 Part B (Heat Engine)

If the coefficient of linear expansion of a material is 2×10^{-5} °C^{-1}, what does it mean?

A. The material expands by 2×10^{-5} times its original area per degree Celsius

B. The material expands by 2×10^{-5} times its original volume per degree Celsius

C. The material expands by 2×10^{-5} times its original length per degree Celsius ✓

D. The material always increases by 2×10^{-5} kg when temperature is increased by 1°C

Q136 Part B (Heat Engine)

A cylinder head gasket is incorporated between which of the following two parts of the engine?

A. Puppet valve and cylinder block

B. Piston ring and cylinder head

C. Cylinder head and water jacket

D. Cylinder block and cylinder head ✓

Q137 Part B (Heat Engine)

The distance a cam lobe rises away from the base circle of the camshaft is known as:

A. mushroom valve lift

B. rocker arm lift

C. gross lift

D. lobe lift ✓

Q138 Part B (Heat Engine)

The kingpin provides directional stability along with the _____.

A. Castor Angle ✓

B. Toe-out

C. Camber Angle

D. Toe-in

Q139 Part B (Heat Engine)

Which of the following statements correctly describes the placement and purpose of orientation marks on a drawing sheet?

1. Orientation marks are placed at two opposite corners of the drawing sheet to indicate the correct orientation on the drawing board.
2. Orientation marks consist of arrow heads placed across the frame, with one at the shorter side and one at the longer side, coinciding with the centering marks.
3. One of the orientation marks always points towards the draughtsman, indicating the direction in which the drawing sheet should be placed.
4. Orientation marks are used to mark the midpoint of each side of the drawing sheet for accurate centering.

A. 1, 2, and 3 only

B. 1 and 4 only

C. 2 and 3 only ✓

D. 1, 2, and 4 only

Q140 Part B (Heat Engine)

As the piston moves up to create a compression force, which of the following parts movements leads to inlet valve closure in engine?

A. Connecting rod movement

B. Helical spring movement

C. Crankshaft movement

D. Camshaft movement ✓

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Q141 Part B (Heat Engine)

If a machine has an efficiency of 80%, it means:

A. the machine produces more output than input

B. the machine has a velocity ratio and mechanical advantage both equal to 80

C. the machine does not have any loss in input energy

D. the machine loses 20% of the input ✓

Q142 Part B (Heat Engine)

_____ is a type of spring that is often used as part of the vehicle clutch assembly, and its main function is to engage and disengage the pressure plate and the driven plate (clutch disk).

A. Spiral spring

B. Leaf spring

C. Diaphragm spring ✓

D. Laminated spring

Q143 Part B (Heat Engine)

Flash butt welding and butt welding are particularly suitable for welding of _____.

A. Large sections with various shapes ✓

B. Small, intricate components

C. Thin wires

D. Pipes requiring precise alignment

Q144 Part B (Heat Engine)

____ brakes are a type of brake in which the fluid from the master cylinder is forced into a caliper where it presses against a piston. The piston in turn squeezes two brake pads against the disc (rotor), which is attached to wheel, forcing it to slow down or stop.

A. Vacuum

B. Electrical

C. Disk ✓

D. Drum

Q145 Part B (Heat Engine)

Which of the following is the key difference between a fuse and a circuit breaker?

A. A fuse can be reset after tripping, while a circuit breaker must be replaced.

B. A fuse is used for high-voltage circuits, while a circuit breaker is used for low-voltage circuits.

C. A fuse is a mechanical device, while a circuit breaker is an electronic device.

D. A fuse is a one-time-use device, while a circuit breaker can be reset and reused. ✓

Q146 Part B (Heat Engine)

What is the purpose of the water cooling system in a resistance welding machine?

A. To cool the work piece

B. To cool the electrodes ✓

C. To cool the transformer

D. To cool the force mechanism

Q147 Part B (Heat Engine)

Final drive is the last stage of power transmission from the propeller shaft to rear axles and then to the wheels. To which of the following angles does it turn the propeller shaft motion?

A. Right angle to drive the rear axle ✓

B. 45 degree angle to drive the rear axle

C. −45 degree to drive the front axle

D. Equal and opposite angle to drive the rear axle

Q148 Part B (Heat Engine)

Match the correct length and breadth of the Trimmed sizes of sheets.

Designation	Trimmed size
A. A0	P. 297 × 420
B. A1	Q. 420× 594
C. A2	R. 594 × 841
D. A3	S. 841 × 1189

A. A - R, B - S, C - Q, D - P

B. A - P, B - R, C - Q, D - S

C. A - S, B - R, C - P, D - Q

D. A - S, B - R, C - Q, D - P ✓

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Q149 Part B (Heat Engine)

Which of the following is a key advantage of using Thyristors in power control applications?

- A. High frequency switching ✓
- B. High efficiency and low power loss
- C. Small size and low cost
- D. Low voltage handling capabilities

Q150 Part B (Heat Engine)

What is the main function of wheel bearing seals?

- A. To make the bearing spin faster
- B. To increase tire pressure
- C. To stop the wheel from rotating
- D. To prevent lubricant leakage and block dirt/moisture ✓

Q151 Part B (Heat Engine)

Which of the following is true for a given fixed compression ratio?

- A. Both Otto and Diesel cycles are equally efficient.
- B. Otto cycle is the most efficient. ✓
- C. Dual cycle is the most efficient.
- D. Diesel cycle is the most efficient.

Q152 Part B (Heat Engine)

In engineering drawing (lettering and numbering), a single stroke means that the _____.

- A. thickness of the line of the letter or number is obtained in one stroke of the pencil ✓
- B. thickness of the line of the letter or number is obtained in three strokes of the pencil
- C. thickness of the line of the letter or number is obtained in no strokes of the pencil
- D. thickness of the line of the letter or number is obtained in two strokes of the pencil

Q153 Part B (Heat Engine)

Which of the following punch marks is used for the correct location and seating of the divider point?

- A. Centre punch marks of 30°
- B. Centre punch marks of 60°
- C. Prick punch marks of 120°
- D. Prick punch marks of 30° ✓

Q154 Part B (Heat Engine)

Which of the following statements is correct about a diesel cycle and its air standard efficiency with respect to the compression ratio?

- A. The air standard efficiency of a diesel cycle increases with the increase in the compression ratio. ✓
- B. The maximum compression ratio for the diesel engine is limited by detonation.
- C. The air standard efficiency decreases with the increase in the compression ratio.
- D. For a given compression ratio, Otto cycle is the least efficient while the diesel cycle is the most efficient.

Q155 Part B (Heat Engine)

Which of the following types of valves is NOT used in the four stroke engine?

- A. Butterfly valves ✓
- B. Rotary valves
- C. Reed valves
- D. Poppet valves

Q156 Part B (Heat Engine)

Which of the following best describes the role of the inert gas in TIG welding?

- A. To act as a filler metal
- B. To shield the weld zone from atmospheric contamination ✓
- C. To cool the weld pool
- D. To increase the welding speed

Q157 Part B (Heat Engine)

Which of the following statements is/are correct?
Statement I - The annealing process uses heat to reduce the hardness and increase the ductility and toughness of various steels, cast iron, and alloys.
Statement II - Quenching is a rapid cooling process that alters specific properties of materials by manipulating the cooling rate.

- A. Statement (I) is correct but Statement (II) is incorrect.
- B. Statement (I) and (II) both are correct. ✓
- C. Statement (I) is incorrect but Statement (II) is correct.
- D. Statement (I) and (II) both are incorrect.

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Q158 Part B (Heat Engine)

Which of the following uses of wire gauge is INCORRECT?

- A. It measures the diameter of a wire.
- B. It does not help determine how much current a wire can carry. ✓
- C. Using the wrong wire gauge can damage appliances and electronic devices.
- D. It is used in electrical installations, welding and other applications.

Q159 Part B (Heat Engine)

When drawing a curved line of a specific length in an engineering drawing, which tool is most appropriate for ensuring accuracy?

- A. Protractor
- B. Straightedge
- C. French Curve ✓
- D. Compass

Q160 Part B (Heat Engine)

What do the SAE viscosity rating numbers denote, such as 0W or 5W?

- A. Denotes thicker oil that better resists viscosity breakdown when hot
- B. High viscosity oil and difficult flow for cold starting
- C. Easier oil flow for cold starting ✓
- D. Denotes thicker oil that better resists viscosity breakdown when cold

Q161 Part B (Heat Engine)

Which of the following types of wooden mallets are used for hollowing panel beatings?

- A. Standard wooden mallets
- B. End-faked mallets
- C. Side-faked mallets
- D. Bossing mallets ✓

Q162 Part B (Heat Engine)

Which of the following parts of a dial bore gauge is used to hold all the components together and contains a mechanism for transmitting the plunger motion to the dial?

- A. Sliding plunger
- B. Anvil
- C. Stem ✓
- D. Extension rings

Q163 Part B (Heat Engine)

In the carburetor the fuel is broken up and mixed with air, what is this process called?

- A. Ignition
- B. Emulsification
- C. Carburation ✓
- D. Combustion

Q164 Part B (Heat Engine)

Fusion welding is characterised by _____.

- A. joining metals only under high pressure
- B. melting and fusing joining edges, with or without filler metal, without pressure ✓
- C. requiring specialised equipment for pressure application
- D. using only similar metals

Q165 Part B (Heat Engine)

Which of the following types of engines has irregular operation that occurs because the amount of fresh mixture entering the cylinder is not enough to clear all the exhaust gases and a part of it remains in the cylinder to contaminate the charge?

- A. Four-stroke petrol engine
- B. Two-stroke diesel engine
- C. Four-stroke diesel cycle
- D. Two-stroke petrol engine ✓

Q166 Part B (Heat Engine)

What is the primary purpose of applying brakes in a vehicle?

- A. To increase the speed of the vehicle
- B. To improve fuel efficiency
- C. To stop or slow down the vehicle ✓
- D. To open the fuel tank

Q167 Part B (Heat Engine)

What is the primary principle behind the generation of electrical energy in a piezoelectric device?

- A. Conversion of thermal energy into electrical energy
- B. Conversion of chemical energy into electrical energy
- C. Conversion of light energy into electrical energy
- D. Conversion of mechanical stress into electrical energy ✓

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Q168 Part B (Heat Engine)

Which of the following types of wooden mallets are used for general purpose work such as flattening and bending?

A. Bossing mallets

B. Side-faked mallets

C. Standard wooden mallets ✓

D. End-faked mallets

Q169 Part B (Heat Engine)

The basic function of the connecting rod is to convert:

A. the reciprocating motion of piston to the rotary motion of the crankshaft ✓

B. the curvilinear motion of piston to the linear motion of the camshaft

C. the reciprocating motion of piston head to the rotary motion of the camshaft

D. the linear motion of the crankshaft into rotary motion of piston

Q170 Part B (Heat Engine)

Which of the following is NOT a correct statement about the torsion spring?

A. This spring needs less space.

B. It is lighter than leaf spring system.

C. It takes the driving or braking torque, and additional link mechanisms are not required for this purpose. ✓

D. This spring provides very neat and compact design.

Q171 Part B (Heat Engine)

Which of the following is a correct function of the indirect injection combustion chamber?

A. It accommodates the port (Inlet and Outlet) for In & Out of air.

B. There is a confined space in it, in which the air and fuel mixtures are burned. ✓

C. It does not have properties to withstand temperature variations.

D. It houses and guides the crankshaft.

Q172 Part B (Heat Engine)

What is the accuracy level of a vernier caliper that can be read?

A. 0.02 mm ✓

B. 0.01 mm

C. 0.2 mm

D. 0.1 mm

Q173 Part B (Heat Engine)

The hydraulic brake system works on the principle of:

A. Boyle's Law

B. Ohm's Law

C. Pascal's Law ✓

D. Newton's Law

Q174 Part B (Heat Engine)

What force (effort) will be required to push a load, initially at rest, of mass 500 g, so that at a distance of 20 m, its final velocity is 20 m/sec [Assume that there is no friction and 'g' = 10 m/s^2].

A. 5 J

B. 10 N

C. 5 N ✓

D. 10 J

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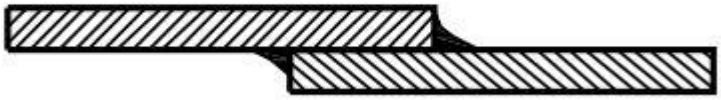
Q175 Part B (Heat Engine)

Identify the type of brazed joint shown below.



A. Joggle Lap

B. Simple Lap ✓

C. Strapped Lap

D. Butted Flange

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Part A

100 Questions • Answer Key

Q1 Part A

Which of the following correctly describes the direction of electric current?

- A. Opposite to the direction of electron flow ✓
- B. From low potential to high potential
- C. Same as the direction of electron flow
- D. Opposite to the direction of positive charge flow

Q2 Part A

Two containers, one painted black and the other painted white, have been kept in sunlight for one hour in the afternoon. Choose the correct observation.

- A. Both containers become equally hot.
- B. The black container becomes hotter than the white container. ✓
- C. There is no effect on either container.
- D. The white container becomes hotter than the black container.

Q3 Part A

Which of the following represents an item with kinetic energy?

- A. A stone in motion ✓
- B. A book resting on a table
- C. A compressed spring
- D. An extended rubber band

Q4 Part A

What is the scientific notation for 55,60,000 km?

- A. 55.6×10^4 km
- B. 5.56×10^4 km
- C. 5.56×10^6 km ✓
- D. 556×10^6 km

Q5 Part A

Select the triad that follows the same pattern as that followed by the two triads given below. Both triads follow the same pattern.

JK - LM - NO
TU - VW - XY

- A. DE - FB - DF
- B. DE - FG - KL
- C. WE - DF - HI
- D. DE - FG - HI ✓

Q6 Part A

Which of the following is NOT a fundamental quantity in the SI system?

- A. Force ✓
- B. Time
- C. Luminous intensity
- D. Amount of substance

Q7 Part A

E, F, G, H, P, Q, and R, are sitting around a circular table facing the centre. F sits fourth to the right of E. Only R sits between F and H. H is NOT an immediate neighbour of E. Only P sits between E and G.
How many people sit between G and Q when counted from the right of G?

- A. Three
- B. One
- C. Two ✓
- D. Four

Q8 Part A

In winters, people wear jacket because _____.

- A. jacket allows the heat to flow from our body to surroundings
- B. fabric of jacket is an insulator of heat so it traps body heat ✓
- C. it looks good
- D. fabric of jacket is a conductor of heat so it traps body heat

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Q9 Part A

In this question, a statement is given followed by two courses of action, numbered I and II. You must assume everything in the statement to be true, and on the basis of the information given in the statement, decide which of the given courses of action logically follow(s) for pursuing.

Statement:
A major fire broke out this afternoon in a mall in Jaipur, causing several casualties amongst the people present inside.

Courses of Action:

I. The police must check to see if the fire safety regulations were followed by the mall.
II. Traffic police must divert traffic away from the fire site, to enable evacuation of people.

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

Q10 Part A

How do we find absolute error?

A. Absolute error = Actual value + observed value
B. Absolute error = Actual value/observed value
C. Absolute error = Actual value – observed value ✓
D. Absolute error = Actual value × observed value

Q11 Part A

The floor of a rectangular hall has a perimeter of 220 m. If the cost of painting the four walls at the rate of ₹10 per m^2 is ₹11,000, then find the volume of the hall.

A.
B.
C. ✓
D.

Q12 Part A

Refer to the following letter, number and symbol series and answer the question that follows. Counting to be done from left to right only.

(Left) K A T & 4 @ Y # 6 K & 2 R % 7 D 3 5 E * S (Right)

How many such symbols are there which are immediately preceded by a number and also immediately followed by a letter?

A. Three
B. Two
C. One ✓
D. Four

Q13 Part A

Two trains of lengths 155 m and 160 m are running at speeds of 74 km/hr and 52 km/hr, respectively, on parallel tracks in opposite directions. In how many seconds will they pass each other?

A. 7 seconds
B. 18 seconds
C. 14 seconds
D. 9 seconds ✓

Q14 Part A

How fast should a cat of mass 15 kg run in order to have a kinetic energy of 120 J?

A. 0.16 m/s
B. 40 m/s
C. 4 m/s ✓
D. 16 m/s

Q15 Part A

Which of the following is the temperature range in a clinical thermometer?

A. 10°C to 45°C
B. 31°C to 44°C
C. 30°C to 43°C
D. 35°C to 42°C ✓

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Q16 Part A

In a certain code language, 'LOVE' is coded as '8364' and 'EARS' is coded as '3517'. What is the code for 'E' in the given code language?

A. 7
B. 4
C. 5
D. 3 ✓

Q17 Part A

Which of the following is an INCORRECT formula for power?

A. VI
B. I^2Rt ✓
C. I^2R
D. V^2/R

Q18 Part A

In a clearance sale of electronic items, an item whose marked price was ₹12,225 is now sold for ₹10,758, d% is the discount percentage on the item. The value of d is:

A. 12% ✓
B. 11%
C. 14%
D. 13%

Q19 Part A

Which of the following groups represents conductors of heat?

A. Wood, paper, silver
B. Paper, copper, plastic
C. Aluminium, silver, copper ✓
D. Aluminium, plastic, wood

Q20 Part A

Simran rides a distance of 60 m in one minute and then returns along the same straight path. The average velocity of her ride is _____.

A. 1 m/s
B. 60 m/s
C. 2 m/s
D. 0 m/s ✓

Q21 Part A

What is the main function of the Transport Layer in the internet architecture?

A. Routing of packets
B. Data encapsulation
C. IP addressing
D. Reliable data transfer and error correction ✓

Q22 Part A

Rakesh starts a business with a capital of ₹2,50,000. He incurs a loss of 5% during the first year. However, he makes a profit of 4% on his remaining investment during the second year. Finally, he makes a profit of 20% on his new capital during the third year. Find his total profit at the end of three years.

A. ₹46,500
B. ₹46,600
C. ₹46,400 ✓
D. ₹46,700

Q23 Part A

If 11.6 : x :: x : 2.9, and x > 0, then find the value of x.

A. 10.9
B. 7.7
C. 5.8 ✓
D. 3.1

Q24 Part A

The areas of three adjacent faces of a solid cuboid are 162 cm^2, 144 cm^2 and 50 cm^2. What is the volume (in cm^3) of the cuboid?

A. 1365
B. 805
C. 833
D. 1080 ✓

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Q25 Part A

Two sets of numbers are given below. In each set of numbers, certain mathematical operation(s) on the first number results in the second number. Similarly, certain mathematical operation(s) on the second number results in the third number and so on. Which of the given options follows the same set of operations as in the given sets?

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

24 – 48 – 108 – 36; 18 – 36 – 96 – 32

A. 82 – 139 – 234 – 78

B. 48 – 96 – 156 – 52 ✓

C. 53 – 106 – 166 – 55

D. 132 – 264 – 444 – 138

Q26 Part A

Pihu starts her car at 9 a.m. to reach her office, which is 20 km away. She covers the first 10 km in 30 minutes and reaches her office at 10 a.m. Pihu's motion is _____.

A. uniform motion ✓

B. non-uniform motion

C. retarded motion

D. accelerated motion

Q27 Part A

If the sum of lengths of two adjacent sides of a parallelogram is 12 cm, then the perimeter of the parallelogram is:

A. 36 cm

B. 34 cm

C. 20 cm

D. 24 cm ✓

Q28 Part A

Find the value of $x^2 + y^2$, given that, $x = 7 + \sqrt{1}$, $y = 7 - \sqrt{1}$.

A. 98

B. 69

C. 100 ✓

D. 56

Q29 Part A

What will come in place of the question mark (?) in the following equation, if '+' and '–' are interchanged and '×' and '÷' are interchanged?

32 + 28 ÷ 3 × 4 – 15 = ?

A. 29

B. 26 ✓

C. 20

D. 32

Q30 Part A

The heat developed in a 5 ohm resistor in 2 minutes when a 2A current passes through it is _____.

A. 1000 J

B. 500 J

C. 2400 J ✓

D. 40 J

Q31 Part A

Which of the following features allows the user to quickly find emails received from a specific sender?

A. Draft

B. Sort ✓

C. Filter

D. Archive

Q32 Part A

What should come in place of the question mark (?) in the given series?

87 118 149 ? 211 242

A. 199

B. 171

C. 188

D. 180 ✓

Q33 Part A

Aditya is using two thin blankets instead of one thick blanket in winter to keep himself warm because _____.

A. the friction between the two blankets produces heat

B. the air trapped between the blankets is a poor conductor of heat ✓

C. two blankets are cheaper than one thick blanket

D. the blankets are at a higher temperature than the surroundings

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Q34 Part A

Which of the following benefits can be obtained by conducting an energy audit in a commercial building?

- A. Identification of opportunities for energy savings ✓
- B. Increasing the cost of energy bills
- C. Reduced market value of building
- D. Reduction in price of energy per its unit usage

Q35 Part A

Which technology operates through an electrochemical process that transforms the energy stored in hydrogen gas (H_2) and oxygen into electrical power without combustion?

- A. Wind power
- B. Solar thermal power
- C. Hydrogen fuel cells ✓
- D. Hydroelectric power

Q36 Part A

Based on the English alphabetical order, three of the following four letter-cluster pairs are alike in a certain way and thus form a group. Which letter-cluster pair DOES NOT belong to that group??
(Note: The odd one out is not based on the number of consonants/vowels or their position in the letter-cluster pair)

- A. SL – NP
- B. MF – HJ
- C. WP – RS ✓
- D. DW – YA

Q37 Part A

The median of the data 2, 6, 4, 8, 1, 2, 5, 8, 9, 10, 12, 9, 7, 8, 3, 1, 0, 9, 2, 5 is _____.

- A. 5
- B. 5.5 ✓
- C. 6.5
- D. 6

Q38 Part A

Which of the following is NOT one of the 5S principles?

- A. Supervise ✓
- B. Standardise
- C. Sustain
- D. Sort

Q39 Part A

The energy possessed by an object by virtue of its motion is known as _____.

- A. heat energy
- B. kinetic energy ✓
- C. light energy
- D. potential energy

Q40 Part A

An object of mass m is made to fall freely from a height h. As the object continues to fall, what will happen to its energy?

- A. The potential energy and kinetic energy will both increase.
- B. The potential energy would decrease while the kinetic energy would increase. ✓
- C. The kinetic energy and potential energy will not change.
- D. The potential energy would increase while the kinetic energy would decrease.

Q41 Part A

Seema is twice as old as Alka. If nine years is subtracted from Alka's age and six years is added to Seema's age, then Seema will be four times Alka's age. How old was Alka three years ago?

- A. 20 years
- B. 16 years
- C. 18 years ✓
- D. 21 years

Q42 Part A

The HCF of two numbers is 62, and the other two factors of the LCM of these factors are 7 and 9. Which of the options given below can be a possible value of the smaller of the two numbers?

- A. 433
- B. 434 ✓
- C. 431
- D. 432

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Q43 Part A

An electric lamp with a resistance of 35 ohms and a conductor with a resistance of 5 ohms are connected to an 8 V battery in series. Calculate the current flowing through the circuit.

A. 2 A

B. 1.82 A

C. 0.2 A ✓

D. 40 A

Q44 Part A

Which of the following is an application of the 5S concept in a workshop?

A. Removing safety protocols to improve efficiency

B. Increasing the number of safety supervisors

C. Using extra tools without proper storage

D. Keeping tools and materials organised for easy access ✓

Q45 Part A

Read the given statements and conclusions carefully. Assuming that the information given in the statements is true, even if it appears to be at variance with commonly known facts, decide which of the given conclusion(s) logically follow(s) from the statements.

Statements:
Some ships are boats.
All boats are submarines.
Some submarines are yachts

Conclusions:
(I) Some yachts are boats.
(II) Some yachts are ships.

A. Neither conclusion (I) nor (II) follows. ✓

B. Only conclusion (II) follows.

C. Only conclusion (I) follows.

D. Both conclusions (I) and (II) follow.

Q46 Part A

Calculate the energy possessed by an object of mass 10 kg when it is raised to a height of 5 m from the ground. Given: $g = 9.8\ m\ s^{-2}$.

A. 450 J

B. 400 J

C. 500 J

D. 490 J ✓

Q47 Part A

Which of the following is a poor conductor of heat?

A. Wool ✓

B. Copper

C. Steel spoon

D. Aluminium rod

Q48 Part A

If an electric heater draws a current of 5 A when the potential difference across its terminals is 75 V, what current will it draw when the potential difference is increased to 150 V?

A. 30 A

B. 20 A

C. 10 A ✓

D. 15 A

Q49 Part A

What should come in place of the question mark (?) in the given series?

17 29 41 59 77 101 125 ?

A. 161

B. 149

C. 175

D. 155 ✓

Q50 Part A

If 'A' stands for '÷', 'B' stands for '×', 'C' stands for '+' and 'D' stands for '−', then what will come in place of the question mark (?) in the following equation?

35 A 7 C 9 B 3 D 16 = ?

A. 16 ✓

B. 10

C. 18

D. 21

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Q51 Part A

The taxi charges in a city consist of a fixed charge together with the charge per kilometre for the distance covered. For a distance of 35 km, the charge paid is ₹375 and for a distance of 48 km, the charge paid is ₹427. Find the fixed charges and the charge per km (in ₹), respectively.

A. 227 and 5

B. 235 and 4 ✓

C. 275 and 3

D. 220 and 6

Q52 Part A

What should come in place of the question mark (?) in the given series?

UT27, RQ25, NM23, ?

A. IH21 ✓

B. IG21

C. IH29

D. JH19

Q53 Part A

Which of the following correctly describes the role of DNS (Domain Name System) in internet architecture?

A. DNS routes data packets to their destination across the internet.

B. DNS translates IP addresses into domain names to make them easier to remember.

C. DNS translates domain names into IP addresses to allow browsers to locate web servers. ✓

D. DNS secures the data transmitted over the internet by encrypting it.

Q54 Part A

What is the main advantage of using solar energy over fossil fuels?

A. Solar energy extraction requires high operational cost when compared to fossil fuels.

B. Greenhouse gas emission is higher when solar energy is used.

C. Solar energy is abundantly available and renewable in nature. ✓

D. Solar energy requires mining and extraction, whereas fossil fuels are free of cost.

Q55 Part A

Which term describes the maximum amount of solar energy that a photovoltaic (PV) system can convert into electricity under standard test conditions?

A. Effective capacity

B. Peak load

C. Nameplate capacity ✓

D. Rated capacity

Q56 Part A

Which of the following steps is essential when configuring a web browser to enhance both security and privacy for a user?

A. Enabling pop-ups for all websites to improve user experience

B. Setting the homepage to a frequently visited website for quick access

C. Configuring the browser to block third-party cookies and enabling HTTPS-only mode ✓

D. Disabling the browser's cache to improve website loading times

Q57 Part A

Which key combination is commonly used for copying text in many text editing applications in Windows?

A. Ctrl+C ✓

B. Tab

C. Ctrl+V

D. Ctrl+S

Q58 Part A

Two sets of numbers are given below. In each set of numbers, certain mathematical operation(s) on the first number results in the second number. Similarly, certain mathematical operation(s) on the second number results in the third number and so on. Which of the given options follows the same set of operations as in the given sets?

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

11 – 121 – 221 – 171; 27 – 729 – 829 – 779

A. 13 – 169 – 244 – 188

B. 16 – 196 – 296 – 246

C. 23 – 529 – 629 – 589

D. 25 – 625 – 725 – 675 ✓

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Q59 Part A

The list price of an article is ₹5,000 and a discount of 70% is offered on the list price. What additional discount per cent on the already discounted price must be offered to a customer to bring the net selling price to ₹1,275?

A. 18%

B. 15% ✓

C. 16%

D. 10%

Q60 Part A

How does turning off unused electrical devices contribute to energy conservation?

A. ✓

B.

C.

D.

Q61 Part A

What is the first step when encountering a system failure in a workplace?

A. Report the issue and follow the emergency protocol ✓

B. Immediately restart all systems without inspection

C. Ignore the failure and continue working

D. Disconnect all power sources permanently

Q62 Part A

Find the value of 96.86572×10^7.

A. 96,86,57,200 ✓

B. 9,68,65,720

C. 0.9686572

D. 96,86,572

Q63 Part A

Which of the following is an example of uniform motion?

A. A vehicle moving through a crowded area

B. A sprinter running a 100-metre race with varying speed

C. A ball rolling down a slope

D. A train moving at a constant speed on a straight track ✓

Q64 Part A

In a certain code language,
'A × B' means 'A is the son of B',
'A − B' means 'A is the brother of B',
'A + B' means 'A is the wife of B' and
'A % B' means 'A is the father of B'.

How is M related to T if 'M × N % P + S − T'?

A. Brother's wife's father's brother

B. Brother's wife's father's father

C. Brother's wife's brother ✓

D. Brother's wife's father

Q65 Part A

The resistances of 30 ohm, 20 ohm and 60 ohm are connected in parallel. The equivalent resistance of the combination is _____.

A. 12 ohm

B. 10 ohm ✓

C. 0.1 ohm

D. 110 ohm

Q66 Part A

In Engineering Drawing, principal lines are drawn to represent _____.

A. wide lines along which the prints are trimmed

B. interior or hidden edges

C. axes of cylindrical, conical or spherical objects

D. visible edges and surface boundaries of objects ✓

Q67 Part A

Akshay gets 2% increase in his sale amount in the first year and 25% in the second year. With that his present sale is ₹1,42,800. What was his sale (in ₹) two years ago?

A. 1,12,000 ✓

B. 1,14,240

C. 1,40,000

D. 92,000

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Q68 Part A

Based on the English alphabetical order, three of the following four letter-cluster pairs are alike in a certain way and thus form a group. Which letter-cluster pair DOES NOT belong to that group?
(Note: The odd one out is not based on the number of consonants/vowels or their position in the letter-cluster pair.)

A. DL – HB
B. WE – AU
C. SA – WQ
D. MU – QL ✓

Q69 Part A

A line in an engineering drawing is the _____.

A. closed curve where all points are the same distance from a fixed centre point
B. three-dimensional object with length, breadth, and height
C. dimensionless location in space or on a drawing sheet that has no width, height, or depth
D. one-dimensional figure, which has length but no width ✓

Q70 Part A

Mangal starts from Point A and walks 14 m towards north. He takes a right turn, walks 9 m and then takes a right turn, walks 37 m, reaches Point B and stops. Jayanti starts from Point Z which is 15 m towards the east of Point B. She walks 11 m towards east, takes a left turn, walks 42 m, turns left and walks 63 m, turns left and walks 19 m and stops at Point Y. What is the shortest distance between Point A and Point Y? (All turns are 90 degree turns only.)

A. 25 m
B. 31 m
C. 26 m
D. 28 m ✓

Q71 Part A

Ampere is the SI unit of _____.

A. mass
B. electric charge
C. electric current ✓
D. electric power

Q72 Part A

Match the following.

(A) Continuous thick lines (P) Projection lines
(B) Hidden lines (Q) Principal lines
(C) Outlines (R) Dotted lines
(D) Extension lines (S) Object lines

A. A-S, B-R, C-P, D-Q
B. A-P, B-R, C-Q, D-S
C. A-S, B-R, C-Q, D-P ✓
D. A-R, B-S, C-Q, D-P

Q73 Part A

What is the immediate action to take when a fire breaks out in a workplace?

A. Raise the alarm and evacuate the area ✓
B. Try to put it out using water without knowing the fire type
C. Gather near the fire to observe the situation
D. Ignore the fire and continue working

Q74 Part A

A is thrice as good a workman as B and together they can finish a piece of work in 12 days. In how many days can A alone finish the work?

A. 18 days
B. 16 days ✓
C. 12 days
D. 14 days

Q75 Part A

A boy goes to school at a speed of 5 km/hr. He returns at a speed of 14 km/hr. He takes a total of 8 hours for both going to school and returning. The distance (in km) between his home and school is:

A. 28.6
B. 29.5 ✓
C. 31
D. 27

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Q76 Part A

Which of the following is an effective way to prevent electrical accidents in the workplace?

A. Using water to cool overheated electrical equipment

B. Using insulated tools and wearing rubber gloves ✓

C. Working on live wires with bare hands

D. Ignoring minor electrical faults

Q77 Part A

In Engineering Drawing, which of the following is the correct definition of the term 'dimension'.

A. A numerical value expressed in an appropriate unit of measurement ✓

B. A continuous thick or wide line along which the prints are trimmed

C. The thickness of the line of a letter

D. A line that is drawn to make a section evident

Q78 Part A

Match the following, according to lettering and numbering (uppercase lettering) as per BIS SP: 46-2003.

Width (W) Capital letters
(A) 5 (I) W
(B) 6 (II) A, M, Q, V, X, Y
(C) 7 (III) B, D, G, H, K, N, O, P, R, S, T, U and Z
(D) 9 (IV) C, E, F, L

A. A-(IV), B-(III), C-(II), D-(I) ✓

B. A-(I), B-(III), C-(II), D-(IV)

C. A-(IV), B-(II), C-(III), D-(I)

D. A-(IV), B-(III), C-(I), D-(II)

Q79 Part A

In a business, Tushar invests in ₹10,000 and Salil invests in ₹20,000. Tushar received 10% of the profit for managing the business and the rest of the profit is divided in the ratio of their capitals. Find Tushar's share of the profit (in ₹) in a profit of ₹14,400.

A. 5,510

B. 5,610

C. 5,910

D. 5,760 ✓

Q80 Part A

Each of I, J, K, L, U, V and W has an exam on a different day of a week starting from Monday and ending on Sunday of the same week.J has the exam on Friday. Only two people have the exam between V and J. Only four people have the exam between L and V. U has the exam immediately after W. K does not have the exam on Monday.How many people have the exam before K and after I?

A. Three

B. One

C. Two

D. Four ✓

Q81 Part A

Jaspreet deposited a sum of ₹12,800 at 5% rate of interest per annum, compounded annually. The total amount (in ₹) received by Jaspreet after 2 years will be:

A. 14,512

B. 14,112 ✓

C. 14,442

D. 13,997

Q82 Part A

What is the amount of work done in moving a charge of 6 C from a point with a potential of 120 V to a point with a potential of 140 V?

A. 3.33 J

B. 120 J ✓

C. 720 J

D. 840 J

Q83 Part A

Which of the following options is correct when two objects at the same temperature are kept in contact with each other?

A. Heat is transferred from object 1 to object 2.

B. Both objects transfer heat to each other.

C. Heat is transferred from object 2 to object 1.

D. No heat is transferred. ✓

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Q84 Part A

In a certain code language, 'WILD' is coded as '8164' and 'DOGS' is coded as '3517'. What is the code for 'D' in the given code language?

- A. 1 ✓
- B. 4
- C. 3
- D. 5

Q85 Part A

Two sets of numbers are given below. In each set of numbers, certain mathematical operation(s) on the first number results in the second number. Similarly, certain mathematical operation(s) on the second number results in the third number and so on. Which of the given options follows the same set of operations as in the given sets?

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

4 – 8 – 18 – 9
6 – 12 – 22 – 11

- A. 11 – 13 – 22 – 63
- B. 8 – 16 – 26 – 13 ✓
- C. 9 – 18 – 28 – 20
- D. 3 – 15 – 12 – 20

Q86 Part A

A can complete a piece of work in 18 days. B can complete it in 14 days. With the assistance of C, they completed the work in 7 days. C alone can complete it in _____ days.

- A. 36
- B. 63 ✓
- C. 42
- D. 64

Q87 Part A

In a certain code language, 'BORE' is coded as '8624' and 'TABS' is coded as '3217'. What is the code for 'B' in the given code language?

- A. 1
- B. 7
- C. 8
- D. 2 ✓

Q88 Part A

Eight people are sitting in two parallel rows containing 4 people each in such a way that there is equal distance between adjacent persons. In row 1 – A, B, C and D are seated and all of them are facing south. In row 2 – P, Q, R and S are seated and all of them are facing north. Thus each person faces another person from the other row. Only three people sit to the right of R. D faces the person who is the immediate neighbour of S and P. C faces the person who sits second to the left of S. R does not face A. Who amongst the following faces B?

- A. R ✓
- B. S
- C. P
- D. Q

Q89 Part A

The mode of 4, 6, 4, 6, 5, 7, 5, 7, 4, 6, 7, 6 is:

- A. 5
- B. 6 ✓
- C. 4
- D. 7

Q90 Part A

A fruit seller had some apples. He sells 40% of the apples and now has 900 apples. How many apples did he originally have?

- A. 1350
- B. 1800
- C. 2250
- D. 1500 ✓

Q91 Part A

What should come in place of the question mark (?) in the given alpha-numeric series?

2M, 5O, 10R, 13T, 18W, 21Y, ?

- A. 26A
- B. 26B ✓
- C. 26C
- D. 24B

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Q92 Part A

Alloys are preferred over pure metals in electrical heating devices:

A. because the resistivity of an alloy is lower than that of its constituent metals.

B. because the resistivity of an alloy is generally higher than its constituent metals. ✓

C. because the elasticity of an alloy is higher than that of its constituent metals.

D. because alloys oxidise (burn) readily at high temperatures.

Q93 Part A

How many significant figures are there in 4.700 m?

A. 3

B. 4 ✓

C. 2

D. 1

Q94 Part A

How many base units are given in the SI system?

A. 9

B. 3

C. 11

D. 7 ✓

Q95 Part A

A person saves 50% of his income. If his expenditure is ₹640, then his income (in ₹) is:

A. 600

B. 1,320

C. 1,280 ✓

D. 560

Q96 Part A

Select the pair that follows the same pattern as the one followed by the two sets of pairs given below. Both pairs follow the same pattern.

BSR : GQW
LOB : QMG

A. QGT : TDW

B. RWH : WUM ✓

C. HVD : LTH

D. KRW : NPZ

Q97 Part A

$$\frac{a^2+b^2+ab}{a^3-b^3}$$

A. $\frac{1}{2}$ ✓

B. $\frac{2}{3}$

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

D. $\frac{2}{5}$

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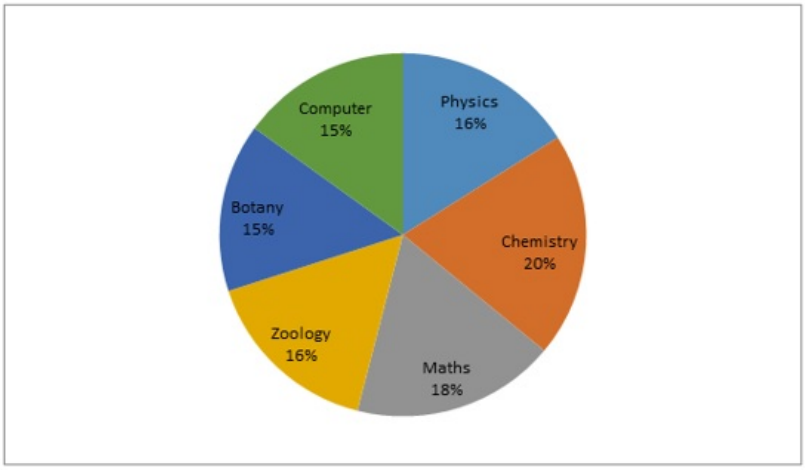
Q98 Part A

Study the given pie chart and answer the question that follows.

The given pie chart indicates the percentage-wise breakup of students in different subjects. The total number of students in the college is 5000.



What is the ratio of the students studying Zoology to the students studying Botany?

A. 15 : 14

B. 16 : 15 ✓

C. 15 : 16

D. 14 : 15

Q99 Part A

$$\frac{121\tan^2\theta - 3}{169\mathrm{Cot}^2\theta + 1}$$

A. $-\frac{83}{21}$

B. $-\frac{83}{61}$

C. $\frac{83}{61}$ ✓

D. $\frac{83}{21}$

Q100 Part A

The resistance of a metallic wire is R. If the radius of the metallic wire is reduced to half of its initial value while keeping all other parameters the same, the new resistance becomes _____.

A. 1. 4R ✓

B. $\frac{R}{2}$

C. $\frac{R}{4}$

D. 4. 2R

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Q101 Part B (Heat Engine)
Which of the following materials is used as a binding agent in organic brake linings?

A. Metal powder
B. Rubber
C. Cotton
D. Resin ✓

Q102 Part B (Heat Engine)
Which option shows the correct answer when 27°C is converted to the kelvin scale?

A. – 300 K
B. 246 K
C. 300 K ✓
D. – 246 K

Q103 Part B (Heat Engine)
The primary function of the flux during brazing is to _____.

A. make the joint more aesthetically pleasing
B. remove rust and prevent atmospheric effects ✓
C. increase the melting point of the spelter
D. strengthen the joint

Q104 Part B (Heat Engine)
Natural rubber is soft at high temperatures and brittle at low temperatures; hence raw rubber is heated with sulphur and other additives at a temperature range between 373 – 415 K to make it strong. This process is called _____ of rubber.

A. vulcanisation ✓
B. molding
C. latex
D. extrusion

Q105 Part B (Heat Engine)
Which of the following conversions are correct?

A. 1 L = 1000 dm^3 and 1 mL = 1000 cm^3
B. 1000 L = 1 dm^3 and 1000 mL = 1 cm^3
C. 1 L = 1 dm^3 and 1 mL = 1 cm^3 ✓
D. 1000 L = 1 dm^3 and 1 mL = 1000 cm^3

Q106 Part B (Heat Engine)
Which of the following care and maintenance of a marking table is INCORRECT?

A. The marking table should be protected from damage.
B. The marking table should be protected from rust.
C. After use, the marking table should be cleaned with a soft cloth.
D. The surface of the marking table should not be given a thin layer of oil. ✓

Q107 Part B (Heat Engine)
The accuracy of measurement by a try square is about:

A. 0.02 mm per 10 mm length
B. 0.001 mm per 10 mm length
C. 0.004 mm per 10 mm length
D. 0.002 mm per 10 mm length ✓

Q108 Part B (Heat Engine)
What is the primary reason for conducting a vehicle road test?

A. To test how fast the vehicle can go
B. To avoid the need for inspections
C. To increase fuel efficiency
D. To ensure the vehicle is functioning safely and correctly ✓

Q109 Part B (Heat Engine)
How many check-valves are in a tandem master cylinder?

A. None; it uses a pump only.
B. Three for each wheel
C. One for all brakes
D. Two, one for front and one for rear brakes ✓

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Q110 Part B (Heat Engine)

In a two stroke petrol engine, during the upward stroke of the piston, the gases are compressed in the piston, and at the same time, which of the following is also performed during the operation?

A. Fresh fuel enters in the cylinder from the crank chamber through the valve.

B. Fresh air for petrol engine enters the cylinder from the chamber through the valve exhaust port.

C. Fresh air and fuel (petrol) mixture enters the crank chamber through the valve. ✓

D. Exhaust gases enter the crank chamber through the valve.

Q111 Part B (Heat Engine)

Which of the statements is correct about a compression ignition engine?

A. Diesel engine produces less noise compared to petrol engine.

B. Operating speed range is less compared to petrol engine. ✓

C. Starting is easy for diesel engine since less cranking effort is required compared to petrol engine.

D. Initial and maintenance costs of diesel engine is less compared to petrol engine.

Q112 Part B (Heat Engine)

The process of aligning a principal inertia axis with the geometric axis of rotation of the shaft through the addition or removal of material in a shaft is known as:

A. balancing ✓

B. parallel alignment

C. equilibrium

D. angular alignment

Q113 Part B (Heat Engine)

The clutch slave cylinder disengages the clutch from the engine by moving the:

A. spline shaft

B. pressure plate ✓

C. cushion spring

D. leaf spring

Q114 Part B (Heat Engine)

The SI unit of 'ultimate stress' is _____.

A. pascal (Pa) ✓

B. newton (N)

C. newton per meter (N/m)

D. joule per square meter (J/m^2)

Q115 Part B (Heat Engine)

Which of the following screwdrivers has cross-shaped tips that are unlikely to slip from the cruciform slots in Philips recessed head screws?

A. Stumpy screwdriver

B. Offset screwdriver

C. Cross-recess screwdriver ✓

D. Ratchet screwdriver

Q116 Part B (Heat Engine)

The accuracy of the dial bore gauge instrument depends on which of the following parts?

A. A dot indicator on a linear scale

B. An arrow on a semi-circular scale

C. A pointer on a graduated dial ✓

D. A marking on a logarithmic dial

Q117 Part B (Heat Engine)

Compared to the metals being joined, the melting point of solder is _____.

A. equal (the same)

B. unpredictable

C. higher

D. lower ✓

Q118 Part B (Heat Engine)

A rectangular floor measuring 10 m × 8 m is to be tiled. If each tile covers 0.25 m^2, how many tiles are needed?

A. 200

B. 300

C. 320 ✓

D. 250

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Q119 Part B (Heat Engine)

Which of the following is INCORRECT about line standard?

- A. More accurate due to line thickness ✓
- B. Subject to parallax error
- C. Quick measurements over a wide range
- D. Used to measure the distance between two engraved lines

Q120 Part B (Heat Engine)

_____ is a type of single thin sheet of metal that yields when pressure is applied and is widely used in most modern cars. When pressure is removed, the metal springs back to its original shape.

- A. Spiral spring
- B. Diaphragm spring ✓
- C. Leaf spring
- D. Cushion spring

Q121 Part B (Heat Engine)

Which of the following statements is NOT correct about the procedure of calculating balancing of crankshaft of an engine?

- A. To balance a crankshaft, metal can be added by welding material deposition on the 'heavy' side until balance is achieved. ✓
- B. To balance a crankshaft, metal can be removed by drilling holes on the 'heavy' side until balance is achieved.
- C. Crankshaft balancing involves calculating the rotating and reciprocating masses of a crankshaft.
- D. It involves determining the balancing couple and counterweight mass required to balance the crankshaft.

Q122 Part B (Heat Engine)

A 100-mm centre-punch could have a 10-mm diameter body and a 6-mm diameter point ground to an angle of _____.

- A. 120°
- B. 90° ✓
- C. 60°
- D. 30°

Q123 Part B (Heat Engine)

What can happen if air gets locked in the fuel system?

- A. Reduced exhaust emissions
- B. Increased fuel efficiency
- C. Erratic running of the engine ✓
- D. Improved engine performance

Q124 Part B (Heat Engine)

What is the primary purpose of shielding in electrical cables?

- A. To increase the voltage capacity of the cable
- B. To increase the current-carrying capacity of the cable
- C. To protect the cable from external electromagnetic interference ✓
- D. To prevent heat loss from the cable

Q125 Part B (Heat Engine)

In a logic circuit, three SPST (Single Pole Single Throw) switches are used to implement a logic gate. The switches are connected in series. What is the output of the circuit if all switches are closed?

- A. Undefined
- B. 1 ✓
- C. The output will depend on the type of gate used
- D. 0

Q126 Part B (Heat Engine)

Diesel fuel is generally used in which of the following types of vehicles?

- A. Aerospace vehicles
- B. Scooters
- C. Cars
- D. Heavy trucks and buses ✓

Q127 Part B (Heat Engine)

Which of the following types of materials is NOT used in an oil filter as a strainer?

- A. Thin aluminum foil ✓
- B. Felt
- C. Cloth
- D. Wire screen

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Q128 Part B (Heat Engine)

Which of the following is a key electrical safety tip in a workshop?

- A. Operate machines with wet hands
- B. Ignore frayed wires if the device is still working
- C. Use water to clean electrical panels
- D. Ensure electrical equipment is properly grounded ✓

Q129 Part B (Heat Engine)

Which of the following statements is NOT correct about the functions of a lube oil pump?

- A. Maintains consistent oil circulation throughout the engine.
- B. Provides direction for the oil's passage through the galleries and to various areas.
- C. The movement of engine lubricant around the engine is made difficult ✓
- D. Oil is transferred to the engine's key components under high pressure,.

Q130 Part B (Heat Engine)

For which of the following calipers, a screw and nut are provided for opening and closing the caliper legs?

- A. Spring joint calipers ✓
- B. Firm joint calipers
- C. Simple calipers
- D. Leg and point calipers

Q131 Part B (Heat Engine)

What is a major disadvantage of an over-inflated tyre?

- A. Increases road grip
- B. Reduces rolling resistance
- C. Improves shock absorption
- D. Wears out faster at the centre ✓

Q132 Part B (Heat Engine)

Which of the following stages of an automatic transmission system locks the transmission, restricting a vehicle from moving?

- A. Park (P) stage ✓
- B. Drive (D) stage
- C. Low (L) stage
- D. Neutral (N) stage

Q133 Part B (Heat Engine)

What is the role of the rubber seal in the wheel cylinder?

- A. To increase hydraulic pressure
- B. To prevent brake fluid leakage ✓
- C. To retract the brake shoes
- D. To connect the piston to the brake shoe

Q134 Part B (Heat Engine)

What is the main purpose of an ignition coil in a gasoline engine?

- A. To step up low voltage to high voltage ✓
- B. To regulate engine temperature
- C. To control the engine's timing
- D. To supply fuel to the engine

Q135 Part B (Heat Engine)

Which of the following statements is/are true about Non-Functional Dimensions (NF) in engineering drawing?

Statement 1: Non-functional Dimensions are shown without limits, as they do not affect the functionality of the component or space.
Statement 2: Non-Functional Dimensions are typically used for reference purposes only, and do not impact the assembly or performance of the component or space.

- A. Only statement 2 is true ✓
- B. Only statement 1 is true
- C. Both statements are true
- D. Neither statement is true

Q136 Part B (Heat Engine)

Which of the following gases is primarily liberated during oxidation of the weld pool in oxy-acetylene welding?

- A. Carbon dioxide ✓
- B. Hydrogen
- C. Carbon monoxide
- D. Nitrogen

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Q137 Part B (Heat Engine)

What is the primary reason for the heating effect in a conductor when an electric current passes through it?

A. The electric field in the conductor causes heat generation.

B. The movement of electrons causes heat generation. ✓

C. The conductor absorbs heat from the surrounding environment.

D. The movement of protons causes heat generation.

Q138 Part B (Heat Engine)

The piston rings are placed in the ring groove and provide sealing between which of the following two parts to prevents leakage of high-pressure gases?

A. Piston and the cylinder liner ✓

B. Piston and the cylinder block

C. Piston and the cylinder head

D. Piston and the cylinder fins

Q139 Part B (Heat Engine)

An angle greater than 180 degrees is referred to as _____.

A. a right angle

B. an acute angle

C. an obtuse angle

D. a reflex angle ✓

Q140 Part B (Heat Engine)

A statement and conclusion for pictorial drawing are given below. Determine the logical relationship between them.

Statement: Pictorial drawings are three-dimensional and provide a visual representation of an object.

Conclusion: Therefore, pictorial drawings are useful for describing the shape of a piece part or component.

A. The conclusion does not logically follow from the statement.

B. The conclusion is partially supported by the statement.

C. The conclusion is unrelated to the statement.

D. The conclusion logically follows from the statement. ✓

Q141 Part B (Heat Engine)

What is the primary purpose of preventive maintenance?

A. To increase the workload of employees

B. To reduce unexpected equipment failures ✓

C. To delay repairs until breakdowns occur

D. To eliminate the need for regular inspections

Q142 Part B (Heat Engine)

_____ recommend(s) 20 mm wide margins for sheet sizes AO and A1 in engineering drawings.

A. Borders and frames: SP: 46 (2003) ✓

B. Geographic coordinate systems

C. Custom grids

D. Grid reference system

Q143 Part B (Heat Engine)

Which of the following statements is NOT correct about the parts associated with the cylinder head?

A. Space enclosed between the cylinder head and piston top during combustion is the combustion chamber.

B. Through the metal screw the spark plug is fitted in the cylinder head plug.

C. The fuel injector is used to spray fuel into the engine cylinder. It is fixed to the cylinder head.

D. The combustion of fuel and the consequent release of thermal energy results in the building up of pressure in the casing. ✓

Q144 Part B (Heat Engine)

A type of brake has a diaphragm operating in a cylinder. For application of brakes on one side, a diaphragm is subjected to atmospheric pressure while the other is applied negative pressure by exhausting air known as ____ brake.

A. air

B. electric

C. vacuum ✓

D. hydraulic

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Q145 Part B (Heat Engine)

What is the term used to describe programs that distinguish between uppercase and lowercase letters, treating "yes" and "YES" as different inputs?

- A. Case-insensitive
- B. Numerical
- C. Case-sensitive ✓
- D. Alphabetical

Q146 Part B (Heat Engine)

Which of the following actions is a part of the emergency response team's responsibilities during an active emergency?

- A. Preparing reports on emergency incidents
- B. Rescuing persons in immediate danger ✓
- C. Conducting routine safety checks
- D. Scheduling regular evacuation drills

Q147 Part B (Heat Engine)

Which of the following is a primary difference between a primary and a secondary electrochemical cell?

- A. A secondary cell produces more energy than a primary cell.
- B. A primary cell can be recharged, while a secondary cell cannot be recharged.
- C. A primary cell cannot be recharged, while a secondary cell can be recharged. ✓
- D. There is no difference between primary and secondary cells.

Q148 Part B (Heat Engine)

Sine bars are used when a high degree of accuracy less than _____ is needed for measuring angles.

- A. 1 degree
- B. 30 degrees
- C. 1 minute ✓
- D. 30 minutes

Q149 Part B (Heat Engine)

Which of the following types of piston ring is placed at the top of the piston in an IC engine?

- A. Oil ring
- B. Compression ring ✓
- C. Wiper ring
- D. Pressure ring

Q150 Part B (Heat Engine)

Which of the following components in the axle is the most likely to fail if there is an unusual loud clanking or clunking as you put your vehicle into gear, or if a vehicle seems to struggle to get power as it starts to move?

- A. Bearing at the wheel is damaged
- B. Bending in the shaft induced
- C. There is a crack initiated in the axle at cross sectional area perpendicular to axis
- D. Axle-joint damage ✓

Q151 Part B (Heat Engine)

The primary function of a blowpipe in Oxy acetylene welding is to:

- A. protect against flashback
- B. carry gas from the regulator
- C. control and mix oxygen and acetylene gases ✓
- D. regulate gas pressure

Q152 Part B (Heat Engine)

Which of the following is NOT the correct statement when fitting rings in an internal combustion (IC) engine?

- A. Cleaning the piston head sealing surface area thoroughly is required. ✓
- B. This is vital for maintaining proper combustion pressure and preventing oil consumption issues.
- C. Use of specialised tools to install the rings without twisting or damaging them is essential.
- D. The most crucial precaution is to ensure proper ring gap and alignment by carefully checking the end gap of each ring.

Q153 Part B (Heat Engine)

Which of the following is a major risk associated with fuel spillage?

- A. Fire hazards and environmental contamination ✓
- B. Better lubrication for workshop floors
- C. Increased productivity
- D. Reduced need for ventilation

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Q154 Part B (Heat Engine)

Which of the following processes is carried out on connecting rods to locate the two halves relative to one another?

A. Dimples are created on the surface

B. Tapper threads are used

C. Mirror finishing is done by diamond turning machine

D. Serrations are used ✓

Q155 Part B (Heat Engine)

When the crank is at the dead centre, what will be the magnitude of bending moment and twisting moment at the crankshaft?

A. Bending moment on the shaft is maximum and the twisting moment is zero. ✓

B. Both bending moment and the twisting moment are zero in the shaft

C. Bending moment on the shaft is minimum and the twisting moment is maximum.

D. Both bending moment and twisting moment on the shaft are maximum

Q156 Part B (Heat Engine)

Which of the following terms is associated with the cams that control the valves and directly influence the breathing process of the engine?

A. Shape and timing of the cams ✓

B. Speed of the cams

C. Material of construction of the cams

D. Location and length of the cams

Q157 Part B (Heat Engine)

Which of the following locations is correct for installing the oil filter in the engine?

A. After lines going to supply the oil to the bearing after coolers

B. In between coolers and the oil lines coming from sump

C. Downstream of coolers in order to filter if any solid part from coolers enters the oil lines ✓

D. Up stream of coolers in order to filter if any solid part from coolers lives the oil lines

Q158 Part B (Heat Engine)

What is the primary goal of the 5S concept?

A. To replace traditional safety measures

B. To increase the number of safety regulations

C. To improve workplace organisation and efficiency ✓

D. To eliminate the need for maintenance

Q159 Part B (Heat Engine)

Match the following designations of sheets with their respective trimmed sizes in length and breadth.

Designation Trimmed Size
A) A0 P) 297 × 420
B) A1 Q) 420 × 594
C) A2 R) 594 × 841
D) A3 S) 841 × 1189

A. A-S ; B-R ; C-Q ; D-P ✓

B. A-Q ; B-R ; C-S ; D-P

C. A-S ; B-P ; C-Q ; D-R

D. A-P ; B-R ; C-Q ; D-S

Q160 Part B (Heat Engine)

What happens if the O-ring seal is damaged?

A. The wheel bearings may stop rotating.

B. The vehicle's suspension may fail.

C. The brake pedal may become harder to press.

D. Oil may seep into the brake drum, reducing braking efficiency. ✓

Q161 Part B (Heat Engine)

The space enclosed in the upper part of a cylinder, by the cylinder head and the piston top, during the combustion process is called:

A. combustion chamber ✓

B. fuel digestion chamber

C. air suction zone

D. compression ratio

Q162 Part B (Heat Engine)

Why do cars have treaded tyres?

A. To increase friction and grip on the road ✓

B. To reduce weight

C. To decrease friction

D. To increase speed

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Q163 Part B (Heat Engine)

Which of the following components is a part of a diesel engine only?

- A. Spray nozzle ✓
- B. Fuel tank
- C. Carburetor
- D. Spark plug

Q164 Part B (Heat Engine)

Which of the following types of brakes can be used with drum, disc or a combination, with air pressure providing the power instead of hydraulic fluid?

- A. Air brakes ✓
- B. Electric brakes
- C. Pneumatic brakes
- D. Magnetic brakes

Q165 Part B (Heat Engine)

Which of the following indicates that the fuel system is free of air during bleeding?

- A. Air bubbles stop escaping with fuel ✓
- B. Fuel stops flowing
- C. Bleeding screw tightens automatically
- D. Engine runs smoothly

Q166 Part B (Heat Engine)

Which of the following types of seats is made of hardened alloys and pressed or shrunk into the cylinder head, often used in aluminium engines for better durability?

- A. Integral valve seats
- B. Ring valve seats
- C. Butterfly valve seats
- D. Insert valve seats ✓

Q167 Part B (Heat Engine)

The core of the ignition coil of a spark ignition engine is made from which material?

- A. Aluminium
- B. Copper
- C. Steel
- D. Soft iron ✓

Q168 Part B (Heat Engine)

Which of the following processes is used to fit a bearing into the connecting rod, allowing the gudgeon pin to provide the oscillating movement at the small end of the connecting rod?

- A. Interference fit
- B. Press fit ✓
- C. Autofrettage fit
- D. Loose fit

Q169 Part B (Heat Engine)

In contexts such as automotive clutches, the spring is used to absorb shock during engagement. It is often referred to as a:

- A. leaf spring of circular shape
- B. tensile spring in helical shape
- C. cushion spring in flat shape ✓
- D. spiral spring of rectangular shape

Q170 Part B (Heat Engine)

The distance between the parts to be joined in a weld is known as _____.

- A. reinforcement
- B. root gap ✓
- C. leg length
- D. fusion penetration

Q171 Part B (Heat Engine)

The angle formed by the backward tilt of the steering axis from vertical, when viewed from the side of the wheel is known as _____.

- A. positive castor ✓
- B. zero castor
- C. positive camber
- D. negative castor

Q172 Part B (Heat Engine)

The function of a steering system is to convert the rotary movement of the steering wheel into:

- A. angular velocity of the front wheels
- B. angular turn of the front wheels ✓
- C. linear motion of the front wheels
- D. angular turns of the rear wheels

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Q173 Part B (Heat Engine)

How many divisions are there on a vernier scale as used in a modern vernier caliper for metric measurement?

- **A.** 50 ✓
- **B.** 25
- **C.** 75
- **D.** 100

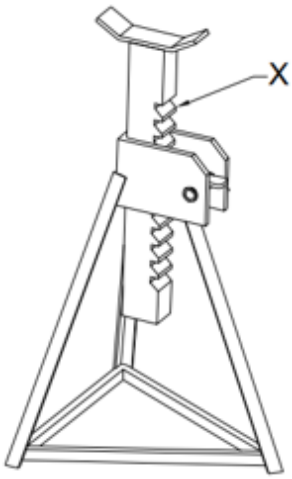
Q174 Part B (Heat Engine)

In a circuit with a NTC type thermistor and a fixed resistor connected in series connected to a DC power supply, what will happen to the output voltage if there is a rise in temperature?

- **A.** The output voltage will increase. ✓
- **B.** The output voltage will remain constant.
- **C.** The output voltage will fluctuate depending on the resistor value.
- **D.** The output voltage will decrease.

Q175 Part B (Heat Engine)

In the given diagram of an adjustable jack stand, what is the name of the part marked as 'X'?



- **A.** Ratchet teeth ✓
- **B.** Ratchet handle
- **C.** Outlet valve
- **D.** Saddle

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Part A

100 Questions • Answer Key

Q1 Part A

Which of the following is NOT correct about Joule's law of heating?

A. Heat produced in a resistor is directly proportional to the resistance for a given current.

B. Heat produced in a resistor is directly proportional to the time for which the current flows through the resistor.

C. Heat produced in a resistor is inversely proportional to the square of the current for a given resistance. ✓

D. Heat produced in a resistor is directly proportional to the square of the current for a given resistance.

Q2 Part A

How does retrofitting an old building with energy-efficient windows impact energy consumption?

A. It decreases the building's heating and cooling costs. ✓

B. It causes a rise in indoor temperatures.

C. It has no effect on energy consumption.

D. It increases the need for artificial lighting.

Q3 Part A

Three partners, A, B and C, shared the profit in a business in the proportion of 11 : 13 : 16. They invested their capitals for 7 months, 5 months and 12 months, respectively. What was the ratio of their capitals?

A. 96 : 135 : 101

B. 3 : 5 : 8

C. 21 : 35 : 44

D. 165 : 273 : 140 ✓

Q4 Part A

A force of 6 N is exerted on an object, resulting in its displacement of 2 m in the direction of the force. If the force is constant during the displacement, what is the work done in this case?

A. 25 J

B. 12 J ✓

C. 10 J

D. 3 J

Q5 Part A

In order to resolve disputes arising from cyber crime, such as tampering with computer source documents, hacking the computer system, using password of another person and publishing sensitive personal data of others without their consent, a forum has been established by the Central Government (India) in accordance with the provisions contained under Section 48(1) of the Information Technology Act, 2000. What is the name of that forum?

A. Internet Crime Complaint Center

B. National Cybercrime Reporting Station

C. Cyber Appellate Tribunal ✓

D. Cybercrime Reporting Tribunal

Q6 Part A

Given below are two sets of numbers. Both the sets are formed using the same mathematical equations or follow a common pattern. Which of the given options follows the same set of mathematical equations or patterns as the sets given in the question?

1333 – 1730 – 2199 – 2746 – 3377
218 – 345 – 514 – 731 – 1002

A. 3 – 10 – 29 – 66 – 127 ✓

B. 3 – 6 – 11 – 18 – 27

C. 38 – 51 – 66 – 83 – 102

D. 123 – 146 – 171 – 198 – 227

Q7 Part A

A porter lifts a 10 kg luggage from the ground and places it on his head, 2.5 m above the ground. Calculate the work done by him on the luggage. (Take g = 10 ms^{-2}.)

A. 200 J

B. 250 N

C. 250 J ✓

D. 100 J

Q8 Part A

The speed of a train is 144 km/hr. The distance covered by the train in 12 seconds is:

A. 78 m

B. 480 m ✓

C. 518 m

D. 103 m

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Q9 Part A

What should come in place of the question mark (?) in the given alpha-numeric series?

Y13, F11, L9, Q7, U5, X3, ?

A. A1
B. Z2
C. Z1 ✓
D. Y1

Q10 Part A

Which of the following statements is INCORRECT?

A. In solids, heat transfer is typically carried out through conduction.
B. Burning of feet on hot sand is an example of heat transfer by conduction.
C. Conduction is the process of heat transfer from hotter body to colder body.
D. Conduction is the process of heat transfer that does not require any medium to transfer heat. ✓

Q11 Part A

Calculate the resistance of the bulb filament if it draws 200 mA current from 220 V source.

A. 44 Ω
B. 220 Ω
C. 1100 Ω ✓
D. 0 Ω

Q12 Part A

What is the first step to take in case of a power failure in a workshop?

A. Check if emergency lighting and backup power are functional ✓
B. Continue working as usual
C. Panic and leave the premises immediately
D. Ignore the situation and wait for power to return

Q13 Part A

Read the given statement and conclusions carefully. Assuming that the information given in the statement is true, even if it appears to be at variance with commonly known facts, decide which of the given conclusion(s) logically follow(s) from the statement.

Statement:
Over the past year, there has been a noticeable increase in respiratory diseases in City W. According to a public health study, this increase is related to an increase in the number of cars on the road, which has raised air pollution levels.

Conclusions:
I. Increased vehicular traffic contributes to higher levels of air pollution.
II. Improving public transportation would reduce respiratory illnesses in City W.

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

Q14 Part A

If 'A' stands for '÷', 'B' stands for '×', 'C' stands for '+' and 'D' stands for '−', then what will come in place of the question mark (?) in the following equation?

47 D 25 A 5 C 2 B 9 = ?

A. 60 ✓
B. 58
C. 56
D. 62

Q15 Part A

What is the SI unit for solid angle?

A. Metre
B. Candela
C. Steradian ✓
D. Radian

Q16 Part A

In a certain code language, 'GOES' is coded as '8624' and 'SNYC' is coded as '3817'. What is the code for 'S' in the given code language?

A. 8 ✓
B. 2
C. 4
D. 3

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Q17 Part A

What is necessary for a circuit to have electric current flowing through it?

A. Only bulb

B. Only wire

C. A closed conducting path with a voltage source ✓

D. Only switch

Q18 Part A

Find the minimum value of $2x^2 - 5x - 3$ and also find x.

A. 6.125 and x = 1.2

B. −6.125 and x = 0.25

C. 6.125 and x = 1.25

D. −6.125 and x = 1.25 ✓

Q19 Part A

Which of the following statements is correct?

A. All metals are poor conductors of heat.

B. Plastic and wood allow heat to pass through them easily.

C. Copper and aluminium are good conductors of heat. ✓

D. Dry air is a good conductor of heat.

Q20 Part A

A refrigerator seller offers a discount of 10% on its listed price of ₹57,500 and still earns a profit of 15%. The cost price of the refrigerator is:

A. ₹42,000

B. ₹45,000 ✓

C. ₹48,000

D. ₹40,000

Q21 Part A

E, F, G, H, P, Q, and R, are sitting around a circular table facing the centre. F sits third to the left of H. Only two people sit between H and G when counted from the right of H. Q is an immediate neighbor of G. P is NOT an immediate neighbour of H. E is an immediate neighbour of Q.
Who sits second to the left of E?

A. P

B. H

C. G

D. R ✓

Q22 Part A

Which of the following is NOT an SI unit?

A. Mole

B. Hour ✓

C. Metre

D. Kilogram

Q23 Part A

Which term is used to describe the closeness of the measured value to the standard or true value?

A. Precision

B. Approximate

C. Accuracy ✓

D. Mean

Q24 Part A

Two trains are running in opposite directions at the same speed. The length of each train is 175 m. If they cross each other in 7 s, the speed of each train is:

A. 80 km/hr

B. 85 km/hr

C. 90 km/hr ✓

D. 75 km/hr

Q25 Part A

Which of the following is generally the temperature range in a laboratory thermometer?

A. −10°C to 110°C ✓

B. −100°C to 130°C

C. −10°C to 150°C

D. 35°C to 42°C

Q26 Part A

A person saves 50% of his income. If his expenditure is ₹440, then his income (in ₹) is:

A. 560

B. 600

C. 880 ✓

D. 920

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Q27 Part A

A man rides a bicycle from Point A to Point B in 10 minutes and comes back to Point B along the same path in 10 minutes. If the distance between Points A and B is 1 km, calculate his average velocity?

- A. 0 m/s ✓
- B. 0.1 m/s
- C. 3.3 m/s
- D. 1.6 m/s

Q28 Part A

What should come in place of the question mark (?) in the given series?

179 171 163 ? 147 139

- A. 153
- B. 151
- C. 157
- D. 155 ✓

Q29 Part A

The two sides CB and BA of triangle ABC are produced to CE and BD, respectively, in such a way that ∠DAC = 110° and ∠ABE = 130°. Which of the following options is true?

- A. BC <AC < AB
- B. AB <AC < BC
- C. AC <AB < BC ✓
- D. BC <AB < AC

Q30 Part A

What should come in place of the question mark (?) in the given series?

62 73 87 104 124 ?

- A. 142
- B. 134
- C. 147 ✓
- D. 153

Q31 Part A

A, B, C, D, E and F live on six different floors of the same building. The lowermost floor in the building is numbered 1, the floor above it is numbered 2 and so on till the topmost floor is numbered 6. E lives on an even-numbered floor but not 4. The sum of floors on which E and B live is 9. Only three people live between A and C. The sum of floors on which F and C live is 3. What is the sum of floors on which B and F live?

- A. 6
- B. 5 ✓
- C. 7
- D. 4

Q32 Part A

Based on the English alphabetical order, three of the following four letter-clusters are alike in a certain way and thus form a group. Which letter-cluster DOES NOT belong to that group?
(Note: The odd one out is not based on the number of consonants/vowels or their position in the letter-cluster.)

- A. JNEL
- B. UYPW
- C. CGXF ✓
- D. QULS

Q33 Part A

Which of the following statements is NOT true?

- A. Clinical and laboratory thermometers are the same. ✓
- B. The range of clinical thermometer is 35 to 42°C.
- C. Laboratory thermometer cannot be used to measure body temperature.
- D. Clinical thermometer should not be used to measure the temperature of boiling water.

Q34 Part A

Which of the following letter-clusters should replace # and % so that the pattern and relationship followed between the letter-cluster pair on the left side of :: is the same as that on the right side of ::?

: KHM :: OLQ : %

- A. # = LIN, % = NLP
- B. # = LIM, % = NKP
- C. # = LIN, % = NKP ✓
- D. # = LIN, % = NKO

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Q35 Part A

Which of the following is the primary reason for adopting scientifically designed methods for safely disposing of toxic waste from automobiles?

A. To improve vehicle lifespan by minimising mechanical wear

B. To reduce fuel consumption and improve overall efficiency

C. To protect human health from harmful fumes and dust in the air ✓

D. To increase vehicle performance by optimising engine efficiency

Q36 Part A

ABC Association meeting is to be held on the 2nd Sunday of next month. The cost of the registration is ₹50 per person. Lunch will be provided to the participants at an additional cost of ₹24. If the number of participants who paid for lunch was 100 more than the members who did not, and if the total receipts for registrations and lunch is ₹69,400, how many people registered and how many lunches are to be prepared, respectively?

A. 1100 and 500

B. 500 and 600

C. 1100 and 1100

D. 1100 and 600 ✓

Q37 Part A

Read the given statements and conclusions carefully. Assuming that the information given in the statements is true, even if it appears to be at variance with commonly known facts, decide which of the given conclusion(s) logically follow(s) from the statements.

Statements:
I. All books are pencils.
II. All pencils are cardboards.
III. All cardboards are notebooks.

Conclusions:
I. Some notebooks are pencils.
II. Some cardboards are books.
III. Some notebooks are books.

A. All conclusions I, II and III follow. ✓

B. Only conclusions I and II follow.

C. Only conclusions II and III follow.

D. Only conclusions I and III follow.

Q38 Part A

Which of the following is the correct statement of Ohm's Law?

A. The potential difference across the ends of a conductor is inversely proportional to the current flowing through it.

B. The potential difference across the ends of a conductor is directly proportional to the current flowing through it. ✓

C. If the potential difference across the two ends of a conductor is 1 V and the current through it is 1A, then the resistance of the conductor is 2Ω.

D. Current through a resistor is directly proportional to its resistance.

Q39 Part A

Under which Section of the Factories Act, of 1948, is the employment of women and children near cotton openers prohibited?

A. Section 29

B. Section 25

C. Section 21

D. Section 27 ✓

Q40 Part A

Which of the following tools is commonly used to support the 'Standardize' step in the 5S methodology?

A. Job cycle charts ✓

B. Labels and signs

C. Floor markings

D. Cleaning supplies

Q41 Part A

The potential energy of an object is equivalent to the _____.

A. energy transferred ✓

B. change in velocity

C. energy lost

D. change in speed

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Q42 Part A

T-Square is used to _____ in engineering drawings.

A. transfer dimensions and dividing lines into a number of equal parts

B. draw horizontal lines, parallel lines and to guide/hold the setsquares ✓

C. draw curved lines on drawing sheets

D. support the drawing paper/tracing paper for making drawings

Q43 Part A

Based on the English alphabetical order, three of the following four letter-clusters are alike in a certain way and thus form a group. Which letter-cluster DOES NOT belong to that group?
(Note: The odd one out is not based on the number of consonants/vowels or their position in the letter-cluster.)

A. EKJR ✓

B. VBZI

C. GMKT

D. IOMV

Q44 Part A

A shopkeeper allows a discount of 18% on the marked price of an article and sells it for ₹2,870. Find the marked price of the article.

A. ₹3,460

B. ₹3,500 ✓

C. ₹3,350

D. ₹3,200

Q45 Part A

Which of the following features is unique to Telegram compared to WhatsApp and Facebook Messenger?

A. Ability to create channels for broadcasting messages to large audiences ✓

B. Integration with Facebook for seamless sharing

C. Voice and video calling capabilities

D. End-to-end encryption for all messages

Q46 Part A

What is the dimensional equation of mass density (ρ) ?

A. $[M L^{-3} T^{0}]$ ✓

B. $[M L^{-2} T^{0}]$

C. $[M^{0} L^{3} T^{0}]$

D. $[M L^{-3} T^{-2}]$

Q47 Part A

Which of the following keyboard shortcuts on a Windows 10 home screen opens the item's properties?

A. Insert + Alt

B. F2 + Alt

C. Tab + Del

D. Alt + Enter ✓

Q48 Part A

Why is regular maintenance of HVAC systems considered a medium ECO?

A. It prevents overheating of the system.

B. It decreases the system's energy consumption. ✓

C. It speeds up system breakdowns.

D. It increases the cost of energy.

Q49 Part A

What should come in place of the question mark (?) in the given series?

WU5, SQ7, NL11, ?

A. HE15

B. HF13 ✓

C. HF17

D. GE17

Q50 Part A

Which of the following is NOT a good heat conductor?

A. Aluminum

B. Copper

C. Fur ✓

D. Iron

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Q51 Part A

In a certain code language, 'WIDE' is coded as '8694' and 'INKS' is coded as '3917'. What is the code for 'I' in the given code language?

- A. 9 ✓
- B. 7
- C. 3
- D. 6

Q52 Part A

Which of the following is an ethical concern related to Information Technology?

- A. Increased accessibility to educational resources
- B. Enhancement of communication channels
- C. Privacy violations and data breaches ✓
- D. Reduction in administrative costs

Q53 Part A

Which of the following terms is used to describe the pollutants that originate from identifiable sources, such as factories or vehicles?

- A. Random Pollution
- B. Point Source Pollution ✓
- C. Radicle Pollution
- D. Non-point Source Pollution

Q54 Part A

Why does a combination of two thin blankets keep you warmer in the winter than a single thick blanket?

- A. Two thin blankets absorb more heat from the surroundings than one thick blanket.
- B. Two thin blankets allow more heat to escape, keeping you warmer.
- C. Two thin blankets generate more heat than one thick blanket.
- D. Two blankets create an additional insulating layer of air, reducing heat loss. ✓

Q55 Part A

Two sets of numbers are given below. In each set of numbers, certain mathematical operation(s) on the first number results in the second number. Similarly, certain mathematical operation(s) on the second number results in the third number and so on. Which of the given options follows the same set of operations as in the given sets?

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

988 – 494 – 444 – 534; 894 – 447 – 397 – 487

- A. 682 – 341 – 291 – 381 ✓
- B. 226 – 113 – 144 – 268
- C. 586 – 293 – 244 – 328
- D. 138 – 69 – 14 – 98

Q56 Part A

A can do a work in 14 hours. B can do the same work in 21 hours. A started working alone. After how many hours should B join A so that the whole work is completed in 10 hours?

- A. 3.5
- B. 4 ✓
- C. 3
- D. 4.5

Q57 Part A

Which element is used in thermometers?

- A. Lead
- B. Mercury ✓
- C. Gallium
- D. Bromine

Q58 Part A

Four chairs and a table set up cost ₹22,000. Determine the table's cost, if it is ₹2,000 more expensive than the chair.

- A. ₹5,000
- B. ₹6,000 ✓
- C. ₹4,000
- D. ₹6,500

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Q59 Part A

What is the kinetic energy possessed by an object having mass 25 kg and moving with a uniform velocity of 2 m s^{-1}?

- A. 50 J ✓
- B. 100 J
- C. 120 J
- D. 80 J

Q60 Part A

How is a voltmeter connected in a circuit to measure potential difference?

- A. Neither in series nor in parallel
- B. Directly to the power source only
- C. In series with the circuit
- D. In parallel across the points where potential difference is to be measured ✓

Q61 Part A

Eight people are sitting in two parallel rows containing 4 people each in such a way that there is equal distance between adjacent persons. In row 1 – A, B, C and D are seated and all of them are facing south. In row 2 – P, Q, R and S are seated and all of them are facing north. Thus each person faces another person from the other row. No one sits to the left of B. R faces the person who sits second to the right of D. C faces the person who is the immediate neighbour of Q and R, B does not face S. Who amongst the following faces P?

- A. D
- B. B ✓
- C. A
- D. C

Q62 Part A

If an electric load draws a current of 2 A for 1 second, then calculate the number of electrons (with charge 1.6×10^{-19} C) passing through the load.

- A. 1.25×10^{19} ✓
- B. 1.25×10^{20}
- C. 0.25×10^{20}
- D. 0.25×10^{19}

Q63 Part A

Which of the following is NOT correct?

- A. The motion of satellite around Earth in a circular orbit is uniform circular motion.
- B. The distance-time graph of an object moving with uniform speed is not a straight line. ✓
- C. A person jogging in the park is not an example of uniform circular motion.
- D. An object moving with a constant velocity represents uniform motion.

Q64 Part A

In a certain code language, 'BOAT' is coded as '8654' and 'AIDS' is coded as '3517'. What is the code for 'A' in the given code language?

- A. 5 ✓
- B. 3
- C. 6
- D. 8

Q65 Part A

What is the ratio of the areas of two successive format sheet sizes created by either halving along the length or doubling along the width?

- A. 2 : 1
- B. 4 : 1
- C. 1 : 2 ✓
- D. 1 : 4

Q66 Part A

The weights (in kg) of 20 students of a class have been recorded as 35, 42, 56, 44, 55, 44, 36, 44, 49, 48, 55, 35, 44, 47, 49, 48, 56, 44, 37 and 35. The modal weight (in kg) of the class is:

- A. 45
- B. 47
- C. 37
- D. 44 ✓

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Q67 Part A

The speed of a bus is 6 metres/second. The distance (in kilometres) travelled by the bus in 8 hours and 20 minutes is:

- A. 180 ✓
- B. 184
- C. 175
- D. 185

Q68 Part A

If the length, the breadth, and the height of a cuboid are 5 m, 2 m, and 50 cm, respectively, then find its volume.

- A. 50 m^3
- B. 500 m^3
- C. 5 m^3 ✓
- D. 20 m^3

Q69 Part A

Given below are two sets of numbers. Both the sets are formed using the same mathematical equations or follow a common pattern. Which of the given options follows the same set of mathematical equations or patterns as the sets given in the question?

4 – 9 – 25 – 64 – 169; 16 – 49 – 121 – 324 – 841

- A. 16 – 36 – 64 – 100 – 144
- B. 64 – 225 – 529 – 1444 – 3721 ✓
- C. 64 – 100 – 144 – 196 – 256
- D. 4 – 16 – 36 – 64 – 100

Q70 Part A

What should come in place of the question mark (?) in the given alpha-numeric series?

Q16, O14, M12, K10, I8, ?

- A. H6
- B. G6 ✓
- C. G4
- D. J6

Q71 Part A

Among three partners A, B and C in a business. The capital of B is equal to half the difference between thrice the capital of C and twice the capital of A. If at the end of the year, they received a profit of ₹25,415, what is the share of C (in ₹)?

- A. 9,166
- B. 8,666
- C. 11,666
- D. 10,166 ✓

Q72 Part A

What is the value of 100 g in SI units?

- A. 100 kg
- B. 10 kg
- C. 0.1 kg ✓
- D. 1 kg

Q73 Part A

If 24 joules of work is done in moving a charge of 2 coulombs across two points, then what will be the correct voltage across these two points?

- A. 12 V ✓
- B. 24 V
- C. 2 V
- D. 48 V

Q74 Part A

The thickness of a thread is measured by a student using a microscope of magnification 100. After making 30 observations, he finds the average width of the thread is 5.7 mm. What is the estimated thickness of the thread?

- A. 0.057 mm ✓
- B. 171 mm
- C. 0.57 mm
- D. 0.09 mm

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Q75 Part A

The marked price of an article was ₹27,500. The shopkeeper gave two successive discounts; the first discount was 20%, and the second was at a rate of 30% of the first discount. What is the selling price (in ₹) of the article?

A. 20,860
B. 26,080
C. 20,086
D. 20,680 ✓

Q76 Part A

Which of the following actions involves scientific work?

A. Climbing up the stairs ✓
B. Spending time conversing with friends
C. Watching a film
D. Holding a large load on one's head while standing motionless

Q77 Part A

When reporting a fire in an emergency, what is the most critical information to provide to emergency services?

A. The likely cause of the fire and the building owner's name
B. The weather conditions at the time of the fire
C. How the fire started and if someone is injured or missing ✓
D. The colour of the smoke and the direction it is moving

Q78 Part A

If 21.6 : x :: x : 29.4, and x > 0, then find the value of x.

A. 23.9
B. 25.4
C. 25.2 ✓
D. 23.3

Q79 Part A

Which of the following options is NOT a necessary characteristic of a kite?

A. The pairs of opposite angles are bisected by the corresponding diagonals. ✓
B. At least one diagonal is bisected by the other diagonal.
C. At least one pair of opposite angles is congruent.
D. The diagonals are perpendicular to each other.

Q80 Part A

An electric heater of resistance 50 Ω uses a current of 3 A. Determine the heat generated in 20 seconds.

A. 5000 J
B. 9000 J ✓
C. 1000 J
D. 60 J

Q81 Part A

Which of the following processes causes accumulation of heavy metals such as lead and mercury in soil?

A. Improper disposal of industrial wastes ✓
B. Natural soil formation
C. Ozone layer depletion
D. Water evaporation

Q82 Part A

Which of the following letter-number clusters will replace the question mark (?) in the given series to make it logically complete?

AD8, FI16, KN24, ?

A. PS35
B. PS32 ✓
C. OS32
D. OR35

Q83 Part A

A mass m is moving with a velocity v and its kinetic energy is K. What will be the new kinetic energy if the velocity is doubled?

A. 4 K ✓
B. 2 K
C. K/2
D. K

Q84 Part A

Which is the least number that must be subtracted from 5563 to make it exactly divisible by 18?

A. 3
B. 7
C. 5
D. 1 ✓

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Q85 Part A

What is the primary purpose of netiquette in online communication?

A. To increase the number of followers on social media

B. To improve typing speed

C. To enhance internet connection speed

D. To ensure polite and respectful interactions ✓

Q86 Part A

Select the pair which follows the same pattern as that followed by the two sets of pairs given below. Both pairs follow the same pattern.

ARF : YTH
WVJ : UXL

A. MEL : HZN

B. KXF : HZH

C. SZN : QBP ✓

D. QEB : NBD

Q87 Part A

Which of the following is a main greenhouse gas that is responsible for global warming?

A. Carbon Dioxide ✓

B. Nitrogen

C. Oxygen

D. Helium

Q88 Part A

Based on the English alphabetical order, three of the following four letter-cluster pairs are alike in a certain way and thus form a group. Which letter-cluster pair DOES NOT belong to that group?
(Note: The odd one out is not based on the number of consonants/vowels or their position in the letter-cluster pair)

A. KF – HM ✓

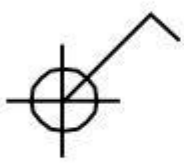
B. DY – AG

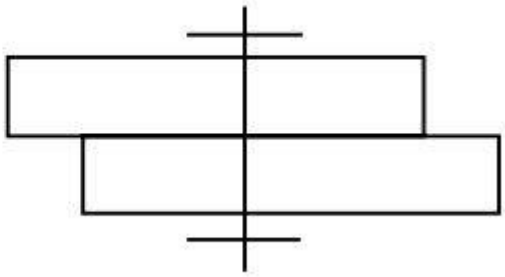
C. QL – NT

D. BW – YE

Q89 Part A

Examine the symbolic representation of the hole and rivet provided below. According to BIS SP 46-2003, what does this symbol represent?





A. Drilled on-site

B. Fitted in the workshop ✓

C. Drilled in the workshop

D. Drilled and fitted on-site

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Q90 Part A

If $x+y+z=0$, then find the value of $\frac{x^2}{2yz}+\frac{y^2}{2xz}+\frac{z^2}{2xy}$.

A. $\frac{3}{5}$

B. $\frac{2}{5}$

C. $\frac{3}{2}$ ✓

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

Q91 Part A

Study the given table carefully and answer the question that follows.

	Number of students who	
	Appeared for the exam	Passed the exam
Class IX	104	89
Class X	63	47

What was the total number of students who failed the exam from classes IX and X?

A. 28

B. 33

C. 21

D. 31 ✓

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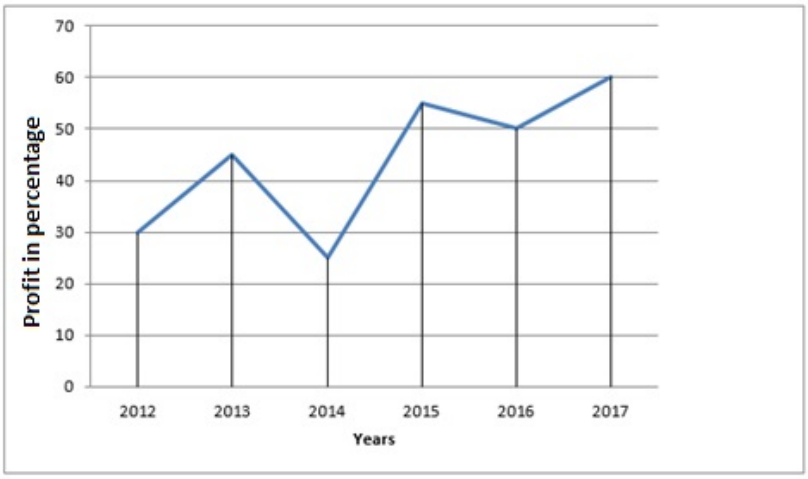
Q92 Part A

Study the given graph and answer the question that follows.



What is the average profit percentage of the given years?

A. 43.4%

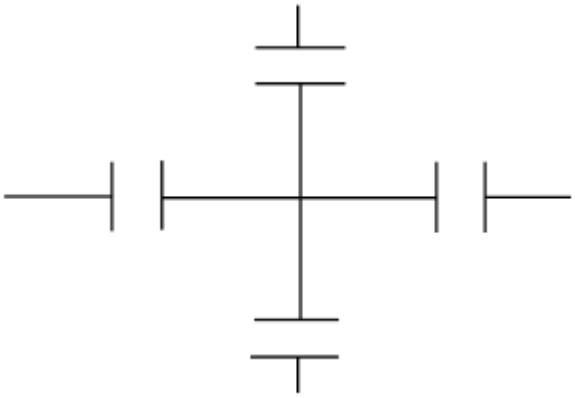
B. 45%

C. 44%

D. 44.1% ✓

Q93 Part A

Identify the orthographic symbol of a pipe fitting shown in the figure.



A. Bend

B. Union

C. Tee

D. Cross ✓

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Q94 Part A

By how much is 60% of 50 greater than $\frac{4}{5}$ of 35?

A. 4

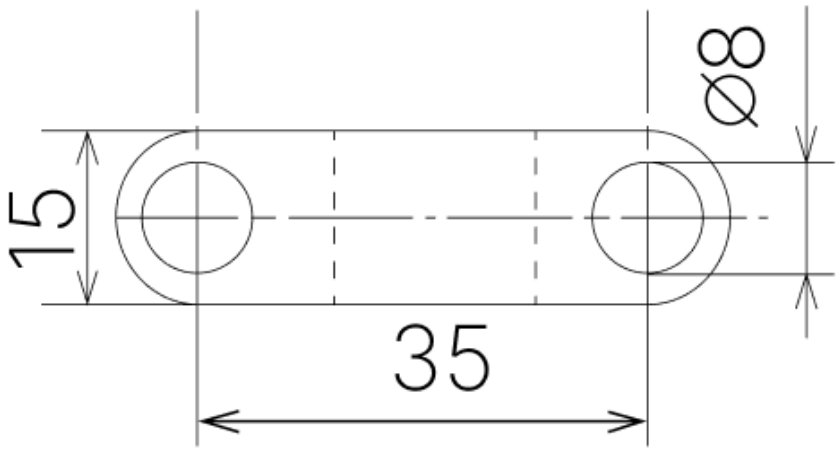
B. 1

C. 3

D. 2 ✓

Q95 Part A

What type of view is represented of the given machine component?



A. Isometric view

B. Oblique view

C. Orthographic view ✓

D. Perspective view

Q96 Part A

Pipes A and B can fill a rectangular tank in 40 minutes and 120 minutes, respectively. Pipe C can empty the completely filled same tank in 240 minutes. If pipes A, B and C are opened at the same time, then how many minutes will it take to fill the tank?

A. $32\frac{2}{7}$

B. $34\frac{3}{7}$

C. $34\frac{2}{7}$ ✓

D. $34\frac{2}{8}$

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Q97 Part A

The cost of painting a spherical ball at the rate of ₹2.50 per cm^2 is ₹13,860. What is the diameter of the ball (use $\Pi = (\frac{22}{7})$?

A. 48 cm

B. 21 cm

C. 42 cm ✓

D. 40 cm

Q98 Part A

In an electrical circuit, 'n' number of 1 Ω resistors are connected in parallel. When one of the resistors is eliminated, the overall resistance of the circuit is _____.

A. $\frac{1}{(n-1)}$ ✓

B. Zero

C. $\frac{1}{n^2}$

D. $\frac{1}{n}$

Q99 Part A

A shopkeeper sells sugar at ₹30 per kg, which he has bought at ₹24 per kg. Being dishonest, he also gives only y gm of sugar instead of 1000 gm that is mentioned on the weight. In this way, the shopkeeper manages to make an overall profit of $66\frac{2}{3}\%$.

What is the value of y?

A. 720

B. 750 ✓

C. 600

D. 800

Q100 Part A

$\frac{r}{10}\%$

A. $\frac{r^4}{10}$ ✓

B. $10r^4$

C. $\frac{r^4}{5}$

D. $\frac{r^4}{20}$

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Q101 Part B (Heat Engine)
The SI unit of temperature is/are _____.

A. both kelvin and celsius
B. celsius
C. kelvin ✓
D. fahrenheit

Q102 Part B (Heat Engine)
When flushing a radiator, what is the purpose of submerging the radiator in a water tank after flushing?

A. To cool the radiator
B. To clean the exterior of the radiator
C. To refill the radiator with coolant
D. To check for leaks using air pressure ✓

Q103 Part B (Heat Engine)
Convert 8.5% into a decimal.

A. 0.85
B. 8.5
C. 0.085 ✓
D. 85

Q104 Part B (Heat Engine)
The emergency brake locks the wheels by bypassing which system?

A. Electric brake system
B. Air pressure system
C. Hydraulic brake system ✓
D. Fuel injection system

Q105 Part B (Heat Engine)
Which of the following calipers are used for marking lines, parallel to inside and outside edges and for locating the centre of round bars?

A. Spring joint calipers
B. Leg and point calipers ✓
C. Simple calipers
D. Firm joint calipers

Q106 Part B (Heat Engine)
Which of the following types of engine classifications is based on the thermodynamic cycle?

A. In-line cylinder engine
B. V-engine
C. Radial engine
D. Otto cycle engine ✓

Q107 Part B (Heat Engine)
Which of the following types of chisels is used for separating metals after chain drilling?

A. Cross-cut chisel
B. Flat chisel
C. Web chisel ✓
D. Diamond point chisel

Q108 Part B (Heat Engine)
A voltmeter with a resistance of 10,000 ohms is connected across a circuit that has a voltage of 50 V. What is the current flowing through the voltmeter?

A. 2 mA
B. 1 mA
C. 5 mA ✓
D. 4 mA

Q109 Part B (Heat Engine)
Which type of line is used to represent hidden edges or surfaces in a technical drawing, as per BIS SP 46-2003?

A. Continuous thin line
B. Continuous thick line
C. Dashed thin line ✓
D. Chain thin line

Q110 Part B (Heat Engine)
Which of the following is NOT a part of the gear changing mechanism in an automatic transmission system?

A. Universal coupling ✓
B. Epicyclic gear arrangement
C. Fluid coupling
D. Torque converter

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Q111 Part B (Heat Engine)

In two-stroke engines, one power cycle is completed in how many revolutions of the crankshaft?

A. Two revolutions

B. Four revolutions

C. Three revolutions

D. One revolution ✓

Q112 Part B (Heat Engine)

Which of the following colours is commonly used for caution signs?

A. Blue

B. Yellow ✓

C. Red

D. Green

Q113 Part B (Heat Engine)

What is the minimum age for employment in factories or mines or other hazardous employment, according to Article 24 of the Indian Constitution?

A. 14 years ✓

B. 12 years

C. 16 years

D. 18 years

Q114 Part B (Heat Engine)

A crucial engine component that ensures proper sealing of the intake and exhaust valves is known as:

A. valve barrier

B. valve gasket

C. valve seat ✓

D. valve ring

Q115 Part B (Heat Engine)

Where is a typical clutch actuated by a number of coil springs?

A. On a pitch circle near the central axis of the shaft

B. On a base circle near the centre of the circle

C. On an addendum circle near the centre of the radius

D. On a pitch circle near the periphery ✓

Q116 Part B (Heat Engine)

What is an effective way to reduce backlash in a gear system?

A. Use worn-out gears for better engagement

B. Use proper lubrication and regular maintenance ✓

C. Increase the clearance between gears

D. Ignore minor misalignments in gear setup

Q117 Part B (Heat Engine)

Acetylene hose-pipes are typically identified by their ____ colour.

A. black

B. green

C. maroon ✓

D. blue

Q118 Part B (Heat Engine)

What is the primary function of a spark plug in an spark ignition engine?

A. To provide lubrication to engine parts

B. To regulate engine timing

C. To ignite the compressed air-fuel mixture ✓

D. To cool the engine

Q119 Part B (Heat Engine)

Which of the following statements is correct about the clutch used in vehicles?

A. It allows the driver to couple or decouple the power transmission at will without stopping the engine. ✓

B. It allows the driver to lift and unload the bulk material from engine and transmission.

C. It allows the driver to change the drive of engine in any direction.

D. It allows the driver to change the speed of engine.

Q120 Part B (Heat Engine)

A carburetor used in a petrol engine is designed so as to fit in which of the following parts of the engine?

A. Piston

B. Casing

C. Cylinder head ✓

D. Connecting rod

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Q121 Part B (Heat Engine)

For your safety at work, which of the following should be ensured?
1. All the required protective clothing and equipment are used.
2. Training and instruction necessary for performing tasks safely have been received.

A. Only statement 1
B. Neither statement 1 nor 2
C. Only statement 2
D. Both statements 1 and 2 ✓

Q122 Part B (Heat Engine)

Which of the following statements about title block is/are true?

Statement 1: The title block is situated in the bottom right-hand corner of the drawing sheet.
Statement 2: The contents of the title block are standardised and cannot be modified to suit individual company needs.

A. Both statements are false
B. Statement 1 is false, but statement 2 is true
C. Statement 1 is true, but statement 2 is false ✓
D. Both statements are true

Q123 Part B (Heat Engine)

What is the state of the metal at the junction when heat is applied during resistance welding?

A. Plastic ✓
B. Solid
C. Liquid
D. Gaseous

Q124 Part B (Heat Engine)

Which of the following changes is/are observed in the engine when the idle adjustment screw in the carburetor is adjusted?

A. Decreases idle port area, reduce engine speed ✓
B. Regulate air intake
C. Control fuel mixture at high speeds
D. Increase idle port area, increase engine speed

Q125 Part B (Heat Engine)

Which of the following is NOT a typical component of a welding cable's construction?

A. Fine copper wires
B. Rubber insulation
C. Woven fabric reinforcing layers
D. Steel core ✓

Q126 Part B (Heat Engine)

What is the accuracy level of metric micrometer reading?

A. 0.5 mm
B. 1.0 mm
C. 0.1 mm
D. 0.01 mm ✓

Q127 Part B (Heat Engine)

Which of the following information is necessary to construct a rectangle?

A. Length of two adjacent sides ✓
B. Length of one side and the area of the rectangle
C. Only the length of one side
D. Only the length of the diagonal

Q128 Part B (Heat Engine)

What is a consequence of using a lower heat input in oxy-acetylene welding?

A. Reduced filler metal requirement
B. Increased welding speed
C. Increased weld penetration
D. Slower welding speed ✓

Q129 Part B (Heat Engine)

Which of the following is NOT the purpose of lubrication oil in an engine?

A. Separation of lighter boiling materials such as gasoline, jet fuel, diesel, etc.
B. Finishing to improve oxidation and heat stability
C. Mixing of impurities uniformly that include aromatics and polar compounds ✓
D. Dewaxing to improve low-temperature fluidity

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Q130 Part B (Heat Engine)

When passing stationary vehicles, keep a watch on _____ who may come out suddenly from the front of the stationary vehicle. While overtaking, it should be done on the _____ side. Always keep a good _____ between your vehicle and others.

A. cyclists; left; interval
B. vehicles; right; gap
C. drivers; left; space
D. pedestrians; right; distance ✓

Q131 Part B (Heat Engine)

Which of the following metals has the lowest melting point?

A. Mercury ✓
B. Iron
C. Lead
D. Gold

Q132 Part B (Heat Engine)

The camshaft is driven by the crankshaft through which of the following types of power transmission techniques?

A. Flat belt transmission drive
B. Timing gears drive ✓
C. Chain drive
D. Epicyclic gear train drive

Q133 Part B (Heat Engine)

In a logic circuit, two inputs A and B are applied to an AND gate, and the output of the AND gate is connected to the input of a NOT gate. If the inputs A and B are both at logic 0, what will be the output of the entire circuit?

A. Undefined
B. 0
C. 1 ✓
D. 2

Q134 Part B (Heat Engine)

Which of the following types of engine classifications is based on cylinder arrangement?

A. Diesel cycle enigne
B. Dual cycle engine
C. V-engine ✓
D. Otto cycle engine

Q135 Part B (Heat Engine)

What is the approximate temperature range of a neutral oxy-acetylene flame?

A. 3000°C-3500°C ✓
B. 2500°C-2750°C
C. 1500°C-2000°C
D. 2000°C-2500°C

Q136 Part B (Heat Engine)

Which of the following devices is used to insert a micrometer in the hole of an external cylinder for zero aligning?

A. Spanner
B. Allen key
C. Screw driver
D. Wrench ✓

Q137 Part B (Heat Engine)

What is the typical temperature range of a mercury-based clinical thermometer?

A. 0°C to 100°C
B. 35°C to 42°C ✓
C. 0°C to 50°C
D. −10°C to 110°C

Q138 Part B (Heat Engine)

If the vehicle does NOT move due to the brake system, what should be checked first?

A. Parking brake applied ✓
B. Piston diameter
C. Brake adjuster
D. Loose inlet fitting

Q139 Part B (Heat Engine)

What is the reason that cam lobe causes the engine to make a ticking or tapping noise, especially when idling, and is often rhythmic and varies in loudness?

A. When the cam lobe is subjected to higher load.
B. When the cam lobe wears out. ✓
C. When the cam lobe is hot.
D. When cam lobe is has insufficient lubrication.

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Q140 Part B (Heat Engine)

After removing the carbon deposit on the cylinder head, which of the following is used to clean the cylinder head?

A. Diesel
B. Kerosene
C. Lub oil
D. Cleaning solvent ✓

Q141 Part B (Heat Engine)

Which property is NOT essential for a friction material?

A. Low thermal conductivity
B. High noise generation ✓
C. Durability
D. Resistance to wear

Q142 Part B (Heat Engine)

What is the best method of manufacturing of connecting rod used in an engine?

A. Drop forging ✓
B. Investment casting
C. Sand casting
D. Machining operation

Q143 Part B (Heat Engine)

The process in which an oil pump housing is first filled with oil, especially for oil pumps that are driven by the crankshaft, is known as:

A. alignment of a pump
B. ferrography of a pump
C. priming of a new oil pump ✓
D. cavitation of a pump

Q144 Part B (Heat Engine)

Which of the following is the primary reason why copper is widely used as a conductor in electrical wiring?

A. Copper has low resistance and high conductivity. ✓
B. Copper has a low melting point.
C. Copper is abundant and inexpensive.
D. Copper has high resistance to electricity.

Q145 Part B (Heat Engine)

Which of the following types of additives are blended with the lubricant to reduce the surface tension of the oil?

A. Tackiness agents
B. Demulsifiers
C. Mist suppressors
D. Emulsifiers ✓

Q146 Part B (Heat Engine)

A single plate friction clutch consists of a clutch disk between the:

A. differential gear and transmission gear box
B. pressure plate and driving shaft
C. driving shaft and differential gear
D. flywheel and a pressure plate ✓

Q147 Part B (Heat Engine)

In a hydraulic brake booster system, where is the hydraulic pressure stored before it is used to assist braking?

A. Power steering pump
B. Master cylinder
C. Accumulator ✓
D. Brake caliper

Q148 Part B (Heat Engine)

Which of the following parts is NOT associated with camshaft responsible for the opening and closing of engine valves?

A. Tappets
B. Connecting rod ✓
C. Rocker arms
D. Push rods

Q149 Part B (Heat Engine)

A 100-mm prick punch with a 7-mm diameter body could have a 2.5-mm diameter point ground to an angle of _____.

A. 90°
B. 30° ✓
C. 120°
D. 45°

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Q150 Part B (Heat Engine)

If the length of a resistor is doubled, what happens to its resistance, assuming all other factors remain constant?

- A. The resistance is doubled. ✓
- B. The resistance remains the same.
- C. The resistance is halved.
- D. The resistance quadruples.

Q151 Part B (Heat Engine)

What does toe-in mean in the wheel alignment of a vehicle?

- A. Wheels parallel
- B. Wheels rotated 90 degrees
- C. Wheels inclined inward at front ✓
- D. Wheels inclined outward at front

Q152 Part B (Heat Engine)

In a series circuit, three resistors of 10 ohms, 20 ohms, and R ohms are connected in series with a 12 V battery. What is the value of resistance R if current flowing in the circuit is 0.2 A?

- A. 10 ohms
- B. 20 ohms
- C. 30 ohms ✓
- D. 40 ohms

Q153 Part B (Heat Engine)

Who is authorised to conduct road tests on workshop vehicles?

- A. Only trained and certified personnel ✓
- B. Visitors to the workshop
- C. Any employee
- D. The company accountant

Q154 Part B (Heat Engine)

Which of the following 'V' blocks will have one 'V' groove and two grooves (slots) on either side for clamping in two positions?

- A. Double level single groove 'V' block
- B. Matched pair 'V' block
- C. Single level double groove 'V' block ✓
- D. Single level single groove 'V' block

Q155 Part B (Heat Engine)

If the calliper bore diameter worn is greater than 2.630 inches (66.80 mm), what corrective action is recommended?

- A. Tightening the inlet fitting
- B. Replacing the calliper housing ✓
- C. Adjusting the brake pads
- D. Replacing the piston

Q156 Part B (Heat Engine)

What type of rays are a significant hazard during arc welding?

- A. Sound waves and visible light
- B. X-rays and gamma rays
- C. Ultraviolet and infrared rays ✓
- D. Microwaves and radio waves

Q157 Part B (Heat Engine)

How much clearance is to be provided for compression ring fitted into the piston of an IC engine?

- A. Approximately 0.035 – 0.080 mm for compression rings
- B. Approximately 0.095 – 1.80 mm for compression rings
- C. 0.002 D to 0.004 D where D is the cylinder bore ✓
- D. Approximately 0.9 – 1.80 mm for compression rings

Q158 Part B (Heat Engine)

The wave set of hacksaw teeth set has a pitch of _____.

- A. 2.0 mm
- B. 0.5 mm
- C. 0.8 mm ✓
- D. 1.0 mm

Q159 Part B (Heat Engine)

Which of the following provisions is provided in the cylinder head during design for increasing the air cooling effect?

- A. Fins or extended surfaces are provided on the cylinder walls and cylinder blocks. ✓
- B. Cylinder head is provided with water jackets.
- C. Cylinder block is provided with high speed cooling air flow.
- D. Dimple like shapes on surfaces are provided on the cylinder walls.

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Q160 Part B (Heat Engine)

For the given tire size, as per specification as 205/55R16, what is the width of the tire?

A. 205/55 mm

B. 550 mm

C. 205 mm ✓

D. 880 mm

Q161 Part B (Heat Engine)

Which of the following is NOT the correct function of the front axle?

A. It transmits the torque of a vehicle through springs to the front wheels. ✓

B. It absorbs torque applied on it due to braking of vehicle.

C. An axle is a central shaft for a rotating wheel or gear.

D. It supports the weight of the front part of the vehicle.

Q162 Part B (Heat Engine)

What happens if air is NOT removed from a hydraulic brake system?

A. The fuel efficiency improves.

B. The engine runs smoother.

C. The tires wear out faster.

D. The brakes feel spongy and less effective. ✓

Q163 Part B (Heat Engine)

Which of the following symptom or indicator does NOT show the failure of an oil pump?

A. When the engine oil flow slows or stops, the components continue to be lubricated by hot oil that is not permitted to flow

B. When the engine runs at a normal temperature and oil flow is steady. ✓

C. If a hydraulic lifter in a vehicle creates noise

D. Able to push oil through the system adequately and with low pressure in oil lines

Q164 Part B (Heat Engine)

When creating 10 mm single-stroke capital letters in vertical style, what does the 10 mm distance between horizontal parallel lines represent?

A. Letter width

B. Letter height ✓

C. Stroke thickness

D. Interline spacing

Q165 Part B (Heat Engine)

What is the SI unit of 'volume'?

A. Litres

B. Cubic centimetre

C. Cubic metre ✓

D. Millilitres

Q166 Part B (Heat Engine)

Which of the following statements is INCORRECT about end standard?

A. It measures the distance between two parallel flat surfaces.

B. Faces are subject to wear.

C. It is slower but more accurate.

D. It is used to measure the distance between two engraved lines. ✓

Q167 Part B (Heat Engine)

Match the following types of lines with their correct descriptions according to their orientation and characteristics.

Description	Type of Line
A. A line that is neither parallel to a horizontal plane nor perpendicular to it.	1. Horizontal line
B. A line that is perpendicular to horizontal lines.	2. Vertical line
C. A line that changes its direction continuously.	3. Inclined line
D. A line that is parallel to a horizontal plane.	4. Curved line

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

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

C. A - 3, B - 2, C - 4, D - 1 ✓

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

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Q168 Part B (Heat Engine)

Find the lateral surface area of a cube with side length 5 cm.

A. 125 cm^2

B. 150 cm^2

C. 200 cm^2

D. 100 cm^2 ✓

Q169 Part B (Heat Engine)

Which of the following parts of the engine is used to compress the charge during compression stroke and to transmit the gas force to the connecting rod and then to the crankshaft during power stroke?

A. Crankcase

B. Cylinder head

C. Cylinder block

D. Piston ✓

Q170 Part B (Heat Engine)

Which of the following terms in the 5S concept refers to making a habit of maintaining the established procedures?

A. Shine

B. Set

C. Sort

D. Sustain ✓

Q171 Part B (Heat Engine)

Which of the following types of valve seats are commonly used in cast iron head of the engine?

A. Integral valve seats ✓

B. Insert valve seats

C. Elliptical valve seats

D. Two piece valve seats

Q172 Part B (Heat Engine)

Which of the following statements is NOT correct for using scribers?

A. Scriber points are very sharp, so they are to be handled very carefully.

B. While scribing lines, the scriber is used like a pencil.

C. Do not put the scriber in your pocket.

D. Place a cork on the point when in use to prevent accidents. ✓

Q173 Part B (Heat Engine)

A type of piston which provides an even distribution of the air-fuel mixture, consistent flame front during combustion and it has the smallest surface area on top is known as:

A. semi-spherical piston

B. dish piston

C. flat piston ✓

D. dome piston

Q174 Part B (Heat Engine)

For the given tire size, as per specification as 205/55R16, what is the width of the tire?

A. 880 mm

B. 550 mm

C. $\frac{205}{55}$ mm

D. 205 mm ✓

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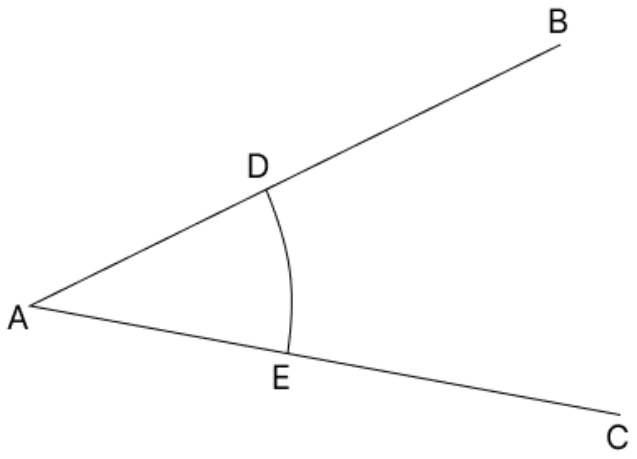
Q175 Part B (Heat Engine)

In the process of bisecting angle BAC in the given figure, why do we draw arcs from points D and E?



A. To find midpoint AB

B. To mark equal lengths

C. To intersect line AC

D. To intersect above A ✓

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