Youth Competition Times

RAILWAY RECRUITMENT BOARD

RRB JE

ELECTRONICS

&

ALLIED ENGINEERING

SOLVED PAPERS & PRACTICE BOOK

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Publisher Declaration

Edited and Published by A.K. Mahajan for YCT Publications Pvt. Ltd.
and printed by Roop Printing Press. In order to Publish the book,
full care has been taken by the Editor and the Publisher,
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In the event of any dispute, the judicial area will be Prayagraj.

₹ 595/-

CONTENT

SOLVED PAPERS

PRACTICE SET

SYLLABUS

Government of India, Ministry of Railways, Railway Recruitment Boards

Recruitment of Junior Engineer (JE), Junior Engineer (Information Technology) [JE(IT)], Depot Material Superintendent (DMS)

2nd Stage CBT : Short listing of Candidates for the 2nd Stage CBT exam shall be based on the normalized marks obtained by them in the 1st Stage CBT Exam. Total number of candidates to be shortlisted for 2nd Stage shall be 15 times the community wise total vacancy of Posts notified against the RRB as per their merit in 1st Stage CBT. However, Railways reserve the right to increase/decrease this limit in total or for any specific category(s) as required to ensure availability of adequate candidates for all the notified posts.

Duration : 120 minutes *(160 Minutes for eligible PwBD candidates accompanied with Scribe)*

No of Questions : 150

Syllabus : The Questions will be of objective type with multiple choices and are likely to include questions pertaining to General Awareness, Physics and Chemistry, Basics of Computers and Applications, Basics of Environment and Pollution Control and Technical abilities for the post. The syllabus for General Awareness, Physics and Chemistry, Basics of Computers and Applications, Basics of Environment and Pollution Control is common for all notified posts under this CEN as detailed below:-

a) **General Awareness :** Knowledge of Current affairs, Indian geography, culture and history of India including freedom struggle, Indian Polity and constitution, Indian Economy, Environmental issues concerning India and the World, Sports, General scientific and technological developments etc.

b) **Physics and Chemistry:** Up to 10th standard CBSE syllabus.

c) **Basics of Computers and Applications:** Architecture of Computers; input and Output devices; Storage devices, Networking, Operating System like Windows, Unix, Linux; MS Office; Various data representation; Internet and Email; Websites & Web Browsers; Computer Virus.

d) **Basics of Environment and Pollution Control:** Basics of Environment; Adverse effect of environmental pollution and control strategies; Air, water and Noise pollution, their effect and control; Waste Management, Global warming; Acid rain; Ozone depletion.

e) **Technical Abilities:** The educational qualifications mentioned against each post shown in Annexure-A, have been grouped into different exam groups as below. Questions on the Technical abilities will be framed in the syllabus defined for various Exam Groups given at Annexure-VII-A, B, C, D, E, F & G.

The section wise Number of questions and marks are as below :

Subjects	No. of Questions	Marks for each Section
	Stage-II	Stage-II
General Awareness	15	15
Physics & Chemistry	15	15

Basics of Computers and Applications	10	10
Basics of Environment and Pollution Control	10	10
Technical Abilities	100	100
Total	150	150
Time in Minutes	120	

The section wise distribution given in the above table is only indicative and there may be some variations in the actual question papers.

Minimum percentage of marks for eligibility in various categories: UR -40%, OBC-30%, SC-30%, ST -25%. This percentage of marks for eligibility may be relaxed by 2% for PwBD candidates, in case of shortage of PwBD candidates against vacancies reserved for them.

Virtual calculator will be made available on the Computer Monitor during 2nd Stage CBT.

2nd Stage Syllabus for Electronics & Allied Engineering Exam Group – JE

1. **Electronic Components & Materials :**

   Conductors, Semi conductor& Insulators; Magnetic materials; Jointing & Cleaning materials for U/G copper cable & OFC; Cells and Batteries (chargeable and non chargeable); Relays, Switches, MCB & Connectors.

2. **Electronic Devices and circuits :**

   PN Junction diodes, thyristor; Diode and triode circuits; Junction Transistors; Amplifiers; Oscillator; Multivibrator , counters; Rectifiers; Inverter and UPS.

3. **Digital Electronics :**

   Number System & Binary codes; Boolean Algebra & Logic gates; Combinational & Sequential logic circuits; A/D & D/A converter, counters; Memories

4. **Linear Integrated Circuit :**

   Introduction to operational Amplifier; Linear applications; Non Linear applications; Voltage regulators; Timers; Phase lock loop.

5. **Microprocessor and Microcontroller :**

   Introduction to microprocessor, 8085 microprocessor working; Assembly Language programming; Peripherals & other microprocessors; Microcontrollers

6. **Electronic Measurements :**

   Measuring systems; Basic principles of measurement; Range Extension methods; Cathode ray oscilloscope, LCD, LED panel; Transducers

7. **Communication Engineering :**

   Introduction to communication; Modulation techniques; Multiplexing Techniques; Wave Propagation, Transmission line characteristics, OFC; Fundamentals of Public Address systems, Electronic exchange, Radar, Cellular and Satellite Communication.

8. **Data communication and Network :**

   Introduction to data communication; Hardware and interface; Introduction to Networks and Networking devices; Local Area Network and Wide area network; Internet working.

9. **Computer Programming :**

   Programming concepts; Fundamentals of 'C' and C++; Operators in 'C' and C++; Control Statements; Functions, Array String & Pointers, File Structure; Data Structure and DBMS

10. **Basic Electrical Engg :**

    DC Circuits; AC fundamentals; Magnetic, Thermal and Chemical effects of Electric current; Earthing - Installation, Maintenance, Testing

RRB JE CBT-2

Electronics

Exam Date: 22.04.2025 | **Exam Time: 09:00 AM -11:00 AM**

Section : General Abilities

1. What is the net force acting on an object if balanced forces are applied?

(a) Equal to acceleration
(b) Zero
(c) Infinite
(d) Equal to the mass of the object

Ans. (b) : When balanced forces are applied the net force acting on an object is zero. According to Newton's first law of motion any object will be at rest position or in motion until the unbalance force is applied. So when balance force is applied, the net force is zero.

2. What is the purpose of the Collation option in the Print settings?

(a) To change the printer selection
(b) To adjust the page orientation
(c) To select a custom print range
(d) To print all the pages of a document as a set

Ans. (d) : The purpose of the collation option in the print settings is to print all the pages of a document as a set.
When collation is applied in print settings, it prints multiple copies of a multi page document.
For example if there is 4 page document and 3 collate is enabled, it will print 1-2-3-4, 1-2-3-4, 1-2-3-4.

3. In an electric circuit, what is the correct way to connect an ammeter?

(a) In series with the component
(b) In parallel with the component
(c) In either series or parallel
(d) In parallel with the source

Ans. (a) : In an electric circuit, the correct way to connect an ammeter is in series with component. Ammeter is a device used to measure current of a circuit, it itself has low resistance, that's why it is connected in series to measure current.

4. The fine powder that is obtained from the modified and recycled form of plastic is called _____.

(a) polyethylene (b) polystyrene
(c) polythene (d) polyblend

Ans. (d) : The fine powder that is obtained from the modified and recycled form of plastic is called polyblend. Polyblend is a type of plastic which is used in many applications like in road constructions where it is mixed with bitumen to increase the life span of roads. It also makes roads less prone to moisture.

5. Who among the following inaugurated the 38th National Games held in Dehradun in January 2025?

(a) Pushkar Singh Dhami
(b) Anurag Thakur
(c) Narendra Modi
(d) Droupadi Murmu

Ans. (c) : Prime minister of India Mr. Narendra Modi inaugurated the 38th national games held in Dehradun in January 2025. Narendra Modi is one of the prime ministers who has been actively promoted sports and physical fitness in the country through various programmes like Khelo India program, National games etc.

6. Which of the following states is NOT covered under the Atal Bhujal Yojana?

(a) Maharashtra (b) Jharkhand
(c) Uttar Pradesh (d) Rajasthan

Ans. (b) : The Atal Bhujal Yojana (ATALJAL) includes the states of Gujarat, Haryana, Karnataka, Madhya Pradesh, Maharashtra, Rajasthan and Uttar Pradesh. Jharkhand is not covered under the Atal Bhujal Yojana.

7. Identify the correct formula for the compound formed between Mg^{2+} and PO_4^{3-} ions.

(a) $Mg_2(PO_4)_3$ (b) $Mg(PO_4)_3$
(c) $MgPO_4$ (d) $Mg_3(PO_4)_2$

Ans. (d) : The correct formula for the compound formed between Mg^{2+} and PO_4^{3-} ions is $Mg_3(PO_4)_2$. This chemical reaction is criss-cross method to build the chemical formula of ionic bonds.

8. The Industrial Policy Resolution of 1956 categorised industries into how many groups ?

(a) Nine (b) Five
(c) Seven (d) Three

Ans. (d) : The industrial policy resolution of 1956 categorized industries into three groups.
Three groups-
1. Schedule A → Comprises of industries exclusively owned by state.
2. Schedule B→ Comprises of 12 industries which would be progressively state- owned.
3. Schedule- C → Comprises of remaining industries which were to be in the private sector.

9. What is the primary purpose of using a firewall on a Personal Computer?

(a) To clean up temporary files
(b) To speed up internet connectivity
(c) To block unauthorised access and protect the computer
(d) To increase storage space

Ans. (c) : The primary purpose of using a firewall on a personal computer is to block unauthorized access and protect the computer. A firewall acts as a security barrier between your computer's network and untrusted networks like the internet, monitoring and controlling incoming and outgoing traffic to prevent unauthorized access.

10. What is the approximate pH of a neutral salt solution?

(a) More than 7 (b) Less than 7
(c) Equal to 7 (d) Depends on the temperature

Ans. (c) : The approximate pH of a neutral salt solution is equal to 7. pH is the scale used to measure the acid, base categories of an aqueous solution.
pH=7 (Neutral solution)
pH <7 (Acidic solution)
pH >7 (Basic (Alkaline) solution)

11. What was the main objective of the Extremists during the Indian National Movement?

(a) To attain complete independence (Swaraj)
(b) To promote British goods in India
(c) To bring social reforms
(d) To expand the legislative councils

Ans. (a) : The main objective of the extremists during the Indian National Movement was to attain complete independence (Swaraj) Extremists wanted Swaraj that means complete independence from the British rule. Famous extremists leaders were Bal Gangadhar Tilak, Bipin chandra pal and Lala Lajpat Rai, collectively knowns the Lal- Bal - Pal.

12. In which of the following regions the Himalayas has the greatest width?

(a) Arunachal Pradesh (b) Sikkim
(c) Himachal Pradesh (d) Kashmir

Ans. (d) : The Himalayas have their greatest width in the Kashmir region. Himalayas are widest in Kashmir due to the presence of multiple ranges as like Pir Panjal, Zanskar and great Himalayan ranges.

13. Which state of matter shows the highest expansion when temperature is increased?

(a) Plasma (b) Solids
(c) Liquids (d) Gases

Ans. (d) : Gases state of matter shows the highest expansion when temperature is increased.
Gases expand the most when heated because their molecules are far distance away and have weak intermolecular forces. That's why they move freely and spread out significantly while temperature increases.

14. What is the maximum number of Ministers allowed in the Council of Ministers, including the Prime Minister, as per the 91st Amendment Act ?

(a) 10% of Lok Sabha strength
(b) 20% of Lok Sabha strength
(c) 15% of Lok Sabha strength
(d) 12% of Lok Sabha strength

Ans. (c) : The maximum number of ministers allowed in the council of ministers including the prime minister, as per the 91st amendment act is 15% of the Lok Sabha strength.

15. What is the primary function of the F4 key in MS Excel when editing a cell reference in a formula?

(a) Opens the Find and Replace dialog
(b) Toggles between absolute and relative references
(c) Repeats the last action
(d) Refreshes the worksheet

Ans. (b) : The primary function of the F4 key in, MS Excel when editing a cell reference in a formula toggles between absolute and relative references.
The function of F4 key is also useful to ensure that cell reference behave as intended when formulae are copied to different locations in the worksheet.

16. The main use of chlorofluorocarbons is in _____.

(a) vehicles (b) smog
(c) chimneys (d) refrigerants

Ans. (d) : The main use of chlorofluorocarbons is in refrigerants. Chlorofluorocarbons are acronymed as (CFCs) are mainly used as refrigerants in AC systems, refrigerators and freezers. CFCs are very useful to efficiently transfer heat, making them ideal for cooling applications.

17. The phenomenon of multiple echoes due to repeated reflections is called _____.

(a) diffraction (b) reverberation
(c) resonance (d) refraction

Ans. (b) : The phenomenon of multiple echoes due to repeated reflections is called reverberation. It is the quality of sound persistence in the space due to multiple reflections from surfaces like walls, ceilings or floors.
Reverberation is different from echo as it consists of overlapping reflections than a clear repetition.

18. Inertia depends on which property of an object?

(a) Acceleration (b) Mass
(c) Velocity (d) Shape

Ans. (b) : Inertia is such a property of an object which depends directly on mass. It resists in its state of motion. It is the descriptive principle of Newton's first law of motion. Which describes that an object will remain at rest or in motion unless acted by an external force.

19. Dr. BR Ambedkar described which part of the Indian Constitution as its 'novel features', while Granville Austin referred to it as the 'Conscience of the Constitution'?

(a) Directive Principles of State Policy
(b) Preamble
(c) Fundamental Rights
(d) Fundamental Duties

Ans. (a) : Dr. Br Ambedkar described directive principles of state policy of Indian constitution as its 'novel features' while Granville Austin referred to it as the 'Conscience of the constitution'. The directive principles of state policy is included in part- IV of the Indian constitution. This part makes social and economic welfare of the Indian citizen.

20. Which of the following is the correct way to insert a new column in a spreadsheet?

(a) Go to Home > Insert > Insert Sheet Columns.
(b) Go to File > New > Column.
(c) Press Ctrl + X and then Insert.
(d) Use Ctrl + Z to insert a column.

Ans. (a) : Go to Home> Insert> Insert sheet columns.
The above given sequence is the correct way to insert a new column in the spreadsheet for inserting a new column in applications like Microsoft Excel, go to home tab, click on insert and then choose insert sheet columns.

21. If you want the primary recipient to see that others have received a copy of an email, you should enter their email addresses in the _____ field.

(a) Subject (b) To
(c) Cc (d) Bcc

Ans. (c) : If you want the primary recipient to see that others have received a copy of an email, you should enter their email addresses in the cc field.
Cc- Cc means Carbon Copy when recipients are added in this field, all the people of Cc will get a copy of the email. It will be visible to all other recipients also.
Bcc- Blind Carbon Copy (Bcc) is used when we don't want to reveal other recipients could see the e-mail.

22. What does PCB stand for?

(a) Primary Control Board
(b) Printed Circuit Board
(c) Peripheral Connection Bus
(d) Processing Circuit Board

Ans. (b) : PCB stands for Printed Circuit Board. It is a non- conductive board with conductive pathways, typically copper, etched or printed onto its surface, which mechanically supported and electrically connected electronic components to form a functional.

23. What is the shortcut key to start a slideshow from the beginning?

(a) Ctrl + P (b) F5
(c) Alt + Tab (d) Shift + F5

Ans. (b) : In most presentation software, including Microsoft power point, the shortcut key to start a slideshow from the beginning is F5.
Ctrl + P → Used to open the print dialog box.
Alt + Tab → Used to switch between open applications.
Shift + F5 → Used to start the slideshow from the current slide, not the beginning.

24. Which of the following is a characteristic difference between colloids and true solutions?

(a) True solutions exhibit Brownian motion, but colloids do not.
(b) True solutions show the Tyndall effect, but colloids do not.
(c) True solutions have visible solute particles, whereas colloids have invisible dispersed particles.
(d) True solutions have a single-phase system, whereas colloids have a two-phase system.

Ans. (d) : Characteristic difference between colloids and true solutions.

True solution	Colloid
It have a single - phase system.	It have a two- phase system.
It is a homogeneous mixture of two or more substances.	It is a heterogeneous mixture of two substances.
The size of particles is less than one nanometer.	The range of particle size between one nanometer to 1000 nanometer.
It is always transparent.	It is translucent.
The particles cannot be seen even with microscope.	The particles of a colloidal solution can be seen with microscope.
It does not show tyndall effect.	It show tyndall effect.

25. Which of the following is NOT a component of a CPU?

(a) Hard Disk
(b) Arithmetic Logic Unit (ALU)
(c) Cache Memory
(d) Control Unit (CU)

Ans. (a) : Hard Disk is not a component of a CPU.
A CPU has three main components-
The Arithmetic logic unit (ALU), which performs calculation; the control unit (CU), which manages and coordinates the operations of the entire CPU by issuing control signals; and the cache memory and resistors, which provide fast, temporary storage for data and instructions.

26. Which of the following correctly explains why clothes dry faster on a windy day?

(a) Wind removes the water vapour from the clothes surroundings.
(b) Wind decreases the temperature of the water molecules.

(c) Wind reduces the surface area of the clothes.
(d) Wind increases the humidity around the clothes.

Ans. (a) : Wind speeds up the drying process by constantly removing the moist air around wet clothes, allowing fresh, drier air to take its place. This continuous removal of water vapor promotes evaporation, which is why clothes dry faster on windy days.

27. What is the first step to securing ones smartphone or tablet?
(a) Setting a password/PIN-protected lock screen
(b) Using only free Wi-Fi networks
(c) Installing more apps
(d) Turning off mobile data

Ans. (a) : Setting a password/ PIN protected screen is the fundamental first step to securing your smartphone or tablet. This basic security measure prevents unauthorized access if your device is lost or stolen and protects your personal information from being accessed by others.

28. The practice of Jhum cultivation is prevalent in the _____.
(a) South east (b) North east
(c) South west (d) North west

Ans. (b) : The practice of Jhum cultivation is prevalent in the 'North east'. It is also known as shifting cultivation. Northeastern states include Assam, Meghalaya Mizoram, Nagaland, Arunachal Pradesh, Manipur and Tripura. The hilly terrain and dense forests of this region make it suitable for this method of agriculture.

29. Which of the following companies announced plans in February 2025 to construct the world's longest undersea cable, aiming to enhance internet connectivity across five continents, with landing points in India?
(a) Amazon (b) Meta
(c) Google (d) Microsoft

Ans. (b) : In February 2025, meta announced project waterworth, an initiative to construct the world's longest undersea cable.
- Meta is a parent company of facebook, Instagram, and whatsapp.
- The cable will span over 50000 km, connecting five continents, including the United States, Brazil, India and South Africa.
- The aims of this project to enhance global internet connectivity and support infrastructure.

30. What happens when an acid reacts with a metal oxide?
(a) A salt and water are formed.
(b) Only salt is formed.
(c) A salt and hydrogen gas are formed.
(d) Only water is formed.

Ans. (a) : A salt and water are formed when an acid reacts with a metal oxide.

Example:- $CuO + 2HCl \longrightarrow Cucl_2 + H_2O$

(Metal) Oxide — (Acid) — (Salt) — (Water)

31. The glass panel used in greenhouses is known to retain _____.
(a) heat (b) pH
(c) humidity (d) rainfall

Ans. (a) : The glass panel used in greenhouses is known to retain heat from the sun, creating a warm, controlled environment inside for plant growth through the greenhouse effect.

Difference between horticultural glass and toughened safety glass -

Horticultural glass	Toughened safety glass
It is the traditional standard glass used in greenhouses. It's untreated and relatively fragile making it prone to breakage from impacts like footballs.	It is also known as tempered glass, it is standard glass that has undergone a heating and rapid cooling process.
It is fragile and breaks into large, sharp pieces, which can be dangerous to people and plants.	It is up to four times stronger than standard glass and, when it breaks, it shatters into thousands of tiny blunt fragments, drastically reducing the risk of injury.

32. Why does a bee sting cause pain and irritation?
(a) The string releases carbon dioxide gas.
(b) The sting contains a strong base.
(c) The sting injects a mild sugar solution.
(d) The sting injects methanoic acid.

Ans. (d) : A bee sting causes pain and irritation because it injects venom containing compounds like methanoic acid.
These chemicals trigger a localized inflammatory response in the skin, leading to symptoms such as redness, swelling, and burning sensation, which signals the immune system to remove the foreign substance.

33. Which of the following is NOT toxic to non-target organisms in the soil?
(a) Organic fertilisers (b) Pesticides
(c) Fungicides (d) Herbicides

Ans. (a) : Organic fertilisers is not toxic to non- target organisms in the soil.
These are derived from natural sources like compost, manure and plant residues. They improve soil fertility and structure by promoting beneficial microbial activity and providing nutrients.

34. Which of the following correctly represents the chemical formula of a compound formed by aluminium and sulphate ions?

(a) Al_2SO_4 (b) $Al_2(SO_4)_3$

(c) $Al(SO_4)_3$ (d) $Al_3(SO_4)_2$

Ans. (b) : The correct chemical formula for a compound formed by aluminium and sulphate ions is $Al_2(SO_4)_3$. This compound is commonly known as aluminium sulphate, which is used in paper manufacturing, water purification and as a mordant in dyeing and printing textiles.

35. The primary agent that helps in the decomposition of biodegradable matter in domestic sewage is _____.

(a) phosphate (b) nitrate

(c) bacterium (d) chloride

Ans. (c) : Bacterium is a primary agent that helps in the decomposition of biodegradable matter in domestic sewage.

- Bacteria and other microorganisms, like fungi and protozoa, are the central agents in wastewater treatment.
- Decomposition by bacteria occurs under both aerobic and anaerobic conditions in sewage treatment plants.
- Bacteria play a crucial role in maintaining environmental balance by recycling nutrients and reducing organic pollution in wastewater.

36. The energy that is derived from the use of radioactive isotopes is termed as _____.

(a) nuclear energy (b) geothermal energy

(c) thermal energy (d) solar energy

Ans. (a) : Nuclear energy is a energy that is derived from the use of radioactive isotopes.

Energy derived from radioactive isotopes is a process where the nucleus of an atom is fission or fusion, releasing a large amount of energy and is classified as nuclear energy.

37. The Rudra Veena is predominantly associated with which genre of Hindustani music ?

(a) Thumri (b) Dhrupad

(c) Khayal (d) Ghazal

Ans. (b) : The Rudra Veena is predominantly associated with the Dhrupad genre of Hindustani classical music.

- This ancient string instrument, known for its deep and rich sound, is used to create the spiritual and meditative atmosphere that is central to the Dhrupad style, which is one of the oldest forms of Indian classical music.

38. What happens when a computer is put into Sleep mode?

(a) It keeps the session active in RAM while using using minimal power.

(b) It shuts down completely.

(c) It restarts automatically after a few minutes.

(d) It shores data on the hard drive and powers off.

Ans. (a) : When a computer is put into sleep mode then it keeps the session active in RAM while using minimal power.

Advantages of putting a computer into sleep mode:-

- The computer uses very little electricity (Only enough to keep data in RAM).
- It helps in reducing power consumption, especially for laptops.
- Useful when you take short breaks.
- All open files and programs remain stored in RAM, so your work is ready as it was when you left.
- It reduces hardware wear and extends system life.

39. If an object is dropped from rest, what will be its velocity after 15 seconds? ($g = 9.8\ m/s^2$)

(a) 149 m/s (b) 143 m/s

(c) 145 m/s (d) 147 m/s

Ans. (d) : Given that,

The object is dropped from rest so, initial velocity (u) = 0

Time (t) = 15s

Gravity (g) = 9.8 m/s^2

Final velocity (v) = ?

from kinematic equation

$v = u+gt$

$v = 0 + 9.8 \times 15$

$v = 147$ m/s

40. Which official in the Gupta administration was responsible for peace and war matters?

(a) Sandhi-Vigrahika (b) Vishayapati

(c) Mahapratihara (d) Mahadandanayaka

Ans. (a) : In the Gupta administration, Sandhi - Vigrahika was responsible for matters of peace and war. This officer assisted the king in negotiating treaties, handling military conflicts, and making important decisions regarding foreign policy.

- The minister of war and peace was known as Sandhi-Vigrahika.
- It was the most important rank in the councils of minister under the Gupta administration.

41. If the absolute refractive index of a medium is less than 1, it means _____.

(a) light travels faster in that medium than in vacuum

(b) the medium absorbs all light

(c) light travels slower in that medium than in vacuum

(d) the medium is a perfect reflector

Ans. (a) : If the absolute refractive index of a medium is less than 1, it means light travels faster in that medium than in vaccum.

- Refractive index is a dimensionless number that describes how light propagates through a medium.
- Refractive index is also equal to the velocity of light 'c' of a given wavelength in empty space divided by its velocity 'v' in a substance or.

$$\eta = \frac{c}{v}$$

Where,

$\eta \rightarrow$ Refractive index

$c \rightarrow$ Speed of light

$v \rightarrow$ Phase velocity of light

42. The Millennium Development Goals (MDGs) aimed to reduce extreme poverty by which year ?

(a) 2015 (b) 2014
(c) 2008 (d) 2005

Ans. (a) : The millennium Development Goals (MDGs) aimed to reduce extreme poverty by 2015.

- This was one of the eight international development goals that were established at the UN millennium summit in 2000.
- These goals were adopted by 189 united nations member states during the millennium summit held in September 2000.

43. Which of the following CANNOT be considered as a measure to control global warming?

(a) Efficiently using energy
(b) Cutting down use of fossil fuel
(c) Reduction in emission of greenhouse gases
(d) Causing deforestation

Ans. (d) : Deforestation increases CO_2 level as trees absorb carbon dioxide.
Hence, causing deforestation worsens global warming. It cannot be considered a control measure.

44. Which of the following cities hosted the inaugural Kho Kho World Cup in January 2025?

(a) Mumbai (b) Chennai
(c) New Delhi (d) Kolkata

Ans. (c) : The inaugural Kho-Kho world cup-2025 was hosted in New Delhi, India.

- The event marked the first- ever global tournament for the traditional Indian sport, organized to promote Kho-Kho internationally.
- ndia defeated Nepal in both the men's and women's competition to be crowned champions.

45. Which of the following is NOT a source of release of smokestacks?

(a) Rivers
(b) Smelters
(c) Industries
(d) Thermal power plants

Ans. (a): Smokestacks release gases and pollutants from industries, smelters, and thermal power plants.
Rivers do not emit smoke or gases. Hence, they are not a source of smokestacks release.

46. Which Article provides Ministers the right to participate in parliamentary proceedings but without voting rights?

(a) Article 53 (b) Article 88
(c) Article 77 (d) Article 78

Ans. (b) : Article 88, provides ministers the right to participate in parliamentary proceeding but without voting rights.

- This article states that every Minister and the Attorney- General of India has the right to speak in and take part in the proceedings of either house of parliament, any joint sitting, or any committee, but is not entitled vote by virtues of this article.

47. The maximum sound is generated _____.

(a) from industrial smoke
(b) by the take off of a jet plane
(c) from house chimneys
(d) from vehicular emissions

Ans. (b) : The maximum sound is generated by the take off of a jet plane.

- Jet planes during take - off produce an extremely high level of noise due to their powerful engines and high speeds, often exceeding 140 dB.
- This intense noise can cause immediate hearing damage if exposed closely.

48. According to the Tendulkar methodology, what was the estimated percentage of people below the poverty line in rural areas in 2011-12?

(a) 27.5% (b) 25.7%
(c) 20% (d) 15.5%

Ans. (b) : According to the Tendulkar methodology, by estimated percentage of people below the poverty line in rural areas in 2011-12 was 25.7%.

49. Which defect of vision occurs due to the weakening of ciliary muscles with age?

(a) Hypermetropia (b) Myopia
(c) Astigmatism (d) Presbyopia

Ans. (d) : The defect of vision that occurs due to the weakening of ciliary muscles with age is Presbyopia.

- Presbyopia is an age - related condition where the lense becomes less flexible, making it difficult to focus on near objects due to the weakening of the ciliary muscles.

50. What is India's global military ranking in the 2025 Global Firepower (GFP) index?

(a) 5^{th} (b) 4^{th}
(c) 2^{nd} (d) 3^{rd}

Ans. (b) : India has secured the 4^{th} position globally in the global firepower index 2025, solidifying its states as one of the world's most powerful militaries after the united states, Russia, and china.

Section: Technical Abilities

1. The magnetic field inside a solenoid is:

(a) circular and varying with distance
(b) zero
(c) uniform and parallel
(d) non-uniform and divergent

Ans. (c) : The magnetic field inside a solenoid is uniform and parallel to the axis of the solenoid.

- When an electric current flows through the coils of solenoid it creates a magnetic field that is strong and almost constant inside the solenoid.
- This magnetic field lines run parallel to each other along the length of the solenoid indicating that the field is uniform.

2. Co-axial cables are most commonly used in which of the following applications?

(a) Underwater communication
(b) Satellite communication
(c) Cable television (CATV) systems
(d) Wireless communication networks

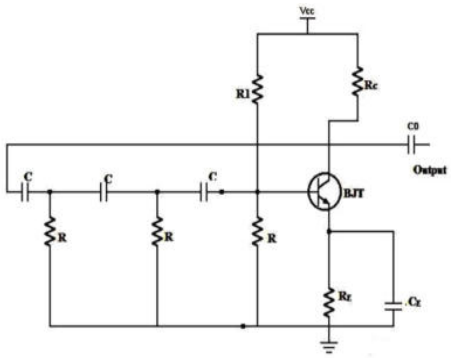
Ans. (c) : Co-axial cables are most commonly used in cable television (CATV) systems.

- Coaxial cables are designed to transmit high-quality signals with minimal interference.
- Co-axial cable are used in such applications as telephone trunk lines, broadband internet networking cables, cable television signals etc.
- It is used as a transmission line for radio frequency signals.

3. For an RC phase shift oscillator, which of the following statements is INCORRECT?

(a) The total phase shift of the RC network is 180º
(b) The magnitude of the gain of the RC network is > 1/29
(c) The magnitude of gain of the amplifier must be ≥ 29
(d) The oscillation frequency of the oscillator is $\frac{1}{2\pi RC\sqrt{6}}$

Ans. (b) : In an RC phase shift oscillator, we typically use three RC stages in series to provide a total phase shift of 180º.



RC Phase Shift Oscillator

- The magnitude of the gain of the RC network is less than 1.
- The magnitude of gain of the amplifier must be ≥ 29.
- The oscillation frequency of the oscillator is $\frac{1}{2\pi RC\sqrt{6}}$.

Hence, option (b) is incorrect.

4. What is the primary goal of simplifying a Boolean expression before implementing it with gates?

(a) To make the circuit slower
(b) To increase the number of gates
(c) To reduce the number of gates and interconnections
(d) To increase power consumption

Ans. (c) : The primary goal of simplifying a Boolean expression before implementing it with logic gates is to reduce the number of gates and interconnections.

The simplification of a Boolean expression helps-

- Reducing the number of logic gates required to implement the circuit.
- Minimizing interconnections between gates, which makes the circuit less complex.
- Improving circuit speed since fewer gates and shorter paths reduce delay.
- Low power consumption and cost which are important in real-world applications.

5. What material is primarily used as the core in fiber optic cables?

(a) Copper (b) Plastic
(c) Aluminium (d) Glass

Ans. (d) : Glass is primarily used as the core in fiber optic cables.

- The core of a fiber optic cable is the central part through which light signals are transmitted.
- The material used for the core must have the ability to carry light efficiently with minimal loss.
- High purity silica glass is primary material used because it allows light to travel long distances with very low loss.

6. The magnetic field outside a toroidal coil:

(a) is zero
(b) is in a circular pattern around the toroid
(c) is uniform and points radially outward
(d) is uniform and points radially inward

Ans. (a) : The magnetic field outside a toroidal coil is zero.

- A toroidal coil is a coil wound into a circular ring shape like a doughnut.
- It is commonly used in inductors and transformers because of its excellent magnetic properties.
- The net enclosed current outside the toroid is zero, that's why the magnetic field outside a toroidal coil is zero.

7. What type of error occurs due to unpredictable variations in measurement conditions?

(a) Gross error (b) Random error
(c) Calibration error (d) Systematic error

Ans. (b) : Random error occurs due to unpredictable variations in measurement conditions.

- The Random errors can arise from; sudden changes in environmental conditions (like temperature, humidity or vibrations) and slight fluctuations in instrument performance.

8. Which of the following statements w.r.t. FSK demodulation using PLL circuit is/are correct?

S1: If the input signal frequency changes, the PLL adjusts its frequency output to match the input frequency.

S2: The phase-locked loop is used to track the changes in the frequency of the modulated signal.

(a) Only S1 (b) Only S2
(c) Neither S1 nor S2 (d) Both S1 and S2

Ans. (d) : The basic working of a PLL used in FSK demodulation-

- A PLL continuously compares the phase of the input signal with the output of a voltage controlled oscillator (VCO). If the input frequency changes the PLL adjusts the VCO to match the new frequency effectively locking onto.
- The phase-locked loop (PLL) tracks the shifts in frequency, which correspond to the digital bits (one frequency for '0' and another for '1'). The PLL's ability to follow these changes allows it to demodulate the FSK signal effectively.

Therefore both statements S_1 and S_2 are correct.

9. Which of the following is NOT a type of loop in C?

(a) do-while loop (b) for each loop
(c) while loop (d) for loop

Ans. (b) : In the C programming language loops are used to execute a block of code repeatedly.

The following are valid types of loops in C-

1. **For loop-** Repeats a block of code a known number of times.
2. **While loop-** Repeats a block as long as a condition is true.
3. **Do-while loop-** Similar to while loop but guarantees the block runs at least once.

- For each loop is not a valid loop in C. It is used in other programming languages like C^{++} , PHP, and python for iterating over collections or arrays in a simplified manner.

10. Which of the following is an example of a Wide Area Network (WAN)?

(a) A home Wi-Fi network
(b) The internet
(c) A Bluetooth connection
(d) A local office network

Ans. (b) : The internet is an example of a Wide Area Network (WAN).

- WAN spans a large geographical area and is used to connect multiple smaller networks such as local area Networks (LANs).
- It allows data communication over long distances, such as between cities, countries or even continents.
- A home Wi-Fi network and a local office network are the examples of LAN.
- A Bluetooth is an example of a Personal Area Network (PAN).

11. What type of distortion occurs if a signal that contains frequency components up to 15 kHz is sampled using 20kHz?

(a) Quantization error (b) Aliasing
(c) Slope Overload (d) No distortion

Ans. (b) : If a signal that contains frequency components up to 15 kHz is sampled using 20 kHz, aliasing type of distortion occurs.

- A signal must be sampled at a rate at least twice the highest frequency present in the signal to avoid aliasing.
- But, the signal is being sampled at only 20 kHz which is less than the Nyquist rate, due to this reason aliasing will occur.

12. The function of pin 18 and 19 (XTAL1 and XTAL2) in 8051 Microcontroller is _____.

(a) to control external interrupt
(b) oscillator connection for clock generation
(c) address and data bus decoding
(d) serial data transmission

Ans. (b) : In the 8051 microcontroller, pins 18 (XTAL1) and 19 (XTAL2) are used to connect an external crystal oscillator or resonator for clock generation.

- These two pins are internally connected to a crystal oscillator circuit within the microcontroller, which helps to generate the clock signal required for the operation of the 8051 microcontroller.

13. The Multiplexed address and Data lines in the 8085 microprocessor are _____.

(a) AD7 - AD0 (b) AD8- AD1
(c) AD8- AD15 (d) AD9 - AD16

Ans. (a) : The multiplexed address and Data lines in the 8085 microprocessor are $AD_7 - AD_0$.

- During the first part of a machine cycle, these lines carry the lower 8 bits of the address (A_0 to A_7).
- In the next part of the cycle, the same lines are used to carry 8-bit data (D_0 to D_7).
- This technique of multiplexing helps reduce the number of physical pins needed on the microprocessor chip.

- To separate the address from the data an external latch is used with the help of a control signal called ALE (Address Latch Enable).

14. Which of the following is a key feature of a microprocessor-based over current relay that enhances its performance in fault detection?

(a) It uses analogue components to process current signals.
(b) It only protects against short-circuit faults.
(c) It incorporates fault analysis algorithms to identify fault types.
(d) It does not require a power supply for operation.

Ans. (c) : A microprocessor - based over current relay is an advanced protection device used in electrical systems. One of its key features is the use of digital signal processing and intelligent algorithms to enhance fault detection and system protection.

- Microprocessor-based relays use software algorithms to analyze fault conditions such as over current, short circuit, ground faults etc.

15. What does 'PROM' stand for?

(a) Processing Read-Only Memory
(b) Peripheral Read-Only Memory
(c) Primary Read-only Memory
(d) Programmable Read-Only Memory

Ans. (d) : PROM stands for Programmable Read-Only Memory.

- RAM - Random Access Memory
- ROM - Read Only Memory
- EPROM - Erasable Programmable Read Only Memory.
- EEPROM - Electrically Erasable Programmable Read Only Memory.

16. Which of the following statements are true regarding the eye diagram in the communication system?

(A) An eye diagram is used to investigate Inter symbol interference.
(B) The width of the eye-opening indicates an interval where the wave can be sampled without ISI.
(C) Eye diagram is observed in Digital storage oscilloscope.

(a) Only A and C (b) A, B and C
(c) Only A and B (d) Only B and C

Ans. (b) : An eye diagram is a powerful tool used in digital communication systems to assess the quality of a signal, especially in the presence of noise, jitter and inter symbol interference (ISI).

- An eye diagram is used to investigate inter symbol interference (ISI).
- The width of the eye-opening indicates an internal where the wave can be sampled without ISI.
- Eye diagram is observed in digital storage oscilloscope

17. The IO/$\bar{M}$ signal in the 8085 microprocessor specifies_____.

(a) Whether an interrupt has occurred
(b) Whether the data is valid
(c) Whether the operation is read or write
(d) Whether the operation is memory or I/O related

Ans. (d) : The IO/$\bar{M}$ signal in the 8085 microprocessor specifies whether the operation is memory or I/O related.

- When IO/$\bar{M}$ = 0, it indicates that the microprocessor is accessing memory.
- When IO/$\bar{M}$ = 1, it indicates the microprocessor is accessing an input or output device.
- This signal works in combination with Read ($R\bar{D}$) and write ($W\bar{R}$) appropriate control actions.

18. In the 8085 microprocessor, _____ instruction is used to identify pending interrupts.

(a) ANI (b) SIM
(c) RIM (d) LXI

Ans. (c) : The RIM (Read Interrupt Mask) instruction in the 8085 microprocessor is used to identify pending interrupts.

- RIM instruction is used to check the status of interrupts, including which interrupts are masked (disabled) and which are pending.
- It is used to read the serial Input Data line (SID).
- When the RIM instruction is executed, it loads the accumulator with an 8-bit value.

19. How do you declare a pointer to an integer?

(a) int *ptr; (b) pointer int ptr;
(c) int ptr*; (d) int ptr;

Ans. (a) : To declare a pointer to an integer, we use the syntax: int*ptr;.

- In C programming, a pointer is a variable that stores the memory address of another variable.

20. The 8051 microcontroller has _____ I/O pins.

(a) 24 (b) 40
(c) 26 (d) 32

Ans. (d) :

- It has contain total 40 pins DIP, 32 of those pins are used as general-purpose Input/output (I/O) pins.
- These 32 Input pins are divided across 4 ports:
- Port 0 → 8 bits (pins 32 -39)
  - Port 1 → 8 bits (pins 1- 8)
  - Port 2 → 8 bits (pins 21-28)
  - Port 3 → 8 bits (pins 10-17)

21. The bandwidth of a raised cosine filter with roll-off factor β (0 to 1) and symbol rate R_S is given by

(a) $BW = R_S(2\beta + 1)$ (b) $BW = R_S(\beta + 1)$

(c) $BW = \frac{R_S}{2}(\beta^2 + 1)$ (d) $BW = \frac{R_S}{2}(\beta + 1)$

Ans. (d) : The bandwidth of a raised cosine filter with roll-off factor β (0 to 1) and symbol rate R_S is given by-

$$BW = \frac{R_S}{2}(\beta + 1)$$

- A raised cosine filter is a type of filter commonly used in digital communication systems to shape the transmitted signal and minimize intersymbol interference (ISI).
- It is useful for pulse shaping in digital modulation techniques.

22. Which of the following statements best describes the operation of a bridge rectifier?

(a) In a bridge rectifier, current flows through two diodes during both positive and negative half cycles, leading to very high-power loss.

(b) The peak inverse voltage (PIV) of diode in a bridge rectifier is the same as in a center-tapped rectifier.

(c) The output voltage of a bridge rectifier consists of only DC components with no AC ripples.

(d) The bridge rectifier is a full-wave rectifier that does not require a center-tapped transformer, improving transformer efficiency.

Ans. (d) : The full wave bridge rectifier does not require a center-tapped transformer.

- The bridge rectifier uses four diodes arranged in a bridge configuration.
- It converts both the positive and negative half-cycles of the input AC signal into a unidirectional output (like DC).

23. In which of the following electrical applications is a glass insulating material commonly used?

(a) Power cables and conductors

(b) High-voltage switchgear and transformers

(c) Low-voltage electronic circuits

(d) Electrical wires for home appliances

Ans. (b) : The high voltage switchgear and transformers electrical applications is a glass insulating material commonly used due to its-

- High dielectric strength.
- Resistance to moisture and chemical corrosion.
- Thermal stability.

24. What happens to the carry-out bit when subtracting two n-bit numbers using 2's complement and the result is positive?

(a) The carry-out bit indicates an overflow

(b) The carry-out bit is added to the result

(c) The carry-out bit is inverted

(d) The carry-out bit is ignored

Ans. (d) : The carry-out bit is ignored when subtracting two n-bit numbers using 2's complement and the result is positive.

- In 2's complement arithmetic, subtraction is performed by adding the 2's complement of the subtrahend to the minuend.
- The carry-out bit is a by product of this addition but it does not indicate overflow in 2's complement.
- When the result of an n-bit 2's complement subtraction is positive, a carry-out from the MSB might occur.
- In 2's complement representation, the carry-out is ignored or discarded.

25. The output voltage of an IC 7905 is _____.

(a) 15 V (b) 5 V

(c) –15 V (d) –5

Ans. (d) : The output voltage of an IC 7905 is –5V.

- The IC 7905 is a part of the 79XX series of negative voltage regulators.
- '79' indicates negative voltage regulation.
- '05' indicates the output voltage which is 5 volts.
- Since it's 79XX series, the output is –5 volts.
- IC 7905 provides a fixed output voltage of –5V, which is typically used in circuits that require negative supply voltage.

26. Which of the options is correct for a non-inverting OP-AMP?

(a) Input is applied at the inverting terminal of OP-AMP.

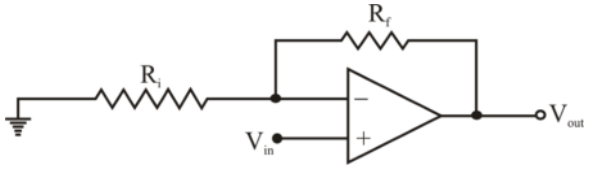
(b) Non-inverting terminal of OP-AMP is grounded.

(c) For an negative input, output is positive

(d) Output is in phase with input

Ans. (d) : In a non-inverting operational amplifier, the output signal is in phase with input signal.

- The input signal is applied to the non-inverting terminal in a non-inverting Op-Amp.



- Voltage gain of a non-inverting Op-Amp is

$$A_V = 1 + \frac{R_f}{R_i}$$

- It has high input impedance and low output impedance.
- Negative feedback is applied to the inverting input of a non-inverting op-amp.

27. A Zener diode has a breakdown voltage of V_z = 7 V at 300 K, with a temperature coefficient of 2.3 mV/°C. What is the new breakdown voltage V_z at 400 K?

(a) 7 V (b) 7.23 V
(c) 6.77V (d) 6.977V

Ans. (b) : Given,

Breakdown voltage $V_z = 7V$

Temperature coefficient = 2.3mV/C

Temperature, $T_1 = 300$ k

$T_2 = 400$ k

$\Delta T = 400 - 300 = 100K$

ΔT = Temperature coefficient $\times \Delta T$

$= 2.3\times10^{-3} \times 100 = 0.23V$

Now, Breakdown voltage at 400K = V_Z (300K) + ΔV

$= 7 + 0.23 = 7.23V$

28. For a diode operating in forward bias, which of the following statements is INCORRECT?

(a) The reduction in the width of the depletion region is due to the recombination of charge carriers and immobile ions near the junction.

(b) The reduction in the potential barrier occurs due to the narrowing of the depletion region.

(c) The reduction in the depletion region allows a majority carrier flow across the junction.

(d) The reduction in the depletion region causes a heavy flow of minority carriers across the junction.

Ans. (d) : For a forward biased diode-

- The recombination of carriers and the movement of in mobile ions near the junction indeed leads to reduction in the width of depletion region.
- As the depletion region narrows in forward bias, the potential barrier reduces.
- The narrowing of the depletion region allows majority carriers to cross the junction and create current.
- Heavy flow of minority carriers is characteristics of reverse bias, not forward bias.

Hence, option (d) is incorrect.

29. A bridge-rectifier is connected to a 24 sin(ωt) V supply. What is the peak inverse voltage (PIV) across the diode?

(a) $48/\pi$ V (b) 24 V

(c) 12 V (d) $24/\pi$ V

Ans. (b) : In a Bridge rectifier, the peak Inverse voltage (PIV) across each diode = V_m

Given, $V_{in} = 24 \sin(\omega t)$ Volt

Where,

$V_m = 24$ Volt

So,

PIV = 24 Volt

30. What is the primary function of the cathode ray tube (CRT) in an oscilloscope?

(a) To display waveforms of the electrical signals

(b) To amplify the electrical signals

(c) To measure the frequency of the signals

(d) To convert the electrical signals into sound

Ans. (a) : The primary function of the Cathode Ray Tube (CRT) in an oscilloscope is to display waveforms of the electrical signals.

- The CRT converts electrical signals into visual display by using an electron beam.
- Electron beam moves across the screen in response to electrical input, creating a visible trace or waveform.

31. Which of the following statements is correct regarding the ripple factor of different rectifiers?

(a) A bridge rectifier has a better ripple factor than a centre-tapped rectifier.

(b) A full-wave rectifier has a higher ripple factor than a half-wave rectifier.

(c) A half-wave rectifier has more than twice the ripple factor of a full-wave rectifier.

(d) A rectifier with a higher ripple factor is more preferable for DC power supply than one with a lower ripple factor.

Ans. (c) : The ripple factor of half-wave rectifier is more than twice the ripple factor of a full-wave rectifier.

We know that,

The ripple factor of half-wave rectifier $r_{(HWR)} = 1.21$

and the ripple factor of full-wave rectifier $r_{(FWR)} = 0.482$

Now, $\dfrac{r_{(HWR)}}{r_{(FWR)}} = \dfrac{1.21}{0.482} = 2.51$

Note- The ripple factor indicates the amount of AC contents present in the DC output of a rectifier.

32. What are the input and output impedances of a voltage-series feedback amplifier?

Given:

Input impedance without feedback: $R_i = 5k\Omega$

Output impedance without feedback: $R_0 = 10k\Omega$

Feedback factor: $A\beta = 19$

(a) 0.25 kΩ, 0.5 kΩ (b) 100 kΩ, 200 kΩ

(c) 0.25 kΩ, 200 kΩ (d) 100 kΩ, 0.5 kΩ

Ans. (d) : Given,

$R_i = 5k\Omega$, $R_0 = 10k\Omega$

Feedback factor $A\beta = 19$

We know that,

The input impedance of voltage-series feedback amplifier,

$R_{if} = R_i(1 + A\beta)$

$= 5\times10^3(1+19)$

$= 100$ kΩ

The output impedance of voltage - series feedback amplifier

$$R_{of} = \frac{R_0}{(1+A\beta)}$$

$$= \frac{10\times10^3}{(1+19)} = 0.5k\Omega$$

33. In common collector configuration of BJT, which of the following options is correct?

(a) It has very high input impedance due to the presence of emitter resistance.

(b) It has a lower input impedance than a common-emitter amplifier.

(c) The input characteristics are a plot of input current (I_B) vs. input voltage (V_{BE}) for a constant I_E.

(d) If the emitter resistance is bypassed with a capacitor, the input impedance increases.

Ans. (a) : Common collector configuration of BJT (Emitter follower) has very high input impedance due to the presence of emitter resistance.

34. In circuit switching, a dedicated communication path is established between the sender and the receiver. This technique is primarily used in which of the following networks?

(a) Cellular networks

(b) Internet

(c) Wireless Local Area Networks (WLANs)

(d) Public Switched Telephone Network (PSTN)

Ans. (d) : In circuit switching, a dedicated communication path is established between the sender and the receiver for the duration of the call. This technique is primarily used in Public Switched Telephone Network (PSTN).

PSTN : (Public Switched Telephone Network)

- PSTN is the traditional telephone system that has been in use for many decades.
- It provides the infrastructure and services for publics telecommunication.

35. Which modulation technique is used to avoid phase ambiguity in BPSK?

(a) QPSK (Quadrature Phase Shift Keying)

(b) ASK (Amplitude Shift Keying)

(c) FSK (Frequency Shift Keying)

(d) DPSK (Differential Phase Shift Keying)

Ans. (d) : Differential phase shift keying (DPSK) modulation technique is used to avoid phase.

•DPSK is a modulation technique in digital communication where data is encoded by changes in phase rather than absolute phase values, relative to the preceding bit.

36. Which Boolean expression correctly represents the Difference (D) output of a Full Subtractor?

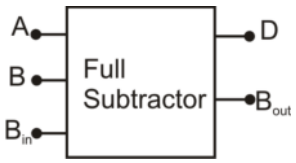
(a) $D = A \oplus B$

(b) D = A AND B

(c) $D = A \oplus B \oplus C_{out}$

(d) $D = A \oplus B \oplus B_{in}$

Ans. (d) :



Difference (D) = $\bar{A}\bar{B}B_{in} + \bar{A}B\bar{B}_{in} + A\bar{B}\bar{B}_{in} + ABB_{in}$

$= \bar{A}\left(\bar{B}B_{in} + B\bar{B}_{in}\right) + A\left(\bar{B}\bar{B}_{in} + BB_{in}\right)$

$= \bar{A}\left(B \oplus B_{in}\right) + A\left(\overline{B \oplus B_{in}}\right)$

$= A \oplus B \oplus B_{in}$

Output Borrow (B_O) = $\bar{A}B + \bar{A}B_{in} + BB_{in}$

Truth table

Inputs			Outputs	
A	**B**	**B_{in}**	**D**	**B_0**
0	0	0	0	0
0	0	1	1	1
0	1	0	1	1
0	1	1	0	1
1	0	0	1	0
1	0	1	0	0
1	1	0	0	0
1	1	1	1	1

37. One of the main advantages of AAAC (All Aluminium Alloy Conductor) over AAC (All Aluminium Conductor) is:

(a) increased weight for better mechanical strength

(b) higher corrosion resistance

(c) reduced cost of production

(d) lower conductivity

Ans. (c) : The main advantages of All Aluminium Alloy conductor (AAAC) over All Aluminium conductor (AAC) are higher corrosion resistance and better mechanical strength.

• AAAC is used in long-span transmission and distribution lines and also coastal or industrial areas.

38. In the case of a 360° phase shift between two signals, the time delay will be equal to:

(a) half the period of the signal

(b) a quarter of the period of the signal

(c) twice the period of the signal

(d) one period of the signal

Ans. (d) : In the case of a 360° phase shift between two signals, the time delay will be equal to one period of the signal.

Given , $\phi = 360°$

Time delay (Δt) = $\frac{\phi}{360°} \times T$

Where,

ϕ = phase shift

T = time period of the signal

$$\Delta t = \frac{360°}{360°} \times T$$

$$\Delta t = 1 \times T$$

Hence, A 360° phase shift will be equal to one period of the signal.

39. Which of the following are Pulse Time Modulation (PTM) techniques?

(a) PAM and PCM (b) PDM and PCM

(c) PPM and PAM (d) PWM and PPM

Ans. (d) : Pulse width modulation (PWM) and pulse position modulation (PPM) are pulse time modulation (PTM) techniques.

•PTM refers to modulation techniques where the information is conveyed by changing the timing characteristics of pulses in a signal ,rather their amplitude.

40. Which of the following factors is directly proportional to the eddy current loss in magnetic materials?

(a) Magnetic field frequency

(b) Thickness of the material

(c) Temperature of the material

(d) Permeability of the material

Ans. (a, b) : The square of both magnetic field frequency and thickness of the material are directly proportional to the eddy current loss in magnetic materials.

• Eddy current loss $\boxed{P_e = k B_n^2 f^2 t^2 V}$

$$P_e \propto f^2 t^2$$

where, k = Eddy current Coefficient

B_m = Magnetic flux density

f = Magnetic field frequency

t = Thickness of the material

V = Volume of the magnetic material's

Note: For this question, discrepancy is found in question/answer. So, this question is ignored for all candidates.

41. In a circuit, if the voltage across a resistor is doubled and the resistance remains constant, what happens to the current?

(a) The current remains the same

(b) The current is halved

(c) The current doubles

(d) The current quadruples

Ans. (c) : In a circuit if the voltage across a resistor is doubled and the resistance remains constant, then the current will be double.

• We know that,

$$I = \frac{V}{R} \quad (\text{by Ohm's law})$$

if V = 2V and R remains constant the $I' = \frac{2V}{R}$

$$\boxed{I' = 2I}$$

42. Which of the following characteristics is ture for ferromagnetic matereials?

(a) They retain their magnetisation even after the external magnetic field is removed.

(b) They are weakly repelled by a magnetic field and have negative magnetic susceptibility.

(c) They show no effect in a magnetic field and are considered neutral.

(d) They are strongly attracted to a magnetic field but do not exhibit hysteresis.

Ans. (a) : The true characteristics for ferromagnetic materials like iron (Fe), cobalt (Co), nickel (Ni) is that they retain their magnetisation even after the external magnetic field is removed.

• This is due to the alignment of magnetic domains inside the material.

• Diamagnetic materials like copper (Cu), bismuth (Bi) are weakly repelled by a magnetic field and have negative magnetic susceptibility.

43. What is the purpose of fscanf() in C?

(a) Writes formatted data to a file

(b) Reads formatted data from a file

(c) Closes a file

(d) Reads a single character from a file

Ans. (b) : Reads formatted data from a file is the purpose of fscanf() in C language.

• fprint f() is used to write formatted data to a file.

• Closes a file is done by fclose().

• Reads a single character from a file is done by fgetc().

44. Which Boolean expression correctly represents the Difference (D) output of a full Subtractor?

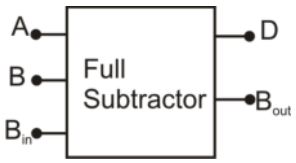
(a) $D = A \oplus B \oplus C_{out}$

(b) $D = A \oplus B \oplus B_{in}$

(c) $D = A \oplus B$

(d) D = A AND B

Ans. (b) :



Difference (D) = $\bar{A}\bar{B}B_{in} + \bar{A}B\bar{B}_{in} + A\bar{B}\bar{B}_{in} + ABB_{in}$

$= \bar{A}\left(\bar{B}B_{in} + B\bar{B}_{in}\right) + A\left(\bar{B}\bar{B}_{in} + BB_{in}\right)$

$= \bar{A}\left(B \oplus B_{in}\right) + A\left(\overline{B \oplus B_{in}}\right)$