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सहायक लोको पायलट की भर्ती/ Recruitment of Assistant Loco Pilot



RRB ALP 2025 CBT 2

Assistant Loco Pilot · CEN 01/2025 · CBT 2 · Electronics Mechanic Trade · Part B (Electronics Mechanic) · Question Paper

English

All 2 Shifts (Sets) · Part B (Electronics Mechanic) Section · Official Answer Key

About this Compilation

This booklet contains all 2 shift papers of the RRB ALP 2025 CBT 2 (Electronics Mechanic) examination in English (Part B (Electronics Mechanic) section only), 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

28 Jul 2026

9:30 AM - 12:00 PM

Set 2

28 Jul 2026

2:30 PM - 5:00 PM

Part B (Electronics Mechanic)

75 Questions • Answer Key

Q1 Part B (Electronics Mechanic)

Which trigonometric ratio represents the opposite side divided by the hypotenuse in a right triangle?

- A. Sine ✓
- B. Cotangent
- C. Cosine
- D. Tangent

Q2 Part B (Electronics Mechanic)

Which operational amplifier configuration is commonly used in zero crossing detectors?

- A. Inverting amplifier with negative feedback is used.
- B. Comparator configuration without feedback is used. ✓
- C. Integrator circuit with resistive feedback is used.
- D. Non-inverting amplifier with positive feedback is used.

Q3 Part B (Electronics Mechanic)

What is the first safety step before dismantling a desktop computer?

- A. Remove RAM from all RAM slots
- B. Open the cabinet
- C. Switch off and unplug the power supply ✓
- D. Disconnect data cables

Q4 Part B (Electronics Mechanic)

Which of the following is a primary criterion when choosing a sensor for monitoring temperature in a manufacturing process?

- A. Accuracy of the sensor readings ✓
- B. Color of the sensor housing
- C. Overall cost of the sensor
- D. Physical size of the sensor

Q5 Part B (Electronics Mechanic)

Which component is used to set biasing in a transistor amplifier but, if omitted, leads to unstable operation?

- A. Inductor
- B. Diode
- C. Resistor network ✓
- D. Transformer

Q6 Part B (Electronics Mechanic)

In an 8051 microcontroller, during a debugging session, several PUSH instructions are executed, and the stack pointer reaches address 31H. Which memory area is now being used for stack storage?

- A. Bit-addressable RAM area
- B. General-purpose RAM area ✓
- C. Register bank area
- D. Program memory area

Q7 Part B (Electronics Mechanic)

A draftsman needs to construct a precise 75° angle without using a protractor. Which combination of instruments should be used?

- A. Use two 45° set-squares together against a T-square
- B. Use a mini-drafter aligned with a T-square edge
- C. Use a 45° set-square with a 30°–60° set-square against a T-square ✓
- D. Use a divider to bisect a 120° angle accurately

Q8 Part B (Electronics Mechanic)

A semiconductor sample shows conduction mainly due to holes, while electrons exist only in small numbers due to thermal generation. Identify the semiconductor type.

- A. Intrinsic semiconductor at 0 K
- B. N-type semiconductor at room temperature
- C. P-type semiconductor at room temperature ✓
- D. Intrinsic semiconductor at room temperature

Q9 Part B (Electronics Mechanic)

An n-type semiconductor is formed by doping with:

- A. Trivalent impurities
- B. Pentavalent impurities ✓
- C. Divalent impurities
- D. Monovalent impurities



Q10 Part B (Electronics Mechanic)

Which factor determines the selection of a soldering iron tip for a solder joint?

- A. The color of the soldering iron handle
- B. The size and type of the solder joint ✓
- C. The storage condition of the soldering iron
- D. The frequency of tip cleaning

Q11 Part B (Electronics Mechanic)

A technician connects a load to the output of a half-wave rectifier without using a filter. What is the nature of the voltage across the load?

- A. Alternating voltage
- B. Pulsating DC voltage ✓
- C. Pure DC voltage
- D. Pulsating AC voltage

Q12 Part B (Electronics Mechanic)

A technician connecting a desktop PC to a network switch in a modern office environment should use a _____ cable terminated with _____ connectors to establish a stable local connection.

- A. coaxial; BNC
- B. twisted pair; RJ45 ✓
- C. USB; Type A
- D. fiber optic; SC

Q13 Part B (Electronics Mechanic)

What is the function of an HDMI port when connecting an external source device to an LED or LCD TV?

- A. To step down the main AC power voltage to safely operate the internal TV logic boards
- B. To convert incoming analog video signals into digital formats inside the TV panel
- C. To automatically increase the native optical refresh rate of the liquid crystal display pixels
- D. To transmit uncompressed digital video and multi-channel audio simultaneously through a single cable ✓

Q14 Part B (Electronics Mechanic)

Three identical 12 V batteries are connected in parallel to supply a load current of 18 A. Assuming equal sharing, how much current is supplied by each battery?

- A. 9 A
- B. 18 A
- C. 6 A ✓
- D. 4 A

Q15 Part B (Electronics Mechanic)

Which connection interface should be used to link a high-definition (HD) digital set-top box to a modern LED or LCD TV to transmit both uncompressed digital video and multi-channel audio through a single cable while supporting Consumer Electronics Control (CEC) to operate both devices with a single remote?

- A. Component Video (YPbPr)
- B. Composite Video (RCA)
- C. S-Video
- D. HDMI ✓

Q16 Part B (Electronics Mechanic)

When a zero crossing detector is used to measure the frequency of a periodic AC signal, what quantity must be counted?

- A. The number of output transitions per unit time ✓
- B. The phase difference between input and output signals
- C. The average voltage level of the output signal
- D. The number of input voltage peaks per cycle

Q17 Part B (Electronics Mechanic)

If the input resistor of an inverting amplifier using OP-AMP is doubled and the feedback resistor remains the same, what happens to the magnitude of voltage gain?

- A. Becomes one fourth
- B. It is halved ✓
- C. Stays the same
- D. It doubles



Q18 Part B (Electronics Mechanic)

An industrial engineer wants to optimize a photoelectric switch system for detecting various packages on a conveyor belt, where the packages differ in shape, color, and surface reflectivity. Which of the following changes would most improve the switch's detection reliability for all package types?

- A. Increasing supply voltage to the sensor within rated limits
- B. Adjusting the sensor's sensitivity and alignment to account for target surface characteristics ✓
- C. Changing wire insulation material for better signal integrity
- D. Using a heavier sensor for mounting stability

Q19 Part B (Electronics Mechanic)

During circuit testing across a PN junction diode, a technician finds that holes are responsible for electrical conduction in a semiconductor. Which region of a PN junction diode does this indicate?

- A. Intrinsic region
- B. P-type region ✓
- C. Depletion region
- D. N-type region

Q20 Part B (Electronics Mechanic)

What is the phase shift required in RC phase shift oscillator from the entire feedback RC network to produce oscillations?

- A. 90 degrees
- B. 360 degrees
- C. 180 degrees ✓
- D. 270 degrees

Q21 Part B (Electronics Mechanic)

What is the resistance value of a surface-mount resistor marked '472' according to SMD resistor code conventions?

- A. 470 ohms
- B. 47000 ohms
- C. 4700 ohms ✓
- D. 4.7 ohms

Q22 Part B (Electronics Mechanic)

Which phase relationship exists between input and output signals in a Common Emitter amplifier?

- A. Output is in phase with input
- B. Output lags input by 90°
- C. Output leads input by 90°
- D. 180° phase shift ✓

Q23 Part B (Electronics Mechanic)

While diagnosing an NPN BJT in a SOT-23 package, your multimeter positive probe (+) is locked on the Base (Pin 1). Measuring to Pin 3 reads 0.6 V, while measuring to Pin 2 reads 0.68 V. Which pin is the Emitter?

- A. Pin 2 is the Emitter, because it has the higher voltage drop. ✓
- B. Pin 3 is the Emitter, because it has the lower voltage drop.
- C. Neither pin; the transistor is broken because the readings don't match.
- D. Both pins are identical and can be used interchangeably.

Q24 Part B (Electronics Mechanic)

How many pins are present on a standard PATA ribbon cable header for desktop hard drives?

- A. 50 pins
- B. 68 pins
- C. 34 pins
- D. 40 pins ✓

Q25 Part B (Electronics Mechanic)

Which safety action shall be completed first before replacing a blown fuse in an electrical circuit?

- A. Replace the fuse with a copper wire
- B. Touch the fuse terminals to confirm the fault
- C. Replace the fuse with a higher current rating
- D. Switch OFF the circuit supply ✓

Q26 Part B (Electronics Mechanic)

How does a voltage cut-off system contribute to the reliability of a power inverter in industrial use?

- A. It increases the battery life in all circumstances.
- B. It ensures the inverter operates only within safe voltage parameters. ✓
- C. It directly lowers electromagnetic interference.
- D. It maintains efficiency regardless of input voltage.



Q27 Part B (Electronics Mechanic)

During the operation of a two-phase stepper motor, one of its phase windings becomes disconnected. What is the most likely effect on the performance of the motor?

- A. The motor will rotate at twice its rated speed.
- B. The motor efficiency will improve due to reduced power consumption.
- C. The motor will continue to operate normally with full torque.
- D. The motor will experience a significant reduction in torque and may fail to step accurately. ✓

Q28 Part B (Electronics Mechanic)

During a lab experiment, the current through a magnetizing coil is increased, while the magnetic path length remains unchanged. What will happen to the magnetic field strength?

- A. It remains constant
- B. It becomes zero
- C. It decreases
- D. It increases ✓

Q29 Part B (Electronics Mechanic)

A 1 kHz square wave signal is applied to the input A of a NOT gate. What will be observed at the output of the NOT gate?

- A. A constant LOW (0) signal
- B. A 1 kHz square wave signal identical to the input
- C. A constant HIGH (1) signal
- D. A 1 kHz square wave signal inverted (complemented) with respect to the input ✓

Q30 Part B (Electronics Mechanic)

What is the main function of the sensors in an IoT system?

- A. To process collected data
- B. To store large amounts of information
- C. To collect data from the environment ✓
- D. To perform an action that changes the environment

Q31 Part B (Electronics Mechanic)

Which of the following is a type of RC Oscillator?

- A. Colpitts Oscillator
- B. Phase Shift Oscillator ✓
- C. Crystal Oscillator
- D. Hartley Oscillator

Q32 Part B (Electronics Mechanic)

In engineering drawing practice, which lettering convention is preferred for marking part numbers to maintain clarity, readability, and uniformity?

- A. Use lowercase letters for small-sized part numbers to save space
- B. Use lowercase letters for part numbers to reduce writing effort
- C. Use uppercase letters for all part numbers to maintain standardization ✓
- D. Use a mixture of uppercase and lowercase letters for all part numbers

Q33 Part B (Electronics Mechanic)

In a Pulse Width Modulation (PWM) signal, the duty cycle is defined as:

- A. Variation in the amplitude of the pulses
- B. Ratio of the pulse ON-time (width) to the total time period of the signal ✓
- C. Phase difference between input and output signals
- D. Variation in the frequency of the pulses

Q34 Part B (Electronics Mechanic)

Which electrical quantity is defined as the potential difference between two points in an electrical circuit?

- A. Current
- B. Resistance
- C. Power
- D. Voltage ✓

Q35 Part B (Electronics Mechanic)

When following the proper procedure to read voltage using a PMMC Voltmeter, which type of voltage can be measured accurately?

- A. Alternating current (AC) voltage only
- B. Both AC and DC voltage accurately
- C. Direct current (DC) voltage only ✓
- D. High-frequency AC voltage only



Q36 Part B (Electronics Mechanic)

In a three-phase, four-wire electrical distribution system, the fourth pole of a four-pole Miniature Circuit Breaker (MCB) is generally used for switching and protecting which conductor?

- A. Pilot wire
- B. Neutral conductor ✓
- C. Control circuit conductor
- D. Earth conductor

Q37 Part B (Electronics Mechanic)

In a single-phase fan or motor circuit used in workshop practice, why is a capacitor connected in series with the auxiliary winding?

- A. To produce phase difference for better starting torque ✓
- B. To increase conductor resistance permanently
- C. To reduce the supply frequency
- D. To act as a fuse during overload

Q38 Part B (Electronics Mechanic)

Which feature best distinguishes a stud extractor from an open-end spanner in its intended application?

- A. A stud extractor grips and removes a stud, while an open-end spanner fits the flats of a bolt. ✓
- B. A stud extractor is used only for tightening, while an open-end spanner is used only for loosening.
- C. A stud extractor requires external heating before use, while an open-end spanner does not.
- D. A stud extractor is longer than an open-end spanner, providing greater torque.

Q39 Part B (Electronics Mechanic)

A work area contains flammable chemicals and moving machinery. Which combination of safety signs is most appropriate for these hazards?

- A. Danger signs for chemicals and warning signs for machinery ✓
- B. Caution signs for chemicals and warning signs for exits
- C. Warning signs for chemicals and caution signs for machinery
- D. Danger signs for machinery and caution signs for chemicals

Q40 Part B (Electronics Mechanic)

To connect a local computer to a network switch, a technician must crimp an 8-pin _____ connector onto the Ethernet cable and plug it directly into the switch's matching _____.

- A. USB; console interface
- B. RJ45; LAN port ✓
- C. RJ11; telephone jack
- D. BNC; coaxial socket

Q41 Part B (Electronics Mechanic)

Which set of terminals is commonly used to connect a Field Effect Transistor in a circuit?

- A. Gate, Drain, Source ✓
- B. Positive, Negative, Neutral
- C. Emitter, Collector, Base
- D. Anode, Cathode, Grid

Q42 Part B (Electronics Mechanic)

The working principle of a crystal oscillator is based on:

- A. Hall effect
- B. Thermionic emission
- C. Photoelectric effect
- D. Piezoelectric effect ✓

Q43 Part B (Electronics Mechanic)

In a JK flip flop, the J input mainly performs which function when $K = 0$ and the clock is active?

- A. The Set input ✓
- B. The Toggle input
- C. The Reset input
- D. The Clock input

Q44 Part B (Electronics Mechanic)

A technician notices the relay in a stabilizer frequently clicks on and off rapidly when connected to an SMPS. What is the most probable issue?

- A. The SMPS is overloaded
- B. The input voltage is fluctuating rapidly ✓
- C. The relay is stuck in one position
- D. The stabilizer has a blown fuse



Q45 Part B (Electronics Mechanic)

Why are optical fibers less susceptible to electromagnetic interference compared to copper wires?

A. They use light instead of electrical signals ✓

B. They are covered with metal

C. They have higher resistance

D. They are thicker than copper wires

Q46 Part B (Electronics Mechanic)

What happens if an amplifier is not properly biased?

A. It increases output power

B. It always turns off the amplifier

C. It may cause distortion ✓

D. It improves efficiency

Q47 Part B (Electronics Mechanic)

A telecommunications company observes call drops at the borders of adjacent cell sites. Which cell site configuration adjustment would minimize this issue?

A. Introducing overlapping coverage areas with handover protocols ✓

B. Decreasing the height of all cell site antennas

C. Reducing the transmission power of each cell site

D. Assigning the same frequency to neighboring cell sites

Q48 Part B (Electronics Mechanic)

In the two-wattmeter method used for measuring power in a balanced three-phase load, both wattmeters show equal readings. Based on this observation, what is the power factor of the load?

A. 0

B. 1.0 ✓

C. 0.866

D. 0.5

Q49 Part B (Electronics Mechanic)

How should screws be tightened when mounting a Hard Disk Drive (HDD) in a desktop computer?

A. Tighten as much as possible with full force

B. Tighten screws evenly and firmly without over-tightening ✓

C. Leave screws slightly loose for HDD to move freely

D. Tighten only one side

Q50 Part B (Electronics Mechanic)

While free-hand sketching a circular pipe from a very steep viewing angle, the circular end appears as a narrow ellipse. Which statement is correct?

A. The minor axis equals the true diameter, while the major axis becomes very small

B. The major axis becomes twice the true diameter, while the minor axis remains unchanged

C. Both axes reduce equally, forming a smaller circle

D. The major axis equals the true diameter, while the minor axis becomes very small ✓

Q51 Part B (Electronics Mechanic)

In an n-channel enhancement mode MOSFET, what must be applied to the gate terminal relative to the source to turn the device on?

A. A positive voltage ✓

B. A negative voltage

C. A gate current

D. A zero voltage

Q52 Part B (Electronics Mechanic)

Which statement correctly distinguishes a primary battery from a secondary battery?

A. A primary battery always has higher voltage than a secondary battery

B. A primary battery is used only in automobiles, while a secondary battery is used only in torches

C. A primary battery can be recharged many times, while a secondary battery cannot be recharged

D. A primary battery is generally non-rechargeable, while a secondary battery can be recharged and reused ✓

Q53 Part B (Electronics Mechanic)

Which internal hardware component of an LCD TV is responsible for regulating, filtering, and distributing the appropriate low-voltage direct current (DC) operational power rails required by the main logic board and the panel timing controller?

A. Switch-Mode Power Supply (SMPS) board ✓

B. T-CON microprocessing chip

C. Low-Voltage Differential Signaling (LVDS) interface

D. Liquid Crystal Display (LCD) shutter matrix



Q54 Part B (Electronics Mechanic)

A Pulse Amplitude Modulation signal can be recovered at the receiver end using a/an _____.

- ☒ A. Low-pass filter
- ☐ B. Inverter
- ☐ C. High-pass filter
- ☐ D. Attenuator

Q55 Part B (Electronics Mechanic)

Which antenna is best suited for directional communication over long distances?

- ☐ A. Dipole antenna
- ☐ B. Isotropic antenna
- ☒ C. Parabolic antenna
- ☐ D. Monopole antenna

Q56 Part B (Electronics Mechanic)

Which of the following statements about HDDs is correct in computer hardware technology?

- ☐ A. HDDs use flash memory to store data
- ☐ B. HDDs are used for temporary storage only
- ☒ C. HDDs store data on spinning magnetic disks
- ☐ D. HDDs use optical discs for storage

Q57 Part B (Electronics Mechanic)

A standard multiplexed 6 by 4 LED matrix contains a total of _____ independent light-emitting nodes, which can be fully operated using a minimum of _____ microcontroller control pins.

- ☐ A. 10; 24
- ☐ B. 48; 48
- ☒ C. 24; 10
- ☐ D. 24; 24

Q58 Part B (Electronics Mechanic)

While designing a system using an 8051 microcontroller, the lower address byte and data are multiplexed on the same lines. Which hardware component is required to hold the lower address byte temporarily for correct memory access?

- ☐ A. Multiplexer
- ☐ B. Encoder
- ☒ C. Latch
- ☐ D. Subtractor

Q59 Part B (Electronics Mechanic)

Which component provides power to the motherboard and other devices?

- ☐ A. RAM
- ☐ B. HDD
- ☐ C. Heat Sink
- ☒ D. SMPS

Q60 Part B (Electronics Mechanic)

In a Common-Base (CB) transistor amplifier, the phase difference between the input voltage (emitter-base) and the output voltage (collector-base) is:

- ☒ A. 0°
- ☐ B. 45°
- ☐ C. 180°
- ☐ D. 90°

Q61 Part B (Electronics Mechanic)

How does Hard Disk store data in a desktop computer?

- ☐ A. Paper tape
- ☐ B. Flash chips only
- ☐ C. Optical discs
- ☒ D. Magnetic platters

Q62 Part B (Electronics Mechanic)

What problem can occur with a Digital Storage Oscilloscope (DSO) if its sampling rate is too low for a high-frequency signal, compared to an analog CRO?

- ☐ A. The analog input probe tips will melt due to excessive heat generation.
- ☒ B. Aliasing error, where the displayed waveform appears as an incorrect low-frequency signal shape.
- ☐ C. The input signal will automatically switch to a direct current measurement mode.
- ☐ D. The entire display screen will permanently turn off due to over-sampling.

Q63 Part B (Electronics Mechanic)

What is the configuration called when the emitter terminal of a transistor is common to both input and output circuits?

- ☐ A. Emitter follower
- ☒ B. Common emitter
- ☐ C. Common base
- ☐ D. Common collector



Q64 Part B (Electronics Mechanic)

In an operational amplifier integrator circuit, which component acts as feedback between the output and the input?

A. Capacitor



B. Inductor

C. Transistor

D. Resistor

Q65 Part B (Electronics Mechanic)

During a laboratory test, a trainee builds an RS flip-flop using NOR gates (active-HIGH inputs). Initially, the output $Q = 0$. The trainee applies $S = 1$ (Set input) and $R = 0$ (Reset input). After this, both inputs are returned to $S = 0$ and $R = 0$. What will happen to the output Q ?

A. Q will return to 0 after inputs become 0.

B. Q will continuously toggle between 0 and 1.

C. Q will remain at 1 after inputs become 0, holding the last state.



D. Q will become invalid when inputs return to 0.

Q66 Part B (Electronics Mechanic)

What does 'hand off' mean in the context of cell phones?

A. Handover a call from one cell to another



B. Make a new phone call

C. Turn off the cell phone

D. Charge the phone battery

Q67 Part B (Electronics Mechanic)

You measure an intact SMD diode in the high-frequency switching stage of an LED driver. The multimeter forward voltage drop reads 0.240 V. What specific type of diode does this low voltage threshold identify?

A. Standard Silicon Rectifier Diode

B. Schottky Diode



C. Zener Diode

D. Light Emitting Diode (LED)

Q68 Part B (Electronics Mechanic)

Which of the following components are used to determine the frequency of oscillation in a Colpitts oscillator?

A. Diodes and resistors

B. Inductor and resistors

C. Capacitors and inductor



D. Resistors and capacitors

Q69 Part B (Electronics Mechanic)

A wire of some material has resistance 10 ohm at a certain length. To make its resistance 5 ohm using the same material and same cross-sectional area, what should be the new length?

A. Half of the original length



B. Double the original length

C. One fourth of the original length

D. Same as the original length

Q70 Part B (Electronics Mechanic)

Which motherboard component is used to connect storage devices like HDD or SSD in desktop computer system?

A. USB port

B. PCIe slot

C. RAM slot

D. SATA port



Q71 Part B (Electronics Mechanic)

How does the construction of a MOSFET help to achieve high input impedance?

A. The device has a thick substrate for support

B. The gate uses a resistive layer to limit current

C. The gate is insulated from the channel by a thin oxide layer



D. The gate is connected directly to the channel

Q72 Part B (Electronics Mechanic)

Which of the following is **NOT** a sensor performance characteristic?

A. Sensitivity

B. Cost



C. Linearity

D. Range



Q73 Part B (Electronics Mechanic)

If the equivalent inductance in a Hartley oscillator is doubled, the frequency is:

A. Reduced by $\sqrt{2}$



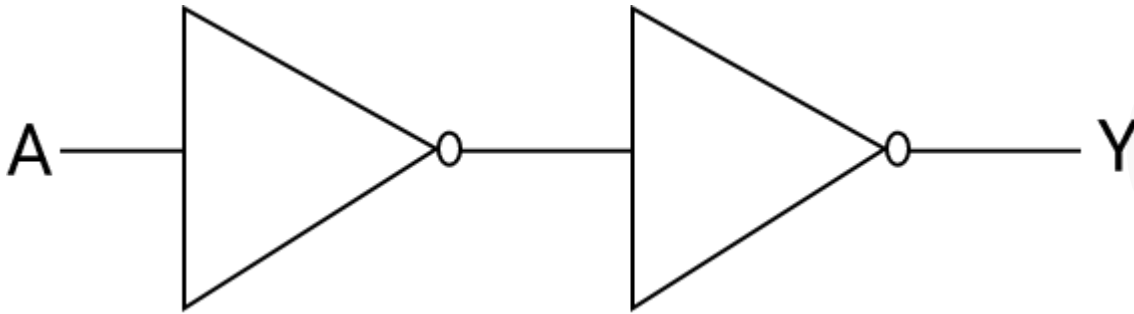
B. Doubled

C. Halved

D. Increased by $\sqrt{2}$

Q74 Part B (Electronics Mechanic)

What is the output Y of the following digital circuit if the input A = 1?
(Note: Both the logic gates shown in the diagram are NOT gates.)



A. 1



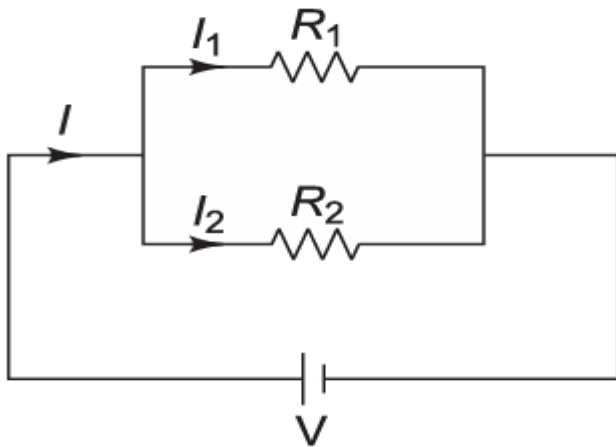
B. High Impedance State

C. 0

D. Undefined

Q75 Part B (Electronics Mechanic)

Two resistors of $8\ \Omega$ and $24\ \Omega$ are connected in parallel across a 12 V supply, as shown in the following figure. What is the total current drawn from the source?



A. 4 A

B. 2 A



C. 1 A

D. 0.5 A



Part B (Electronics Mechanic)

75 Questions • Answer Key

Q1 Part B (Electronics Mechanic)

Why is an online UPS preferred for critical computer equipment over other types of UPS?

- A. It is less expensive than all other UPS types
- B. It is physically smaller than offline UPS systems
- C. It eliminates transfer time, preventing even brief power interruptions ✓
- D. It uses fewer electronic components

Q2 Part B (Electronics Mechanic)

During the troubleshooting workflow of an LED TV that has a No Video, But Has Audio fault condition, which of the following diagnostic steps should a technician perform immediately after confirming the power supply voltages are normal?

- A. Replace the primary microprocessing main board assembly.
- B. Replace the liquid crystal display panel assembly immediately.
- C. Perform a flashlight test on the screen to check for a faint image. ✓
- D. Increase the main AC input voltage using a variable autotransformer.

Q3 Part B (Electronics Mechanic)

A technician opens a computer cabinet and notices a round coin-shaped battery on the motherboard. What is its purpose?

- A. Power the monitor
- B. Control USB ports
- C. Store BIOS/CMOS settings ✓
- D. Increase RAM speed

Q4 Part B (Electronics Mechanic)

An ITI workshop implements 5S but notices recurring safety hazards because tools are often left in different locations and workers cannot find them quickly. Which 5S step should be strengthened most effectively?

- A. Shine
- B. Set in Order ✓
- C. Sort
- D. Sustain

Q5 Part B (Electronics Mechanic)

What is the function of a half wave rectifier?

- A. It stores electrical energy
- B. It converts DC to AC
- C. It converts AC to DC ✓
- D. It amplifies signals

Q6 Part B (Electronics Mechanic)

What does the term booting mean in a computer system?

- A. Starting a computer and loading the operating system ✓
- B. Scanning for virus and deleting the infected files
- C. Defragmenting a hard disk to fix bad sectors
- D. Installing open source software tools

Q7 Part B (Electronics Mechanic)

Which of the following inputs is applied to a base terminal in a transistor amplifier during lab testing?

- A. Zero signal input
- B. Random noise signal
- C. High DC voltage input
- D. Small AC signal input ✓

Q8 Part B (Electronics Mechanic)

What is the primary purpose of using the Pulse Amplitude Modulation (PAM) technique in communication systems?

- A. To represent analog information by varying the amplitude of high frequency discrete pulses ✓
- B. To reduce the bandwidth requirements of signals
- C. To increase the frequency of pulses for transmission
- D. To encode information using phase shifts in pulses

Q9 Part B (Electronics Mechanic)

What is the main purpose of a limiter circuit in a Frequency Modulation receiver?

- A. To change the carrier frequency
- B. To demodulate the signal
- C. To filter out all noise components
- D. To remove amplitude variations ✓



Q10 Part B (Electronics Mechanic)

The common-emitter (CE) configuration of a transistor is most widely used as a/an:

- A. Passive Filter
- B. Voltage Amplifier ✓
- C. Impedance matcher
- D. Rectifier

Q11 Part B (Electronics Mechanic)

In the procedure of measuring resistance with a shunt type ohmmeter, what will the pointer indicate if the test terminals remain open during testing?

- A. Negative reading
- B. Infinite resistance ✓
- C. Zero resistance
- D. Mid-scale reading

Q12 Part B (Electronics Mechanic)

Which sequence best ensures both picture quality and device safety while setting up a new LED or LCD TV with a set-top box?

- A. Connect the set-top box to the TV with HDMI after turning on the TV first, then the set-top box.
- B. Connect the set-top box to the TV with AV cables, plug in while both devices are switched on.
- C. Connect the set-top box to the TV with AV cables, power on both devices, then switch inputs.
- D. Connect the set-top box to the TV with HDMI, power off both devices before plugging, then switch on after connections are secure. ✓

Q13 Part B (Electronics Mechanic)

Two oscillators use the same inductor (L) and the same capacitor (C) values. One is Colpitts with $C_1 = C_2$ and the other is Hartley with $L_1 = L_2$ with negligible mutual inductance (M). Which of the following is true about their resonant frequencies?

- A. Hartley frequency is higher
- B. Frequency depends on transistor beta
- C. Both have the same frequency
- D. Colpitts frequency is higher ✓

Q14 Part B (Electronics Mechanic)

When selecting a sensor for an industrial application that requires detecting very small temperature changes, which sensor characteristic should be prioritized to ensure the sensor can detect the smallest variation in temperature?

- A. Range
- B. Resolution ✓
- C. Accuracy
- D. Sensitivity

Q15 Part B (Electronics Mechanic)

In an N-type semiconductor, what is the role of donor atoms?

- A. They absorb thermal energy
- B. They create holes for conduction
- C. They provide extra electrons for conduction ✓
- D. They increase the energy gap

Q16 Part B (Electronics Mechanic)

As per BIS SP 46:2003 engineering drawing conventions, which arrowhead type is used for dimension lines?

- A. Closed filled arrowhead ✓
- B. Slashed arrowhead
- C. Dot arrowhead
- D. Open arrowhead

Q17 Part B (Electronics Mechanic)

What is the function of RAM in a desktop computer?

- A. Permanent storage of files and folders
- B. Temporary data storage for running applications ✓
- C. Processing data and performing calculations
- D. Storing system backup

Q18 Part B (Electronics Mechanic)

An apprentice needs to make a rectangular opening in a metal plate with accurate edges and sharp corners. Which combination of fitting tools is most suitable?

- A. Round file and center punch for corner shaping work
- B. Surface plate and scribe for cutting and finishing edges
- C. Try square and flat file for layout and edge shaping
- D. Hacksaw and flat file for cutting and edge finishing ✓



Q19 Part B (Electronics Mechanic)

In quantization process for a Pulse code modulation system, a sampled version of a continuous analog signal are mapped to what type of values?

A. A finite set of discrete Binary levels



B. Random values

C. An infinite set of discrete Binary levels

D. Analog values only

Q20 Part B (Electronics Mechanic)

Which type of charge carriers mainly control current in a Field Effect Transistor (FET)?

A. Electrons and holes together

B. Minority carriers only

C. Both minority and majority carriers

D. Majority carriers only

**Q21 Part B (Electronics Mechanic)**

A magnetic path carries a flux density of 0.8 Tesla (T) through an area of 15 cm^2 . What is the magnetic flux (in weber)?

A. 1.2 Wb

B. 0.0012 Wb



C. 0.012 Wb

D. 0.12 Wb

Q22 Part B (Electronics Mechanic)

For a circuit to function as an oscillator and produce sustained sinusoidal output, the feedback applied must be:

A. Zero feedback to avoid distortion

B. Random feedback depending on input signal

C. Positive feedback with proper phase



D. Negative feedback to stabilize gain

Q23 Part B (Electronics Mechanic)

Which single logic gate can be used to implement the Boolean equation $Y = A + B$ in a digital circuit?

A. NAND gate

B. AND gate

C. NOT gate

D. OR gate

**Q24 Part B (Electronics Mechanic)**

A resistor is marked with the bands Yellow, Violet, Orange, and Silver. Which statement is correct regarding the resistance value of the resistor?

A. Its value is 470 k Ω with $\pm 20\%$ tolerance

B. Its value is 47 k Ω with $\pm 10\%$ tolerance



C. Its value is 47 Ω with $\pm 10\%$ tolerance

D. Its value is 4.7 k Ω with $\pm 5\%$ tolerance

Q25 Part B (Electronics Mechanic)

Two wires are made of the same material and have the same length. Wire A has a cross-sectional area of 2 mm^2 , and Wire B has a cross-sectional area of 5 mm^2 . Which wire has the greater resistance?

A. Resistance cannot be compared without knowing voltage

B. Both have equal resistance because length is the same

C. Wire A, because smaller area gives higher resistance



D. Wire B, because larger area gives higher resistance

Q26 Part B (Electronics Mechanic)

In a moderately doped p-type semiconductor at $T = 300 \text{ K}$, where is the Fermi level E_F located relative to the intrinsic Fermi level E_i ?

A. At the center of band gap

B. Outside band gap

C. Near valence band and below the intrinsic Fermi level



D. Near conduction band and above the intrinsic Fermi Level

Q27 Part B (Electronics Mechanic)

On which principle does a Resistance Temperature Detector (RTD) work?

A. Voltage decreases with increase in temperature

B. Resistance remains constant with temperature

C. Resistance decreases with increase in temperature

D. Resistance increases with increase in temperature



Q28 Part B (Electronics Mechanic)

Which scenario best demonstrates the use of IGBT in a real-world application?

- A. Protecting a circuit from voltage surges
- B. Providing voltage regulation in a small device
- C. Controlling the speed of an industrial motor ✓
- D. Amplifying small signals in a radio circuit

Q29 Part B (Electronics Mechanic)

Which illustrates the application of a voltage amplifier?

- A. Enhancing the voltage of a sensor output before sending it to a microcontroller ✓
- B. Converting digital signals into analog
- C. Filtering unwanted frequencies
- D. Measuring resistance directly

Q30 Part B (Electronics Mechanic)

While servicing an inverter-based stabilizer, you notice the relay contacts are heavily pitted. What is the best preventive measure when replacing the relay?

- A. Select a relay with lower coil resistance
- B. Use a relay with smaller contacts
- C. Lower the relay switching voltage
- D. Choose a relay rated for higher contact current ✓

Q31 Part B (Electronics Mechanic)

The SI unit of magnetic flux density is:

- A. Ampere-turn
- B. Henry
- C. Weber
- D. Tesla ✓

Q32 Part B (Electronics Mechanic)

Which type of resistance is best measured using a Series type Ohm meter?

- A. Capacitance value of a circuit
- B. Low resistance in less than 1 Ohm range
- C. Very high resistance Greater than 100 Mega-ohm range
- D. Medium resistance ranging from few ohms to kilo-ohms ✓

Q33 Part B (Electronics Mechanic)

During lab practice, if you connect the input of a NOT gate to a logic low (0), what practical output should you observe?

- A. Undefined
- B. Logic high (1) ✓
- C. Logic low (0)
- D. No change

Q34 Part B (Electronics Mechanic)

Which of the following best describes the Internet of Things?

- A. A single device connected to the internet
- B. Only computers communicating online
- C. A type of programming language
- D. A network of connected devices sharing data ✓

Q35 Part B (Electronics Mechanic)

Which of the following materials has the lowest electrical conductivity and should be avoided for connecting sensitive measurement instruments?

- A. Iron ✓
- B. Silver
- C. Aluminum
- D. Copper

Q36 Part B (Electronics Mechanic)

What is the purpose of the base region in an NPN transistor?

- A. To dissipate heat
- B. To control the number of electrons passing from emitter to collector ✓
- C. To act as the main current path
- D. To generate electrons for the collector

Q37 Part B (Electronics Mechanic)

According to engineering drawing, how is a plane surface defined?

- A. A surface formed by rotating a straight line about a fixed axis
- B. A surface having the shortest path between any two points
- C. A surface in which the line joining any two points lies entirely within it ✓
- D. A surface kept parallel to one principal reference plane



Q38 Part B (Electronics Mechanic)

In premium solid-state architectures requiring high color rendering indices, what unique structural method is used to construct a standard commercial white LED light bulb?

- A. Wiring three separate red, green, and blue monochromatic diodes in an absolute series loop fed by an unrectified AC power supply
- B. Forcing a direct current stream backward through an ultra-thin tungsten filament mounted between a pair of direct bandgap substrates
- C. Packing an isolated high-pressure low-temperature mercury vapor gas cell directly inside a silicon diode block
- D. Depositing a yellow cerium-doped yttrium aluminum garnet phosphor coating directly over a blue indium gallium nitride semiconductor die ✓

Q39 Part B (Electronics Mechanic)

In a Pulse Position Modulation (PPM) signal, which of the following pulse parameters remain constant?

- A. Pulse amplitude only
- B. Pulse width and amplitude both ✓
- C. Pulse position
- D. Pulse width only

Q40 Part B (Electronics Mechanic)

What happens to the gain of a non-inverting amplifier using OP-AMP if the feedback resistor value is increased by 5 % while keeping the input resistor constant? (Assuming the OP-AMP remains in linear range for operation.)

- A. The gain remains constant
- B. The gain decreases
- C. The gain changes unpredictably
- D. The gain increases ✓

Q41 Part B (Electronics Mechanic)

Which port is typically used to connect a monitor to the motherboard in computer system?

- A. SATA port
- B. PATA port
- C. VGA port ✓
- D. Ethernet port

Q42 Part B (Electronics Mechanic)

A silicon sample is doped with boron in a lab. Identify the semiconductor type.

- A. Intrinsic semiconductor
- B. N-type semiconductor
- C. Insulator
- D. P-type semiconductor ✓

Q43 Part B (Electronics Mechanic)

While fixing a circuit board, which method is best for removing a surface-mount component without ripping or damaging the metal copper tracks?

- A. Applying force with a heated tweezer to pull off the component
- B. Applying high heat quickly with a basic soldering iron and prying tool
- C. Using chemical solvent to dissolve solder and remove the component
- D. Using a temperature-controlled soldering station with proper desoldering tools ✓

Q44 Part B (Electronics Mechanic)

The surface-mount soldering defect where unequal surface tension causes a chip component to lift vertically off one pad is known as _____, which can be mitigated during manual rework by using _____.

- A. bridging; an unfluxed copper braid
- B. cold joint; a lower melting-point solder paste
- C. de-wetting; a higher-wattage chisel tip
- D. tombstoning; split-tip soldering iron ✓

Q45 Part B (Electronics Mechanic)

When using a PMMC multimeter to measure current, how should the instrument be connected in the circuit?

- A. In parallel with the load
- B. Across the voltage source
- C. Across the resistor only
- D. In series with the circuit ✓

Q46 Part B (Electronics Mechanic)

A lamp circuit carries a charge of 24 coulombs in 8 seconds. What is the current in the circuit?

- A. 1/3 A
- B. 3 A ✓
- C. 8 A
- D. 2 A



Q47 Part B (Electronics Mechanic)

In the output characteristics of a common-emitter configuration, a family of curves is obtained by varying V_{CE} while keeping which quantity fixed? (Symbols have their usual meaning.)

- A. I_C
- B. V_{CE}
- C. I_B ✓
- D. V_{CC}

Q48 Part B (Electronics Mechanic)

An industrial environment with significant power line interference is causing issues in analog communication. Why would phase modulation be selected over amplitude modulation for the analog signaling in such an environment?

- A. Phase modulation guarantees maximum error in noisy environments
- B. Phase modulation uses less power than amplitude modulation in all cases
- C. Phase modulation requires less complex receivers than amplitude modulation
- D. Phase modulation is less affected by amplitude variations caused by noise ✓

Q49 Part B (Electronics Mechanic)

During an 8051 microcontroller experiment, switches are connected to Port 1. Before reading the switch status, the program writes logic '1' to the port pins. What is the purpose of this operation?

- A. To configure the port pins as output
- B. To configure the port pins as input ✓
- C. To clear the data stored in the port register
- D. To enable serial communication

Q50 Part B (Electronics Mechanic)

In a full adder circuit, under which input condition will the sum output be LOW (0)?

- A. When only one input is HIGH
- B. When all inputs are HIGH
- C. When an odd number of inputs is HIGH
- D. When an even number of inputs is HIGH ✓

Q51 Part B (Electronics Mechanic)

A black rectangular SMD component near an LED driver circuit's input has a white stripe on one edge, and the board is marked with a D. What is this component and its polarity?

- A. Capacitor; stripe is ground
- B. Inductor; stripe is positive input
- C. Diode; stripe is the Anode (+)
- D. Diode; stripe is the Cathode (-) ✓

Q52 Part B (Electronics Mechanic)

Why is a Double-Pole (DP) Miniature Circuit Breaker (MCB) generally preferred over a Single-Pole (SP) MCB in a single-phase distribution system?

- A. It increases the fault current carrying capacity of the circuit.
- B. It simultaneously disconnects both the phase and neutral conductors during switching or fault conditions. ✓
- C. It reduces the power consumption of the connected load.
- D. It eliminates the requirement for earthing in the installation.

Q53 Part B (Electronics Mechanic)

What is the working principle of an LVDT?

- A. It works by changing resistance with position
- B. It uses the piezoelectric effect for measurement
- C. It operates on the principle of mutual induction ✓
- D. It relies on the Hall effect for sensing

Q54 Part B (Electronics Mechanic)

Which type of amplifier is used at the final stage to drive a loudspeaker?

- A. Buffer amplifier
- B. Pre-amplifier
- C. Power amplifier ✓
- D. Voltage amplifier



Q55 Part B (Electronics Mechanic)

In a lab test, three resistors of $2\ \Omega$, $3\ \Omega$, and $6\ \Omega$ are connected in series across a 22V DC source. What is the current through the $3\ \Omega$ resistor in the circuit?

- A. 11 A
- B. 1 A
- C. 3 A
- D. 2 A



Q56 Part B (Electronics Mechanic)

When analyzing a closed-loop circuit containing an **ideal operational amplifier**, what assumption must be applied regarding the currents entering the inverting and non-inverting input pins?

- A. No current flows into either input terminal
- B. A small bias current flows into each terminal
- C. Current flows only into the non-inverting terminal
- D. Equal and opposite currents flow into both terminals



Q57 Part B (Electronics Mechanic)

A machinist is required to mark the axis of a drilled hole on an engineering drawing. Which line type according to BIS SP 46-2003 should be used for the axis?

- A. Chain thin line
- B. Dashed thin line
- C. Continuous thick line
- D. Thick zig-zag line



Q58 Part B (Electronics Mechanic)

When building a basic 6 by 4 LED matrix display, what is the total number of individual LEDs required to complete the grid?

- A. 24 LEDs
- B. 2 LEDs
- C. 64 LEDs
- D. 10 LEDs



Q59 Part B (Electronics Mechanic)

What is the purpose of the I/O shield supplied with a motherboard?

- A. Maintain the cooling of the cabinet
- B. Improve processor speed
- C. Cover and protect unused RAM slots
- D. Align and protect rear motherboard ports



Q60 Part B (Electronics Mechanic)

To convert an op-amp integrator into a practical integrator (avoiding low-frequency saturation), which component is typically added in parallel with the feedback capacitor?

- A. A second capacitor
- B. A resistor
- C. A diode
- D. An inductor



Q61 Part B (Electronics Mechanic)

Which terminal is unique to an IGBT but not found in a BJT?

- A. Base
- B. Emitter
- C. Gate
- D. Collector



Q62 Part B (Electronics Mechanic)

An electrician is required to test a live electrical panel. Which PPE should be worn to protect the hands from electrical hazards?

- A. Safety helmet
- B. Insulated gloves
- C. Safety goggles
- D. Ear plugs



Q63 Part B (Electronics Mechanic)

Which pin on the IC-555 Timer is used to discharge the timing capacitor when it is operated as an astable multivibrator?

- A. Pin 2
- B. Pin 6
- C. Pin 4
- D. Pin 7



Q64 Part B (Electronics Mechanic)

If an intrinsic semiconductor has equal electrons and holes, and 20 electrons are added, what is the majority carrier?

- A. None present
- B. Electrons only
- C. Holes only
- D. Both electrons and holes are majority carriers



Q65 Part B (Electronics Mechanic)

Which memory technology is used in USB pen drives?

A. Flash Memory



B. DRAM

C. Cache Memory

D. SRAM

Q66 Part B (Electronics Mechanic)

During hardware interfacing using the 8051 microcontroller, why are I/O ports essential?

A. To increase the clock frequency of the microcontroller

B. To perform calculations

C. To interface with external devices



D. To store information for processing

Q67 Part B (Electronics Mechanic)

Why are transistors preferred over mechanical switches for rapid switching operations?

A. Transistors require manual operation

B. Transistors are larger in size

C. Transistors consume more power

D. Transistors switch faster and have long life span



Q68 Part B (Electronics Mechanic)

Which technology is used by a CD-ROM drive to read data in computer systems?

A. Laser technology



B. Magnetic head

C. Ultraviolet light technology

D. Electrical contacts

Q69 Part B (Electronics Mechanic)

What is the function of the heat sink on the motherboard in a computer system?

A. Absorb heat from the processor



B. Store BIOS settings in ROM

C. Run the BIOS during booting process

D. Provide power to RAM

Q70 Part B (Electronics Mechanic)

Why is rubber suitable for making seals and gaskets?

A. It readily absorbs water

B. It easily conducts electricity

C. It can form tight, flexible closures



D. It reacts with most chemicals

Q71 Part B (Electronics Mechanic)

An Earth Leakage Circuit Breaker (ELCB) is designed to disconnect the electrical supply under which of the following conditions?

A. When the earth leakage current exceeds the preset sensitivity (trip) value



B. When the supply frequency deviates from its rated value

C. When the earth leakage current falls below the rated value

D. When the load current exceeds the rated current of the circuit

Q72 Part B (Electronics Mechanic)

In an FM system, if the modulating signal frequency is doubled and the peak frequency deviation is kept constant, the modulation index will:

A. Double

B. Remain the same

C. Halve



D. Become zero

Q73 Part B (Electronics Mechanic)

What could happen if the desoldering pump is not used promptly after the solder melts during switch removal from a PCB?

A. The desoldering pump may overheat

B. The switch will detach automatically

C. The solder may solidify before being removed



D. The PCB will break instantly

Q74 Part B (Electronics Mechanic)

What is the main benefit of increasing (extending) RAM in a desktop computer?

A. Higher disk permanent storage

B. Improved multitasking performance



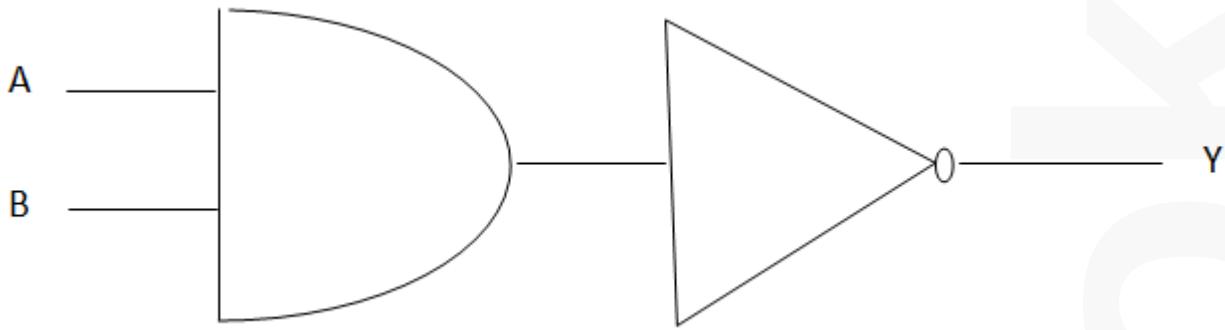
C. Better display resolution

D. Faster processor speed



Q75 Part B (Electronics Mechanic)

Consider the logic circuit shown in the given diagram. Which pair of the inputs A and B will produce output $Y = 0$?



A. $A=0, B=0$

B. $A=1, B=1$



C. $A=1, B=0$

D. $A=0, B=1$

