

Electrical
Engineering

BILINGUAL
MASTER GUIDE

CBT 2

Computer Based Test - Stage 2

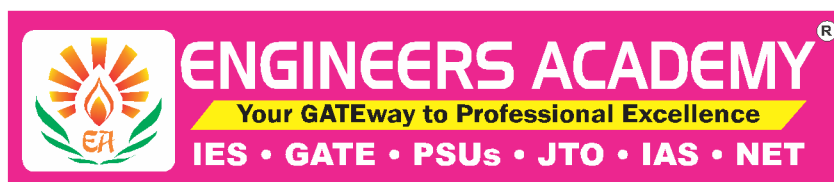
इलेक्ट्रिकल इंजीनियरिंग

RRB-JE

Previous Year Questions Paper With Solutions

TECHNICAL

Complete in-Depth Solutions of All Question | Topic-wise Bifurcation of Questions
Also Useful for State-AE/JE, PSUs and PSCs Exams



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DIRECTOR'S *Message*

To reach heights one must start climbing and if the journey is difficult then perseverance is the key to success. As a teacher we have realized over past years that success in any competitive exam requires hard work and proper guidance. Engineers Academy with its unique teaching methodologies has always proved that we meet the expectations of thousands of students and parents to make their dreams come true. With changing patterns, we have adapted ourselves to deliver the best and ensure better results.

This book has been organized and executed with a lot of care, dedication and passion for lucidity. A conscious attempt has been made to simplify the concepts to facilitate better understanding of the subject.

Engineers Academy has many successful stories of students who secured All India Rank in ESE, GATE, PSUs, SSC-JEn, RRB JEn and other competitive examination. Now we invite you to become a part of Engineers Academy to explore and achieve ultimate goal of your life. We promise to provide you quality guidance with competitive environment which is far advanced and ahead than the reach of other institution.

We would feel satisfied if the book meets the needs of the students for whom it is meant.

Lastly, we are thankful to all the engineers, authors whose work has been the source of enlightenment, inspiration and guidance in presenting this book.

It is hoped that the book in its new form will enjoy its ever increasing popularity.

Regards

Dr. Pankaj Goyal

Preface

Railway Recruitment Board-Junior Engineer has always been preferred by Engineers due to job stability. Indian Railways is one of the biggest Government employers in India. With the exam being just a few a months away, it is time for the candidates planning to appear for the exam to pull up their socks and start their RRB-JE preparation.

The RRB-JE exam is conducted in two stages as shown in table given below.

RRB Exam	Subjects	Total Ques.	Total Marks	Duration
CBT – 1	Quantitative Aptitude	30	100	90 Min.
	General Intelligence & Reasoning	25		
	General Awareness	15		
	General Science	30		
CBT – 2	General Awareness	15	150	120 Min.
	Physics and Chemistry	15		
	Basics of Computer and Applications	10		
	Basics of Environment and Pollution control	10		
	Technical Abilities	100		

We hope this book will be proved an important tool to succeed in RRB-JE and Sr. Section Engineer Exams.

It is earnestly hoped that with the extensive additions and revisions, the present edition will facilitate the students not only in preparing themselves for competitive examinations but also in preparing for their regular examinations and prove more useful to the students than the earlier editions.

Even though, enough readings were given for correcting the error and printing mistakes, due to human tendency there could be some minor typos in the book. If any such typos found, they will be highly appreciated and in incorporated in the next edition. Also, please provide your valuable suggestions at :engineers.academy.india@gmail.com

All the Best!



Engineers Academy Editorial Board

SYLLABUS

1. Basic concepts

Concepts of resistance, inductance, capacitance, and various factors affecting them. Concepts of current, voltage, power, energy and their units.

2. Circuit law

Kirchhoff's law, Simple Circuit solution using network theorems.

3. Magnetic Circuit:

Concepts of flux, mmf, reluctance, Different kinds of magnetic materials, Magnetic calculations for conductors of different configuration e.g. straight, circular, solenoidal, etc. Electromagnetic induction, self and mutual induction.

4. AC Fundamentals:

Instantaneous, peak, R.M.S. and average values of alternating waves, Representation of sinusoidal wave form, simple series and parallel AC Circuits consisting of R.L. and C, Resonance, Tank Circuit. Poly Phase system – star and delta connection, 3 phase power, DC and sinusoidal response of R-L and R-C circuit.

5. Measurement and measuring instruments:

Measurement of power (1 phase and 3 phase, both active and re-active) and energy, 2 wattmeter method of 3 phase power measurement. Measurement of frequency and phase angle. Ammeter and voltmeter (both moving coil and moving iron type), extension of range wattmeter, Multimeters, Megger, Energy meter AC Bridges. Use of CRO, Signal Generator, CT, PT and their uses. Earth Fault detection.

6. Electrical Machines:

- (a) D.C. Machine Construction, Basic Principles of D.C. motors and generators, their characteristics, speed control and starting of D.C. Motors. Method of braking motor, Losses and efficiency of D.C. Machines.
- (b) 1 phase and 3 phase transformers – Construction, Principles of operation, equivalent circuit, voltage regulation, O.C. and S.C. Tests, Losses and efficiency. Effect of voltage, frequency and wave form on losses. Parallel operation of 1 phase / 3 phase transformers. Auto transformers.
- (c) 3 phase induction motors, rotating magnetic field, principle of operation, equivalent circuit, torque-speed characteristics, starting and speed control of 3 phase induction motors. Methods of braking, effect of voltage and frequency variation on torque speed characteristics, Fractional Kilowatt Motors and Single Phase Induction Motors: Characteristics and applications.

7. Synchronous Machines

Generation of 3-phase e.m.f. armature reaction, voltage regulation, parallel operation of two alternators, synchronizing, control of active and reactive power. Starting and applications of synchronous motors.

8. Generation, Transmission and Distribution

Different types of power stations, Load factor, diversity factor, demand factor, cost of generation, inter-connection of power stations. Power factor improvement, various types of tariffs, types of faults, short circuit current for symmetrical faults.

Switchgears and Protection: Rating of circuit breakers, Principles of arc extinction by oil and air, H.R.C. Fuses, Protection against earth leakage / over current, etc. Buchholz relay, Merz-Price system of protection of generators & transformers, protection of feeders and bus bars. Lightning arresters, various transmission and distribution system, comparison of conductor materials, efficiency of different system. Cable – Different type of cables, cable rating and derating factor.

9. Estimation and costing

Estimation of lighting scheme, electric installation of machines and relevant IE rules. Earthing practices and IE Rules.

10. Utilization of Electrical Energy

Illumination, Electric heating, Electric welding, Electroplating, Electric drives and motors.

11. Basic Electronics

Working of various electronic devices e.g. P N Junction diodes, Transistors (NPN and PNP type), BJT and JFET. Simple circuits using these devices.

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1

Chapter

Basic Electronics

RRB Previous Year Questions

RRB : JUNIOR ENGINEER

1. Main element of a filter circuit that reduces the A.C. component in the output is
(a) resistor (b) inductor
(c) transformer (d) capacitor
[RRB JE 2014]
2. Which is NOT correct for oscillators.
(a) Signals may be sine wave
(b) Signals may be square wave
(c) Signals may be Half Sine wave
(d) Signals broadcast by radio transmitters are example of oscillator signals
[RRB JE 2014]
3. Theoretically, a bridge rectifier has a maximum efficiency of
(a) 84% (b) 48.2%
(c) 82.2% (d) 81.2%
[RRB JE 2014]
4. A frequency tuning electronic circuit would consist of
(a) an inductor and a capacitor
(b) an inductor and a resistor
(c) two inductors
(d) two capacitors
[RRB JE 2014]
5. For stabilizing the gain of an amplifier
(a) Positive feedback is used
(b) no feedback is used
(c) negative feedback is used
(d) input voltage is varied
[RRB JE 2014]
1. फिल्टर परिपथ का मुख्य तत्व जो आउटपुट के A.C. घटक को कम करता है, वह है
(a) प्रतिरोध (b) प्रेरकत्व
(c) ट्रांसफॉर्मर (d) संधारित्र
[RRB JE 2014]
2. जो दोलित्र के लिए सही नहीं है ?
(a) संकेत ज्या तरंग हो सकते हैं
(b) संकेत वर्गाकार तरंग हो सकते हैं
(c) संकेत अर्द्ध ज्या तरंग हो सकते हैं
(d) रेडियो ट्रांसमीटर द्वारा प्रसारित संकेत दोलित्र संकेत उदाहरण है
[RRB JE 2014]
3. सैद्धांतिक रूप से, एक सेतु दिष्टकारी की दक्षता
(a) 84% (b) 48.2%
(c) 82.2% (d) 81.2%
[RRB JE 2014]
4. एक आवृत्ति ट्यूनिंग इलेक्ट्रॉनिक परिपथ से मिलकर बनता है –
(a) एक प्रेरकत्व और एक संधारित्र
(b) एक प्रेरकत्व और एक प्रतिरोध
(c) दो प्रेरकत्व
(d) दो संधारित्र
[RRB JE 2014]
5. एक प्रवर्धक की लब्धि को स्थायी करने के लिए
(a) धनात्मक फिडबैक का उपयोग किया जाता है
(b) कोई फिडबैक उपयोग नहीं किया जाता
(c) ऋणात्मक फिडबैक का उपयोग किया जाता है
(d) इनपुट वोल्टेज को परिवर्तित किया जाता है
[RRB JE 2014]

6. Which of the following Amplifiers produces the least distortion ?

- (a) Class A (b) Class B
(c) Class AB (d) Class C

[RRB JE 2014]

7. By which of the following, the intrinsic semiconductor Silicon should be doped in order to obtain p-type semi-conductor?

- (a) Boron (b) Phosphorous
(c) Gallium (d) None of these

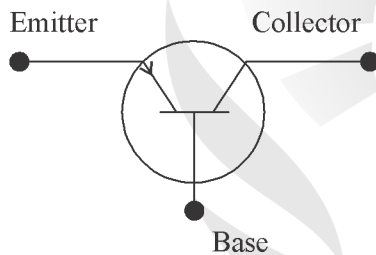
[RRB JE 2014]

8. Flow of electrons in circuit constitutes

- (a) Magnetic charge
(b) an e.m.f
(c) an electric current
(d) an electric charge

[RRB JE 2014]

9. Figure shown below represents a



- (a) a power diode (b) Zener Diode
(c) NPN Transistor (d) PNP Transistor

[RRB JE 2014]

10. An element whose atoms have three valence electrons, the example of such element is

- (a) Silicon (b) Copper
(c) Germanium (d) Aluminium

[RRB JE 2014]

11. A tunnel diode is

- (a) High-resistivity P-N junction diode
(b) A slow switching device
(c) An amplifying device
(d) A very heavily doped P-N junction diode

[RRB JE 2014]

6. निम्नलिखित में से कौन सा प्रवर्धक सबसे कम विकृति पैदा करता है

- (a) श्रेणी A (b) श्रेणी B
(c) श्रेणी AB (d) श्रेणी C

[RRB JE 2014]

7. शुद्ध अर्ध-चालक सिलिकॉन को P-प्रकार अर्ध-चालक प्राप्त करने के लिए मादित किया जाता है ?

- (a) बोरॉन (b) फॉस्फोरस
(c) गैलियम (d) उपरोक्त में से कोई नहीं

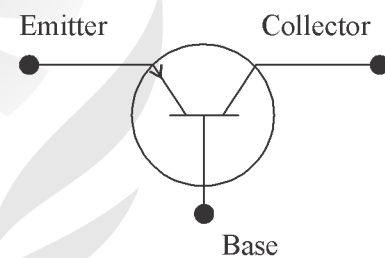
[RRB JE 2014]

8. परिपथ में इलेक्ट्रॉनों के प्रवाह से निर्मित होता है

- (a) चुंबकिय आवेश
(b) ई एम. एफ
(c) विद्युत धारा
(d) विद्युत आवेश

[RRB JE 2014]

9. नीचे दिखाया गया चित्र है -



- (a) एक शक्ति डायोड (b) जेनर डायोड
(c) NPN ट्रांजिस्टर (d) PNP ट्रांजिस्टर

[RRB JE 2014]

10. एक तत्व जिसमें तीन संयोजी इलेक्ट्रॉन होते हैं, ऐसे तत्व का उदाहरण है

- (a) सिलिकॉन (b) तांबा
(c) जर्मेनियम (d) एल्यूमिनियम

[RRB JE 2014]

11. एक सुरंग डायोड है

- (a) उच्च प्रतिरोधकता P-N जंक्शन डायोड
(b) एक धीमा स्विचिंग उपकरण
(c) एक प्रवर्धक उपकरण
(d) एक बहुत भारी मादित P-N जंक्शन डायोड।

[RRB JE 2014]

12. Depletion layer is found in
 (a) P type semiconductors
 (b) N type semiconductors
 (c) diodes
 (d) intrinsic semiconductors

[RRB JE 26.08.2015]

13. The energy gap in a semiconductor is
 (a) zero (b) infinite
 (c) very high (d) the order of 1 eV

[RRB JE 26.08.2015]

14. BJT stands for
 (a) Binomial Junction Terminal
 (b) Bipolar-Junction Transistor
 (c) Binomial Junction Transistor
 (d) Bipolar Junction Terminal

[RRB JE 26.08.2015]

15. Avalanche breaks is primarily dependent on the phenomenon of
 (a) Doping (b) Collision
 (c) Ionization (d) Recombination

[RRB JE 26.08.2015]

16. A UJT contains
 (a) 4 pn junctions
 (b) 3 pn junctions
 (c) 2 pn junction
 (d) 1 pn junction

[RRB JE 26.08.2015]

17. The flow of current in solids is due to
 (a) electrons (b) electrons and ions
 (c) atoms (d) atoms and nucleus

[RRB JE 26.08.2015]

18. Most commonly used control element in voltage regulators is
 (a) BJT (b) UJT
 (c) FET (d) SBS

[RRB JE 26.08.2015]

12. अवक्षय परत किसमें पायी जाती है,
 (a) P टाइप अर्द्धचालक
 (b) N टाइप अर्द्धचालक
 (c) डायोड
 (d) शुद्ध अर्द्धचालक

[RRB JE 26.08.2015]

13. अर्द्धचालक में ऊर्जा अंतराल _____ है,
 (a) शून्य (b) अनन्त
 (c) बहुत अधिक (d) 1 eV की कोटि का है

[RRB JE 26.08.2015]

14. BJT का विस्तृत रूप है –
 (a) द्विपद –जंक्शन टर्मिनल
 (b) द्विध्रुवी – जंक्शन ट्रांजिस्टर
 (c) द्विपद – जंक्शन ट्रांजिस्टर
 (d) द्विध्रुवी – जंक्शन टर्मिनल

[RRB JE 26.08.2015]

15. ऐवेलान्शी ब्रेकडाउन निम्न में से कौन से घटक पर मुख्य रूप से निर्भर होता है
 (a) मादन (b) टकराव
 (c) आयनीकरण (d) पुनर्संयोजन

[RRB JE 26.08.2015]

16. एक UJT में
 (a) 4 pn जंक्शन होते हैं।
 (b) 3 pn जंक्शन होते हैं।
 (c) 2 pn जंक्शन होते हैं।
 (d) 1 जंक्शन होते हैं।

[RRB JE 26.08.2015]

17. ठोस में धारा का प्रवाह _____ के कारण होता है।
 (a) इलेक्ट्रॉनों (b) इलेक्ट्रॉनों और आयनों
 (c) परमाणुओं (d) परमाणुओं और नाभिकों

[RRB JE 26.08.2015]

18. वोल्टेज नियामकों में सामान्य तौर नियंत्रण तत्व के रूप में किसका उपयोग किया जाता है
 (a) BJT (b) UJT
 (c) FET (d) SBS

[RRB JE 26.08.2015]

19. How many electrons are there in the valence shell of a pure semiconductor ?
- (a) 1 (b) 3
(c) 4 (d) 6
- [RRB JE 26.08.2015]
20. Which of the following is not a nonlinear element ?
- (a) GaAs diode (b) Heater coil
(c) Tunnel diode (d) Electric arc
- [RRB JE 26.08.2015]
21. Which of the following is known as metal rectifier?
- (a) Selenium disc rectifier
(b) Copper oxide rectifier
(c) Gas tube diode
(d) Varactor diode
- [RRB JE 26.08.2015]
22. For full-wave rectified sine wave, form factor is
- (a) 1.41 (b) 1.11
(c) 1.5 (d) 1.25
- [RRB JE 26.08.2015]
23. Electron pair bonding occurs when atoms
- (a) lack electrons
(b) lack holes
(c) share holes
(d) share electrons
- [RRB JE 26.08.2015]
24. In a P-type semiconductor, minority carriers are
- (a) holes (b) electrons
(c) dopants (d) atoms
- [RRB JE 26.08.2015]
25. Which of the following is a pentavalent material?
- (a) carbon (b) boron
(c) phosphorus (d) silicon
- [RRB JE 26.08.2015]
19. एक शुद्ध अर्द्धचालक के संयोजी आवरण में कितने इलेक्ट्रॉन होते हैं
- (a) 1 (b) 3
(c) 4 (d) 6
- [RRB JE 26.08.2015]
20. निम्नलिखित में से कौन सा अरेखिक तत्व नहीं है?
- (a) GaAs डायोड (b) हीटर कुण्डली
(c) टनल डायोड (d) विद्युत आर्क
- [RRB JE 26.08.2015]
21. निम्नलिखित में से किसे धातु दिष्टकारी के रूप में जाना जाता है ?
- (a) सेलेनियम डिस्क दिष्टकारी
(b) कॉपर आक्साइड दिष्टकारी
(c) गैस ट्यूब
(d) वैरेक्टर डायोड
- [RRB JE 26.08.2015]
22. पूर्ण तरंग दिष्टकारी ज्या तरंग के लिए रूप कारक है
- (a) 1.41 (b) 1.11
(c) 1.5 (d) 1.25
- [RRB JE 26.08.2015]
23. इलेक्ट्रॉन जोड़ी आबंधन तब होता है जब परमाणुओं में –
- (a) इलेक्ट्रॉन की कमी होती है
(b) होल्स की कमी होती है
(c) होल्स को साझा करते हैं
(d) इलेक्ट्रॉनों को साझा करते हैं
- [RRB JE 26.08.2015]
24. P-प्रकार अर्द्धचालक में, अल्पसंख्यक वाहक होते हैं
- (a) होल्स (b) इलेक्ट्रॉन
(c) डोपेंट (d) परमाणु
- [RRB JE 26.08.2015]
25. निम्नलिखित में से कौन-सा एक पंचसंयोजी पदार्थ है?
- (a) कार्बन (b) बोरॉन
(c) फास्फोरस (d) सिलिकॉन
- [RRB JE 26.08.2015]

26. Another name for a unity gain amplifier is
- difference amplifier
 - comparator
 - single ended
 - voltage follower
- [RRB JE 26.08.2015]
27. At room temperature, the current in intrinsic semiconductor is due to
- holes
 - electrons
 - ions
 - holes and electrons both
- [RRB JE 26.08.2015]
28. In a mercury arc rectifier, characteristic blue luminosity is due to
- high temperature
 - electron streams
 - ionization
 - color of mercury
- [RRB JE 27.08.2015]
29. Which of the following rectifiers can withstand maximum voltage on DC side
- Mercury bulb rectifier
 - Glass bulb rectifier
 - Steel tank rectifier
 - Varactor diode
- [RRB JE 27.08.2015]
30. A JFET is
- a current controlled device
 - a low input resistance
 - a voltage controlled device
 - is always forward based
- [RRB JE 27.08.2015]
31. Which type of gain is achieved using CB configuration
- current voltage
 - voltage
 - resistance
 - power
- [RRB JE 27.08.2015]
26. एकक लाभ प्रवर्धक का अन्य नाम है ?
- भिन्न प्रवर्धक
 - तुलनित्र
 - सिंगल एंडेड
 - वोल्टेज अनुगामी
- [RRB JE 26.08.2015]
27. कमरे के तापमान पर, शुद्ध अर्द्धचालक में धारा के कारण होती है
- होल्स
 - इलेक्ट्रॉनों
 - आयनों
 - होल्स और इलेक्ट्रॉनों दोनों
- [RRB JE 26.08.2015]
28. मर्करी आर्क दिष्टकारी में नीले रंग की चमक की अभिलाक्षणिक होती है
- उच्च तापमान के कारण होती है।
 - इलेक्ट्रॉन धाराओं के कारण होती है।
 - आयनीकृत के कारण होती है।
 - मर्करी के रंग के कारण होती है।
- [RRB JE 27.08.2015]
29. निम्नलिखित में से कौन सा दिष्टकारी डीसी पक्ष पर अधिकतम वोल्टेज का सामना कर सकता है –
- मर्करी बल्ब दिष्टकारी
 - काँच बल्ब दिष्टकारी
 - स्टील टैंक दिष्टकारी
 - वेरैक्टर डायोड
- [RRB JE 27.08.2015]
30. एक JFET है –
- एक धारा नियंत्रित उपकरण
 - एक निम्न इनपुट प्रतिरोधी है
 - एक वोल्टेज नियंत्रित उपकरण
 - हमेशा अग्र अभिनति में होता है।
- [RRB JE 27.08.2015]
31. CB विन्यास का उपयोग करके किस प्रकार का लाभ प्राप्त किया जाता है,
- धारा वोल्टेज
 - वोल्टेज
 - प्रतिरोध
 - शक्ति
- [RRB JE 27.08.2015]

85. The movement of electron which is caused by application of electric field is
- (a) Drift current
(b) Diffusion current
(c) Conventional current
(d) Non-conventional current
- [RRB JE 30.08.2015]
86. In semiconductors, a donor may be
- (a) a bivalent impurity
(b) a tetravalent impurity
(c) a pentavalent impurity
(d) a noble gas
- [RRB JE 16.09.2015]
87. PIN diode in reverse bias condition offers
- (a) zero resistance (b) unit resistance
(c) finite resistance (d) infinite resistance
- [RRB JE 16.09.2015]
88. Which of the following is ultra high switching speed diode
- (a) Zener diode
(b) Photo diode
(c) Fast Recovery diode
(d) Tunnel diode
- [RRB JE 16.09.2015]
89. For normal operation of a transistor, the collector-base junction is
- (a) always reverse biased
(b) always forward biased
(c) is grounded
(d) unbiased
- [RRB JE 16.09.2015]
90. Pulsating output of a rectifier is converted into a steady state DC level by
- (a) Amplifier (b) Modulator
(c) Filter Circuit (d) Transistor
- [RRB JE 16.09.2015]
85. इलेक्ट्रॉन की गति जो विद्युत क्षेत्र के अनुप्रयोग के कारण होती है –
- (a) बहाव धारा
(b) विसरण धारा
(c) संवहन धारा
(d) असंवहन धारा
- [RRB JE 30.08.2015]
86. अर्द्धचालक में, एक दाता हो सकता है –
- (a) एक द्विसंयोजी अशुद्धि
(b) एक त्रि संयोजी अशुद्धि
(c) एक पंच संयोजी अशुद्धि
(d) एक उत्कृष्ट गैस
- [RRB JE 16.09.2015]
87. पश्च अभिनती में PIN डायोड कौनसी स्थिति प्रदान करता है
- (a) शून्य प्रतिरोध (b) इकाई प्रतिरोध
(c) सीमित प्रतिरोध (d) अनंत प्रतिरोध
- [RRB JE 16.09.2015]
88. निम्न में से कौन अल्ट्रा हाई स्विचिंग गति वाला डायोड है।
- (a) जेनर डायोड
(b) फोटो डायोड
(c) फास्ट रिकवरी डायोड
(d) टनल डायोड
- [RRB JE 16.09.2015]
89. एक ट्रांजिस्टर का सामान्य संचालन के लिए संग्राहक आधार संघी होती है –
- (a) हमेशा पश्च अभिनती
(b) हमेशा अग्र अभिनती
(c) भू संकल्पित
(d) अन अभिनती
- [RRB JE 16.09.2015]
90. एक रेक्टिफायर के स्पंदन शील आउटपुट को द्वारा एक स्थिर अवस्था वाले डी.सी. स्तर में परिवर्तित किया जाता है
- (a) प्रवर्धक (b) न्यूनाधिक
(c) फिल्टर परिपथ (d) ट्रांजिस्टर
- [RRB JE 16.09.2015]

91. Which of the following is not a type of filter
 (a) low pass (b) high pass
 (c) bandpass (d) frequency pass
 [RRB JE 16.09.2015]
92. The point at which load line intersects I_b (sat) (saturation value of base current) is called-
 (a) Cut off point (b) Quiescent point
 (c) Breakdown point (d) Saturation point
 [RRB CBT-2 30.08.2019]
93. Which of the following diodes is a signal diode?
 (a) OA79 (b) BY127
 (c) 1N4007 (d) DR25
 [RRB CBT-2 : 01-09-2019]
94. Silicon solar cell has an open circuit voltage NOT equivalent to-
 (a) 1 V (b) 1.3 V
 (c) 0.45 V (d) All of the options
 [RRB CBT-2 : 01-09-2019]
95. _____ oscillator has the best frequency stability and accuracy.
 (a) Tickler feedback
 (b) Hartley
 (c) Crystal controlled
 (d) Colpitts
 [RRB CBT-2 : 01-09-2019]
91. निम्नलिखित में से कौनसा फिल्टर का प्रकार नहीं है?
 (a) निम्न पास (b) उच्च पास
 (c) बैंड पास (d) आवृत्ति पास
 [RRB JE 16.09.2015]
92. वह बिंदु जिस पर भार लाइन I_b (सैट) (आधार धारा का संतृप्ति मान) को काटती है, उसे कहा जाता है।
 (a) कट ऑफ बिंदु (b) अचल बिंदु
 (c) भंजन बिंदु (d) संतृप्ति बिंदु
 [RRB CBT-2 30.08.2019]
93. निम्नलिखित में से कौन-सा डायोड संकेत डायोड है?
 (a) OA79 (b) BY127
 (c) 1N4007 (d) DR25
 [RRB CBT-2 : 01-09-2019]
94. सिलिकॉन सौर सेल में एक खुला परिपथ वोल्टेज के समतुल्य होता है -
 (a) 1 V (b) 1.3 V
 (c) 0.45 V (d) ये सभी
 [RRB CBT-2 : 01-09-2019]
95. _____ दोलित्र की सबसे अच्छी आवृत्ति स्थिरता और सटीकता है -
 (a) टिकलर फिडबैक
 (b) हार्टले
 (c) क्रिस्टल नियंत्रक
 (d) कोलपिट्स
 [RRB CBT-2 : 01-09-2019]



RRB : SENIOR SECTION ENGINEER

1. In a transistor radio, a frequency tuner circuit that was conventionally used, would consist of-
- An inductor and a variable capacitor in parallel
 - A bridge rectifier diode feeding the base of a transistor through variable resistance
 - A multiple coil variate
 - A potentiometer with variable resistance

[RRB SSE 2014]

2. "Common Base" configuration refers to the configuration of a –

- Rectifier
- Transistor
- Diode
- Inverter

[RRB SSE 2014]

3. Based on the choice of the 'Q' point on the current voltage characteristics of the transistor, the amplifiers are classified as :

- Class I, II, III and IV
- Class A, B, C and AB
- Class A, B, C and D
- Class IA, IB, IIA and IIB

[RRB SSE 2014]

4. Match the following :

1	Rectifier	a.	Power electronics, Motor speed control. battery charging. Phase control
2	Transistor	b.	Rectifiers, Wave Clipper circuits
3	SCR	c.	Amplifiers, Switches

- 1-a, 2-c, 3-b
- 1-b, 2-a, 3-c
- 1-b, 2-c, 3-a
- 1-c, 2-a, 3-b

[RRB SSE 2014]

5. To obtain the P-type semiconductor :

- A pentavalent Impurity is added
- A trivalent Impurity is added
- Both are added
- None of these

[RRB SSE 2014]

1. एक ट्रांजिस्टर रेडियो में, एक आवृत्ति ट्यूनर परिपथ जिसका पारंपरिक रूप से उपयोग किया जाता था
- AN एक प्ररेकत्व और समानांतर में एक चर संधारित्र
 - एक सेतु दिष्टकारी डायोड होता है जो एक ट्रांजिस्टर के आधार को चर प्रतिरोध के माध्यम से फिड करता है।
 - एक बहु विविधता कुंडली
 - एक पोटेंशियोमीटर चर प्रतिरोध के साथ

[RRB SSE 2014]

2. "उभयनिष्ठ आधार विन्यास" के विन्यास को संदर्भित करता है।

- दिष्टकारी
- ट्रांजिस्टर
- डायोड
- इन्वर्टर

[RRB SSE 2014]

3. ट्रांजिस्टर की धारा वोल्टेज अभिलाक्षणिकों पर 'Q' बिन्दु के चयन के आधार पर, प्रवर्धकों का वर्गीकृत किया गया है :

- श्रेणी I, II, III और IV
- श्रेणी A, B, C और AB
- श्रेणी A, B, C और D
- श्रेणी IA, IB, IIA और IIB

[RRB SSE 2014]

4. निम्नलिखित को मिलाएं

1	Rectifier	a.	Power electronics, Motor speed control. battery charging. Phase control
2	Transistor	b.	Rectifiers, Wave Clipper circuits
3	SCR	c.	Amplifiers, Switches

- 1-a, 2-c, 3-b
- 1-b, 2-a, 3-c
- 1-b, 2-c, 3-a
- 1-c, 2-a, 3-b

[RRB SSE 2014]

5. P-प्रकार अर्द्धचालक प्राप्त करने के लिए

- पंचसंयोजी अशुद्धि जोड़ते
- त्रिसंयोजी अशुद्धि जोड़ते हैं।
- दोनों को जोड़ते हैं।
- इनमें से कोई नहीं।

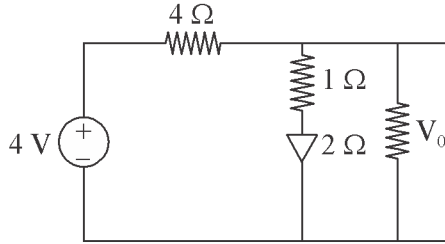
[RRB SSE 2014]

6. Which Junction Transistor is preferred for high input and low output impedances ?
- Common Collector
 - Common Base
 - Common Emitter
 - Any one of these
- [RRB SSE 2014]**
7. For a PN Junction, when the N-side is more positive than the P-side; the diode is said to be
- Forward biased and a large current exists
 - Forward Biased and a small current exists
 - Reverse Biased and a large current exists
 - Reverse Biased and a small current exists
- [RRB SSE 2014]**
8. The MOSFET switch in its on-state may be considered equivalent to :
- Resistor
 - Capacitor
 - Inductor
 - Battery
- [RRB SSE 2014]**
9. Zener Diode is a :
- Reverse biased diode
 - Forward biased diode
 - Variable voltage source
 - Constant current source
- [RRB SSE 2014]**
10. A material is said to have become superconductor when
- its resistance becomes negative
 - its resistance becomes very small
 - its resistance decreases
 - its resistance becomes zero
- [RRB SSE 2014]**
11. FET is a device which has
- high input impedance and is current controlled
 - low input impedance and is voltage controlled
 - high input impedance and is voltage controlled
 - low input impedance and is current controlled
- [RRB SSE 2014]**
6. उच्च इनपुट और निम्न आउटपुट प्रतिबाधा के लिए कौनसे जंक्शन ट्रांजिस्टर को वरियता दी जाती है?
- उभयनिष्ठ संग्राहक
 - उभनिष्ठ आधार
 - उभनिष्ठ उत्सर्जक
 - इनमें से कोई एक
- [RRB SSE 2014]**
7. एक PN जंक्शन के लिए, जब N-सिरा P-सिरा की तुलना में अधिक धनात्मक होता है, तब डायोड को कहा जाता है –
- अग्र अभिनति और एक उच्च धारा वाला
 - अग्र अभिनति और एक निम्न धारा वाला
 - पश्च अभिनति और एक उच्च धारा वाला
 - पश्च अभिनति और एक निम्न धारा वाला
- [RRB SSE 2014]**
8. MOSFET स्विच को उसके चालू-अवस्था के समतुल्य माना जा सकता है।
- प्रतिरोध
 - संधारित्र
 - प्रेरकत्व
 - बैटरी
- [RRB SSE 2014]**
9. एक जेनर डायोड होता है –
- पश्च अभिनति डायोड
 - अग्र अभिनति डायोड
 - चर विभव स्रोत
 - अचर धारा स्रोत
- [RRB SSE 2014]**
10. एक पदार्थ को अतिचालक कहा जाता है जब
- इसका प्रतिरोध ऋणात्मक होता है
 - इसका प्रतिरोध बहुत कम हो जाता है।
 - इसका प्रतिरोध कम होता जाता है
 - इसका प्रतिरोध शून्य हो जाता है
- [RRB SSE 2014]**
11. FET एक उपकरण है जिसमें
- उच्च इनपुट प्रतिबाधा और धारा नियंत्रित है।
 - निम्न इनपुट प्रतिबाधा और वोल्टेज नियंत्रित है।
 - उच्च इनपुट प्रतिबाधा और वोल्टेज नियंत्रित है।
 - निम्न इनपुट प्रतिबाधा और धारा नियंत्रित है।
- [RRB SSE 2014]**

34. Which of the following is a source of EMF ?
 (a) Germanium diode (b) lead acid battery
 (c) P channel FET (d) carbon resistor

[RRB SSE 02.09.2015]

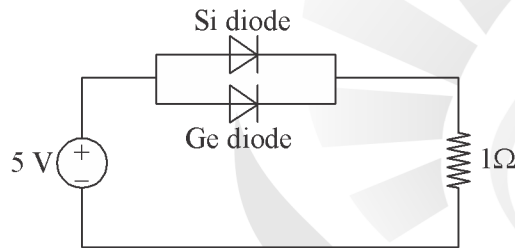
35. Assuming that diode in the given circuit is ideal, The voltage V_0 is



- (a) 2V (b) 3V
 (c) 3.5V (d) 1V

[RRB SSE 02.09.2015]

36. What is the voltage across the 1Ω register ?



- (a) 4.7V (b) 4.3V
 (c) 4V (d) 5V

[RRB SSE 02.09.2015]

37. Which of the following devices has the highest, photo sensitivity ?

- (a) Photoconductive cell
 (b) Photovoltaic cell
 (c) Photodiode
 (d) Phototransistor

[RRB SSE 03.09.2015]

38. The electrodes of a semi-conductor diode are known as :

- (a) gate and source
 (b) anode and cathode
 (c) collector and base
 (d) cathode and drain

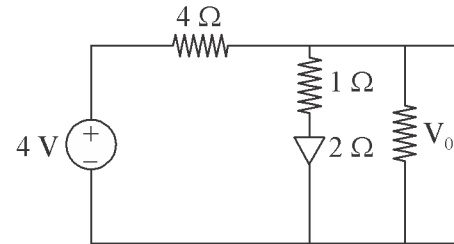
[RRB SSE 03.09.2015]

34. निम्नलिखित में से कौन ईएमएफ EMF का स्रोत है ?

- (a) जर्मेनियम डायोड (b) सीसा संचायक सेल
 (c) P चैनल FET (d) कार्बन प्रतिरोध

[RRB SSE 02.09.2015]

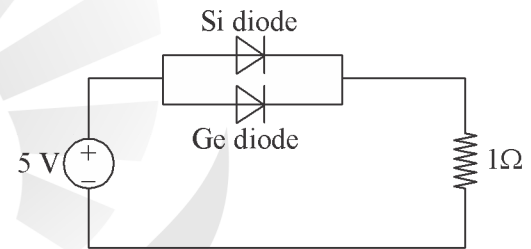
35. दिए गए परिपथ में डायोड, आदर्श वोल्टेज V_0 है



- (a) 2V (b) 3V
 (c) 3.5V (d) 1V

[RRB SSE 02.09.2015]

36. 1Ω प्रतिरोध के पार वोल्टता कितनी होगी ?



- (a) 4.7V (b) 4.3V
 (c) 4V (d) 5V

[RRB SSE 02.09.2015]

37. निम्नलिखित में से किस उपकरण में उच्चतम प्रकाशीय संवेदनशीलता होती है ?

- (a) प्रकाश चालकीय सेल
 (b) प्रकाश वोल्टीय सेल
 (c) प्रकाशीय डायोड
 (d) प्रकाशीय ट्रान्जिस्टर

[RRB SSE 03.09.2015]

38. एक अर्द्धचालक डायोड के इलेक्ट्रोड के रूप में जाना जाता है -

- (a) गेट और स्रोत
 (b) एनोड और कैथोड
 (c) संग्राहक और आधार
 (d) कैथोड और ड्रेन

[RRB SSE 03.09.2015]

39. What semi-conductor device glows red, yellow, or green, depending upon its chemical composition ?

- (a) A light-emitting diode
- (b) A fluorescent bulb
- (c) a neon bulb
- (d) a vacuum diode

[RRB SSE 03.09.2015]

40. A transistor can be destroyed in a circuit by :

- (a) excessive heat
- (b) excessive light
- (c) saturation
- (d) cut-off

[RRB SSE 03.09.2015]

41. On the basics of charge carrier types of field effect transistors (FET) are :

- (a) NPN and PNP
- (b) germanium and silicon
- (c) inductive and capacitive
- (d) N and P channel FET

[RRB SSE 03.09.2015]

42. The diode is an important part of a simple power supply. it converts AC to DC, since it ;

- (a) has a high resistance to AC but not to DC
- (b) allows electrons to flow in only one direction from cathode to anode
- (c) has high resistance to DC but not to AC
- (d) allows electrons to flow in only one direction from anode to cathode

[RRB SSE 03.09.2015]

43. Zener diodes are used as :

- (a) current regulators
- (b) voltage regulators
- (c) RF detectors
- (d) AF detectors

[RRB SSE 03.09.2015]

39. कौन सा अर्धचालक उपकरण अपनी रासायनिक संरचना के आधार पर लाल, पीला या हरा चमकता है,

- (a) एक प्रकाश उत्सर्जक डायोड
- (b) एक प्रतिदिप्ती बल्ब
- (c) एक नियोन बल्ब
- (d) एक निर्वात डायोड

[RRB SSE 03.09.2015]

40. परिपथ में एक ट्रांजिस्टर को नष्ट किया जा सकता है -

- (a) अत्यधिक गर्मी के कारण
- (b) अत्यधिक प्रकाश के कारण
- (c) संतृप्ति के कारण
- (d) कट-ऑफ

[RRB SSE 03.09.2015]

41. आवेश वाहकों के आधार पर क्षेत्र प्रभाव ट्रांजिस्टर (FET) के प्रकार होते हैं

- (a) NPN और PNP
- (b) जर्मेनियम और सिलिकॉन
- (c) प्रेरकीय और धारितीय
- (d) N और P चैनल FET

[RRB SSE 03.09.2015]

42. डायोड एक साधारण शक्ति आपूर्ति का एक महत्वपूर्ण हिस्सा है। यह ए.सी. को डी.सी. में परिवर्तित करता है, क्योंकि यह,

- (a) एसी के लिए एक उच्च प्रतिरोध है लेकिन डी.सी. के लिए नहीं
- (b) इलेक्ट्रॉनों को केवल एक दिशा में कैथोड से एनोड प्रवाहित होने की अनुमति देता है
- (c) डी.सी. के लिए उच्च प्रतिरोध है लेकिन ए.सी. के लिए नहीं
- (d) इलेक्ट्रॉनों को केवल एक दिशा में एनोड से कैथोड प्रवाहित होने की अनुमति देता है

[RRB SSE 03.09.2015]

43. जेनर डायोड का उपयोग किया जाता है -

- (a) धारा नियामकों के रूप में
- (b) वोल्टेज नियामकों के रूप में
- (c) RF संसूचक
- (d) AF संसूचक

[RRB SSE 03.09.2015]

44. Which component can amplify a small signal but must use high voltages ?

- (a) a vacuum tube
- (b) A transistor
- (c) An electrolytic capacitor
- (d) a multiple-cell battery

[RRB SSE 03.09.2015]

44. कौन सा घटक एक छोटे संकेत को बढ़ा सकता है लेकिन उच्च वोल्टता का उपयोग करना चाहिए ?

- (a) एक निर्वात नलिका
- (b) एक ट्रांजिस्टर
- (c) एक वैद्युत अपघट्य संधारित्र
- (d) एक बहुसेल बैटरी

[RRB SSE 03.09.2015]

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1. *Ans. (b)*

A filter circuit is a device to remove the AC components but allows the DC components to pass. A capacitor allows AC only and inductor allows DC only to pass.

2. *Ans. (c)*

Oscillators classified by the type of signal they produce. Since wave oscillator produces a sine wave output

Relaxation oscillator / Stable Multivibrator produce square & rectangular wave.

Sweep oscillator: produces sawtooth wave

3. *Ans. (d)*

Theoretically, a full-bridge rectifier has a maximum Efficiency of 81.2%

4. *Ans. (a)*

Any frequency tuning circuit always have atleast an inductor and a capacitor

$$f = \frac{1}{2\pi\sqrt{LC}}$$

5. *Ans. (c)*

Negative feedback can improve gain stability, linearity and reduce sensitivity to parameter variations.

6. *Ans. (a)*

Least distortion in the output of a power amplifier occurs in class A amplifier.

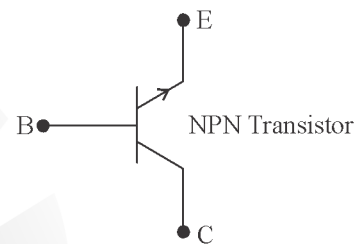
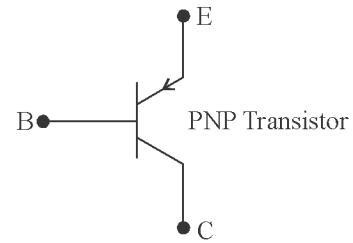
7. *Ans. (a)*

Both options (a) and (c) are true. In order to obtain p-type semiconductor, trivalent impurities (Boron, Aluminium or Gallium) are added in intrinsic silicon.

8. *Ans. (c)*

Flow of electrons (or charge) in circuit constitutes an electric current.

9. *Ans. (d)*



10. *Ans. (d)*

Aluminium (Al^{13}) has 3 valence electrons in last shell.

11. *Ans. (d)*

A tunnel diode is a heavily doped p-n junction diode which has very fast switching characteristics.

12. *Ans. (c)*

Depletion layer is found in diodes at junction of p-type and N type semiconductors.

13. *Ans. (d)*

The energy gap in semiconductor is order of 1 eV.

14. *Ans. (b)*

BJT : B - Bipolar (P and N-type)

J - Junction

T - Transmittor.

15. *Ans. (c)*

Due to impact ionization.

16. *Ans. (d)*

A uni junction transistor (UJT) is a terminal semiconductor device with only one junction that acts exclusively as an electrically controlled switch.

74. *Ans. (d)*
A body containing electron less than its normal number is said to be positively charged because when any element loses electron it becomes positively charge and if elements accepts electron it becomes negatively charged.

75. *Ans. (c)*
At 0°K semiconductor behaves as insulator and at room temp semiconductor has enough free electrons to make it to conduct current.

76. *Ans. (b)*
The flow of electrons caused by variation in concentration is known as diffusion current.

77. *Ans. (a)*
With the increase in temp, flow of electron increase which result in increase of reverse current.

78. *Ans. (c)*
Doping of tunnel diode is approximately 1000 times higher than a conventional diode.

79. *Ans. (c)*
Transistors are analogous to vacuum triode.

80. *Ans. (c)*

81. *Ans. (d)*
Filter is an electric network which permits unattended transmission of signals

82. *Ans. (d)*
Variable capacitor diode or varactor diode is commonly used for harmonic generation.

83. *Ans. (b)*
Ripple factor is a ratio of residual AC component to DC component of the output voltage. For a full wave rectifier, ripple factor is 0.482.

84. *Ans. (b)*
Biasing : Process of applying DC voltage across different terminals of a transistor i.e. collector, emitter and base

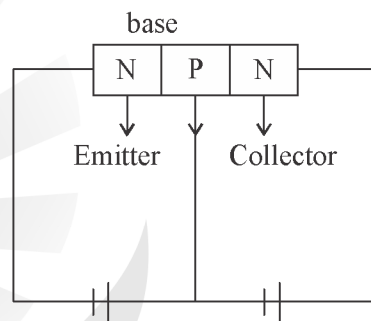
85. *Ans. (a)*
Drift current: Movement of electron caused by applying electric field.

86. *Ans. (c)*
In semiconductor, donor element is pentavalent i.e. it has 5 electrons in its valence orbit.

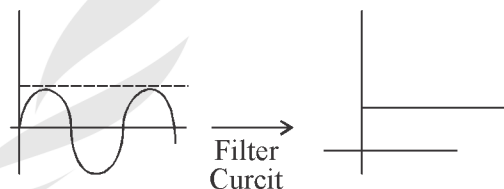
87. *Ans. (d)*
There is no flow of current if PIN diode is connected in reverse biased because in reverse biased large resistance is offered and hence no current flow in the circuit.

88. *Ans. (c)*
Fast recovery diode is ultra high switching speed diode.

89. *Ans. (a)*
For normal operation, collector base junction is always connected in reverse based



90. *Ans. (c)*



Pulsating output of rectifier is converted into steady DC level by filter circuit.

91. *Ans. (d)*
Type of filters are High pas filter, low pass filter and band pass filter.

92. *Ans. (d)*

93. *Ans. (a)*

94. *Ans. (d)*

95. *Ans. (c)*



1. *Ans. (a)*

Tuned circuit consist of inductor and variable capacitor that are connected parallel to each other.

2. *Ans. (b)*

'Common base' "common collector" and "common emitter" are types of Configuration which is done in transistor to achieve desired result.

3. *Ans. (b)*

On the basis of the Q point on the current voltage characteristic, transistors are classified as class A, B, C and AB.

4. *Ans. (c)*

In wave clipper circuit, rectifier is used. In power electronic, motor speed control linearity charging, phase control. SCR (Silicon controlled rectifier) is used. Transistors is used as amplifiers and switches.

5. *Ans. (b)*

In order to convert semiconductor into P- type, a trivalent impurity is to be added

6. *Ans. (a)*

Function transistor

	Input Impedance	Output Impedance
Common Collector	High	Low
Common Base	Low	High
Common Emitter	Moderate	Moderate

7. *Ans. (d)*

In P N function diode, P side is more positive than N side then diode is said to be in forward biased as while in P N function diode if N side is more positive than N side then the connection is reverse biased and in reverse biased small current exists.

8. *Ans. (b)*

MOSFET switch in on state acts like a capacitor

9. *Ans. (a)*

Zener diode is a reverse biased diode

10. *Ans. (d)*

In Super conductor large current flows as resistance of super conductor is zero.

11. *Ans. (c)*

FET is a voltage controlled high input impedance device

12. *Ans. (d)*

Potentiometer is used as voltage divider for measuring electric potential. Potentiometer is used to control electrical devices.

13. *Ans. (a)*

When donor type material is added to semiconductor is becomes N type material and electrons are generated due to this process

14. *Ans. (c)*

Dynamic Conductance (g_m) = $\frac{I}{\eta_{vt}}$

\therefore Dynamic conductance $\propto I$

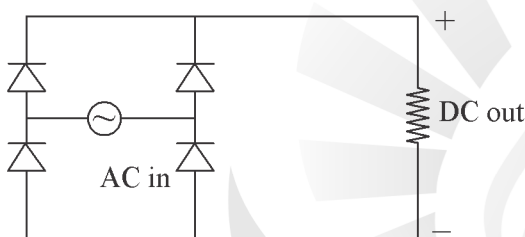
15. *Ans. (c)*

Maximum efficiency of full wave rectifier is given by

$$\eta = \frac{P_{dc}}{P_{ac}} = \frac{\frac{V_{dc}^2}{R_L}}{\frac{V_{rms}^2}{R_L}}$$

$$= \frac{\left(\frac{2V_m}{\pi}\right)^2}{\left(\frac{V_m}{\sqrt{2}}\right)^2} = 81.2\%$$

16. *Ans. (d)*
Donor impurity in silicon is antimony
17. *Ans. (c)*
JFET is voltage controlled current source while BJT is current controlled current source.
18. *Ans. (c)*
Transistor configuration and voltage gain –
In common emitter voltage gain is medium, In common collector voltage gain is low.
While in common base voltage gain is high
19. *Ans. (c)*
In halfwave rectifier only PN junction diode is present. In center tap full wave rectifier, two diodes are present, while in bridge rectifier, four diodes are present.



20. *Ans. (d)*
$$np = n_i^2$$
where np is constant.
For n-type, p is minority carrier concentration,

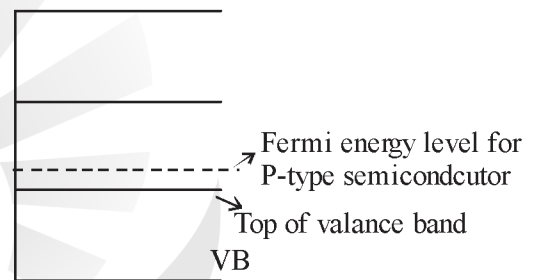
$$p = \frac{n_i^2}{n} = \frac{n_i^2}{N_D}$$

$$p \propto \frac{1}{N_D}$$

Hence, concentration of minority carriers in extrinsic semiconductor under equilibrium is inversely proportional to doping concentration.

21. *Ans. (c)*
Current flow in semiconductor is due to drift and diffusion current.
22. *Ans. (a)*
Early effect of base width modulation is effective decrease in base width with increasing in base collector voltage.

23. *Ans. (b)*
Electron has the greatest, mobility.
24. *Ans. (b)*
The mean free path for electron drift decrease with impurity.
25. *Ans. (b)*
In BJT, base is least doped, collector is moderately doped while emitter is heavily doped region.
26. *Ans. (b)*
Fermi-level represents distribution of charge carrier in any semiconductor. Concentration of holes is greater than concentration of electrons in P-type semiconductor so fermi level will be near to top of valence band



27. *Ans. (d)*
In full wave rectifier with two diodes there is requirement of centre-taped transformer while in case of bridge rectifier normal transformer is required.
In case of bridge rectifier four diode. are needed so peak inverse voltage of each diode will be less as compare to full wave rectifier with two diodes.
28. *Ans. (c)*
Voltage follower circuit is generally used as
1. Isolator circuit.
2. Buffer circuit
29. *Ans. (d)*
30. *Ans. (d)*
Earth wires are not part of solar lighting system because it is a part of the protection of electric components from electric surges.

31. *Ans. (c)*

At absolute zero temperature availability of free electrons will become zero

32. *Ans. (c)*

We know that

Drift velocity = mobility \times electric field

$$V_d = \mu E$$

Where V_d = Drift velocity in m/s

μ = Mobility in $\text{m}^2/\text{V}\text{-sec}$

E = Electric field in V/m

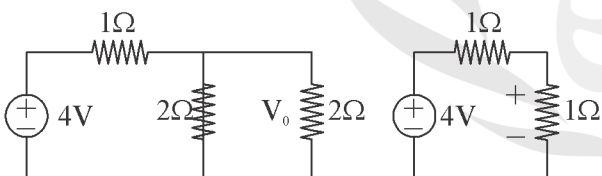
$$\begin{aligned}\mu &= \frac{V_d}{E} \\ &= \frac{200}{400} = 0.5 \text{ m}^2/\text{V}\text{-sec}\end{aligned}$$

33. *Ans. (d)*

In transistor emitter acts as source of charge carrier and collector as sink of charge carriers so if electrons's are entering in to emitter then they will exit from collector terminal

34. *Ans. (b)*35. *Ans. (a)*

Redrawing the circuit for ideal diode



$$V_0 = \frac{4 \times 1}{1+1}$$

$$V_0 = 2V_0$$

36. *Ans. (d)*

$$I = \frac{Q}{t}$$

$$= \frac{5 \times 10^{16} \times 1.65 \times 10^{-19}}{80}$$

$$= 0.1 \text{ mA}$$

37. *Ans. (a)*38. *Ans. (b)*

The electrodes of a semiconductor diode are known as anode and cathode.

39. *Ans. (a)*

A semiconductor device called light emitting diode (LED) produces different colors depending upon its chemical composition when active in a circuit.

40. *Ans. (a)*

A transistor (or any electronic component) can be destroyed in a circuit by excessive heat (that can be due to very high current).

41. *Ans. (d)*

FETs are classified N – channel FET & P – channel FET on the basis of charge carriers.

42. *Ans. (d)*

To convert AC into DC, we need to block one half of AC supply. The diode conducts only for one direction of electric current.

43. *Ans. (b)*

Zener diode in the electronic circuit can be used as a voltage regulator. it provides a constant voltage to the load from a source

whose voltage may vary over a sufficient range.

44. *Ans. (a)*

A vacuum tube uses a very high voltages to operate.

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