

Electrical Engineering

1. What is the difference between neutral and earth?
2. Why is alternating current used for transmission?
3. What is corona?
4. What is skin effect?
5. Why is the voltage stepped up before transmission?
6. What are the standard transmission and distribution voltages?
7. Explain transmission and distribution systems?
8. What are lightning arrestors?
9. What is the difference between an insulator and a dielectric?
10. Explain the principle of operation of relay and a circuit breaker?
11. What is 3-phase supply?
12. What is a busbar?
13. What are the disadvantages of low power factor?
14. What is arc formation?
15. Why do we require protection against lightening?
16. What is substation?
17. What is grading of a cable?
18. What are transmission cables made of?
19. What is the purpose of a fuse?
20. Explain the power rating of this bulb, say 60W, what if the voltage changes?
21. Why is the earth pin in a 3-pin plug the longest and the thickest?
22. Which is the motor used in fan?
23. Explain the basic operation of dc motor / generator, induction motor, synchronous motor, stepper motor, and repulsion motor.
24. What is hysteresis loss?
25. Why do we use a starter for a dc Motor?
26. What are back emf, commutation, armature reaction, stray losses; and breakdown torque?
27. Why is an induction motor called a rotating transformer?
28. What is slip?
29. What is the purpose of compensating winding?
30. What will happen if you supply a fan with dc?
31. What is cogging and crawling?
32. Why shouldn't you start a shunt motor on a heavy load?
33. What are dummy coils?
34. What are CT and PT?
35. What is voltage build up of a generator?
36. What is a universal motor?
37. Why is transformer rating in KVA?
38. What is voltage regulation?
39. Why is transformer flux constant?
40. Why is an induction motor used for most domestic applications?
41. What is regenerative braking?
42. Give an example where a transformer is used in a dc application.
43. What is the problem with a fan that does not rotate unless rotated manually to start?
44. What are brushless alternators?
45. What are equalizer rings used for?
46. What are interpoles used for?
47. What is eddy current loss?
48. What is plugging of an induction motor?

49. What is the principle of operation in a tube light?
50. What are the advantages and disadvantages of compact fluorescent lamps?
51. Which is more dangerous - shock due to ac or dc?
52. What is an UPS?
53. What is the approximate power production capacity of India / Kerala?
54. Explain the principle of dc motor.
55. Explain the uses of servomotor.
56. How do you specify the rating of transformer?
57. How is speed control of ac motors achieved?
58. Differentiate MC and MI instruments.
59. What are integrating instruments? Give examples?
60. Explain PLL circuits.
61. How do you convert fixed ac to variable dc?
62. What is the purpose of testing thyristors in speed control of drives?
63. What are the uses of Schmidt trigger circuits?
64. How can you eliminate noise in digital circuits?
65. Explain low pass filter?
66. How is the alternator synchronized to the main busbar?
67. What is a Scott connected transformer?
68. What is commutation in dc machines?
69. What are damper windings?
70. What are cooling methods used to cool a transformer?
71. Can you start a series motor without load? If no, why?
72. Draw the equivalent circuit of a transformer.
73. What is R model of a circuit?
74. What is specified in synchronous watts?
75. How are lines affected due to switching operations?
76. Is there any difference between the circuit breakers and the isolators?
77. What do we prefer, overhead cables or underground cables?
78. Is corona more in dc lines or ac lines?
79. Are single induction motors self-starting?
80. In a delta connected circuit are 3rd harmonics present?
81. What is a shunt?
82. What is phase swinging?
83. What is phase margin?
84. What type of motor is needed in hoists?
85. What is IDMT?
86. What is current chopping?
87. Which circuit breaker uses current chopping circuit?
88. Can an inverter be used as a converter? How?
89. What are the types of faults that can occur in a 3-phase line?
90. What is a ground line?
91. What is form factor?
92. What is an oscillator?
93. Does an oscillator have input? If so, draw it?
94. What is modulation?
95. How do you start an induction motor?
96. Which type of luminance has greater visibility - GLS or FL?
97. How would you conserve electricity at home, being an electrical engineer?
98. What is the generating voltage in India?

99. Which generating station in Kerala has the largest capacity?
100. Which is the oldest generating station in Kerala?
101. What is SEADA?
102. Why do we use a wave trap, draw the circuit?
103. What is power line communication?
104. What is the difference between an overcurrent relay and a fuse?
105. How can you control the output voltage in an inverter and converter?
106. How can you decrease the harmonics in a wave form?
107. What are travelling waves?
108. What is the general industrial power factor in India?
109. What is diversity factor?
110. Why is the wave form sinusoidal?
111. Give some practical applications of variable resistance.
112. Explain the working of a ceiling fan?
113. What are the equipment in a substation?
114. What are instrument transformers?
115. Name the thyristor that can be turned off by applying signals to its gate terminal.
116. What is the significance of having 11KV as the generation voltage?
117. Explain the effect of a free wheeling diode.
118. What is a page hit?
119. What is cache memory?
120. What do the three pins of a socket represent?
121. Explain basic circuitry of voltage stabilizer.
122. How do you drive a motor using 8085 microprocessor?
123. How does a tester work?
124. How is magnetic field intensity calculated in the vicinity of a current carrying wire?

Important topics in Electrical Engineering

Machines and power systems - make sure that your basics are clear in these, no need to go deep into the subject.
 Microprocessor, with basic knowledge in latest technologies. Analog design and development methods. Digital circuits.
 Questions on seminar, industrial training and project.

Electronics Engineering

1. What are Flip flops and explain their working?
2. Differentiate between flip-flops and latches.
3. What is totem pole?
4. What is the mode of transmission of TV signals?
5. Draw the internal circuit of 8085 microprocessor.
6. What is a bit? What is CMOS?
7. What is the bandwidth of FM?
8. As an electronics engineer, how would you distinguish between paper money and digital money?
9. What is modem? Draw its internal diagram.
10. Obtain a square wave from a sine wave form Zener diodes.
11. What is difference between oscillator and multivibrator?
12. What is blue tooth and WAP?
13. What are trappatt and impatt diodes?
14. What is emitter follower?
15. Give the electromagnetic equations in the order of discovery.

16. Find the transfer function of a given RLC circuit.
17. What happens when you type user-name and password while logging on to a Unix system?
18. Draw the circuit for an adder using NAND gates.
19. Explain internal organization of memory chips.
20. What are the different types of control systems?
21. Explain open loop with block diagram examples.
22. What are the advantages of closed loop?
23. How can you design a stable system?
24. Explain different stability criteria.
25. Explain Routh-Hurwitz rule in one sentence.
26. What are poles and their significance?
27. Is there any control system in this room (interview hall)?
28. What is Karnaugh map?
29. What are the 4 methods to reduce a Boolean expression?
30. Draw 8086 internal architecture.
31. What are the different types of buses?
32. What are the different registers in CPU?
33. What is the use of segment register?
34. Which is the 1st 32-bit microprocessor?
35. What are the different UPS?
36. Compare 8086 and 80286.
37. Explain the internal architecture of 8086.
38. What do you know about antennas?
39. Define control system. Why are control systems so important?
40. Draw the block diagram of a control system and write its transfer function.
41. What is ROC?
42. Transformation between S and Z plane.
43. What is wave studio?
44. What is bit rate?
45. What is the difference between mp3 and wave formats?
46. What is sampling?
47. How do you damp noises and jerks in recording?
48. What is Winamp?
49. What are plugins?
50. Explain the functioning of an OP-AMP.
51. What is the difference between input and output plugins?
52. What do you know about CD writing?
53. How do you mix BGM? What is its procedure?
54. What is bus?
55. What do you mean by 20-bit address bus?
56. What is the ideal gain of an opamp?
57. What is a database?
58. What is the database software that is proprietary of IBM?
59. What is the difference between half adder and full adder?
60. Implement a half adder and a full adder.
61. What is packet switching and circuit switching?
62. What is VOIP (Voice over Internet Protocol)?
63. What types of communications do you know?
64. Explain various types of digital communication.
65. Explain the structure of MOSFET - where and why they are preferred.

66. How is amplification possible in a transistor?
67. Classify power amplifiers (A, B, AB).
68. What is doping?
69. Describe DMA controllers.
70. What is the protocol used in telephone network?
71. Explain different types of switching.
72. How many pins are there in 8086?
73. What is the most important advantage of blue tooth?
74. Which is the universal flip-flop?
75. What are interrupts? How will you set an interrupt?
76. What is Dynamic Memory Access?
77. What is SRAM, DRAM? Compare the two, relative cost of the two.
78. What will happen in case of a power failure for the above?
79. What is modulation? What are the different modulation techniques?
80. What is FM, PM and AM? Compare the three and what happens in them?
81. Which waves will travel longer distance - FM or AM?
82. What is a thyristor? Differentiate between thyristor and diode.
83. Explain the switching action of SCR and triggering.
84. Draw the diagram of thyristor.
85. Advantage of CMOS and TTL.
86. What technology is used in cmos logic?
87. What are VLSI and ULSI? What is the number of components in both?
88. How many components are there in the Pentium processor that we use?
89. Which is the latest Pentium processor? What is its speed?
90. Explain the technology used in the manufacture of Pentium processor.
91. Design a decade counter.
92. Explain asynchronous and synchronous counter.
93. Minimize function using Quine McCluskey: $f = xy + x\bar{y} + yz + x\bar{z} + y\bar{z}$.
94. What is a prime implicant?
95. How does a diode look (internally)? Explain working using internal diagram.
96. Explain processes taking place in the depletion junction of a forward biased diode.
97. What is an op amp?
98. What is a buffer? what is the gain of a buffer?
99. What is an oscillator?
100. How do you forward bias a transistor?
101. What are the practical applications of transistors?
102. What is reverse recovery time and how does it affect a diode?
103. What is a compiler?
104. How can you test a compiler with certain boundary conditions?
105. What is VHDL?
106. What is FSF? What do you know about it? Any current relevance?
107. Differentiate between open loop and closed loop control systems?
108. Draw and explain the working of a monostable vibrator using op-amp.
109. State Thevenin's theorem and Norton's theorem. What is their application?
110. What is the mathematics used in DSP and from which domain to which domain is signal converted?
111. Difference between intrinsic and extrinsic semiconductor.
112. Draw an internal block diagram of a normal voltage stabilizer.
113. What is a reference variable?
114. Volume control in TV is logarithmic. Why?
115. Does MATLAB have an interpreter or a compiler?

116. What do you know about segmentation of memory in 8086?
117. What is virtual memory?
118. Differentiate between macros and functions in C.
119. Explain the significance of electromagnetic interference in PCBs and computer boards.
120. What are the various pin connections to peripherals, memory and interrupts?
121. Draw a rough diagram of a mother board using 8086 with relevant connections.
122. What is the tri-state or high impedance state?
123. What are the differences between open collector output and totem pole output?
124. Find the highest clocking frequency of a digital circuit given the rise time, fall time and propagation delay?
125. Implement Boolean expression using MUX (2 to 4, 3 to 8 etc).
126. Draw the state graphs of a given problem like sequence generator, flip flops etc.
127. Why is the accumulator called so?
128. How can we implement a stack?
129. Construct a D flip flop from a T flip flop.
130. What is virtual ground in an opamp?
131. Why is uplinking frequency higher than down linking frequency?
132. Explain the booting procedure of a computer?
133. What is metastable state in flip-flops?
134. What is round robin technique of interrupt arbitration?
135. What is avalanche breakdown? When does it occur?
136. Explain the operation of a zener diode.

Important topics in Electronics Engineering

Digital Electronic: Karnaugh maps, state machine, sequences generator, flip flop conversions, different logic families, different types of memory, designing of circuits for a given problem using state machines, flip flops etc. Communications Systems: PAM, PCM, ADPCM, DM Quantization, errors in each type of system and basic principles involved. Microprocessors: Architecture, registers, comparison between 8086 and higher processors, assembly language programming, segmentation of memory, peripherals devices (8255, 8259 etc) control words. Electro-magnetic theory: Transmission line (delays, impedance matching). Linear integrated circuits: Basics of op amps, comparators, transducers (different types and their principles and applications). Electronic devices and circuits.

Physics

1. What is Boyle's Law?
2. What is Archimedes Principle?
3. What is the difference between mass and weight?
4. What is specific gravity?
5. What is the Plimsoll Line?
6. What is surface tension? Give some examples.
7. What is Newton's First Law of Motion?
8. What is Newton's Second Law of Motion?
9. What is Newton's Third Law of Motion?
10. What are the different types of energy?
11. What is the difference between kinetic and potential energy?
12. What are the units of power?
13. What is energy?
14. What is force?
15. What is impulse?
16. What is centripetal force? Cite some instances.

17. What is centrifugal force? Give some examples.
18. What is specific heat?
19. Define thermal expansion.
20. What is the SI unit of heat?
21. What is the difference between a plane mirror and a curved mirror?
22. Explain the differences between concave and convex mirrors.
23. Are convex lenses diverging or converging?
24. What is a Mach number?
25. What comes first - magnetic induction or magnetic attraction?
26. What is Coulomb's Law?
27. Explain nuclear fission. How is it different from nuclear fusion?
28. What is a moderator?
29. Why is Mercury used in a thermometer?
30. What type of a thermometer - alcohol or mercury - is used in Arctic Region and why?
31. How do high-wire artists balance on such a thin wire? Why do they carry such long poles?
32. How does a white LED work?
33. Mirrors reflect visible light. But how effective are they at reflecting other electromagnetic waves like x-rays and radio waves?
34. What would happen if you could drill a hole from the North Pole to the South Pole, and drop a stone into it?
35. What happens if you fire two bullets from an aircraft moving at 1000mph? One is fired forwards at 1000mph and the other backwards at 1000mph.
36. Why do some stars end up as black holes?
37. Why is it that bubbles are always round?
38. What are some uses of ultraviolet rays?
39. What are some uses of infrared radiation?
40. Why does helium make your voice sound funny?
41. Why can't we see clearly when we open our eyes underwater?
42. Why does a flame always point upwards?
43. What is 'steady state' in the context of thermodynamics?
44. What is natural frequency?
45. What is resonance?
46. Explain the terms radioactivity and half life.
47. Explain the terms elastic limit and yield point.
48. Why do pipes burst in cold countries during winter?
49. What is an adiabatic process, an isothermal process, isobaric process? Give examples.
50. What is Pauli's Exclusion Principle?
51. What is the significance of Planck's Constant?
52. What is Gauss's Law of Electrostatics?
53. What is Kinetic theory of gases?
54. What is Root Mean Square Velocity?
55. What are degrees of freedom?
56. Explain the equation $C_p - C_v = R$.
57. What is enthalpy?
58. What is simple harmonic motion?
59. What is the difference between static friction and dynamic friction?
60. What is coefficient of restitution?

Chemistry

1. How is a theory different from a hypothesis?

2. What is chemistry?
3. What is the SI system?
4. What is the difference between Celsius and Kelvin temperatures 273 units?
5. What is the temperature at which Fahrenheit and Celsius temperatures are equal?
6. How do you convert a temperature from metric scale to the Fahrenheit scale?
7. What is the weight of an electron?
8. What is specific gravity?
9. Why is ice lighter than water?
10. How do you measure the density of a solution?
11. How does density of a fluid depend on the temperature?
12. What is the difference between an element and a compound?
13. What is the difference between an alloy and a compound?
14. What is plasma?
15. What is an isotope?
16. What is tritium?
17. What is molecular weight?
18. What is Avogadro's law?
19. Give some examples of exothermic and endothermic processes?
20. What is Hess law?
21. What is the second law of thermodynamics?
22. Why does mixing an acid with water release heat?
23. Why don't electrons get sucked into the nucleus?
24. What is Pauli's exclusion principle?
25. What are the shapes and designations of f orbitals?
26. Why does the 4s subshell fill before the 3d subshell?
27. Why is mercury a liquid at room temperature?
28. What is the most abundant element in the universe?
29. What is a valence bond?
30. What are van der Waals forces?
31. What is capillary action?
32. How do you estimate the freezing point of a solution?
33. How do you convert molarity of a solution to normality?
34. What is a solution?
35. What is the effect of temperature on solubility of a gas?
36. What is pH?
37. Is ammonia a weak base?
38. Why does iron rust?
39. What is a catalyst?
40. What is the effect of temperature on the rate of a reaction?
41. What is hydrolysis?
42. What is an amino acid?
43. What is steel?
44. What is the difference between ketones and alcohols?
45. What is the formula for butanol?
46. What is the formula of butyl acetate?
47. What is a polymer?
48. What is the formula of Benzoic acid?
49. What is half life?
50. What is a functional group?
51. What is an aliphatic compound?

52. What are alkynes?
53. What is cyclohexane?
54. What are ethers?
55. What are amines?
56. What is cyanide?
57. What is the atomic number of oxygen?
58. What is a double displacement reaction?
59. What is a redox reaction?
60. What is the isotope of uranium most commonly used in nuclear reactors?

Mathematics

1. What is Integration?
2. What is the opposite of Integration?
3. What do you think is generally the problem with Integration?
4. Can we make use of Integration in some principle of Physics?
5. What is Differentiation?
6. How do you find the maximum of a function $f(x)$?
7. Draw a graph where the second order differential is zero.
8. What is a point of inflection?
9. Draw a graph which has a point of inflection.
10. What is Hungarian Algorithm?
11. What is Ant Colony Algorithm?
12. What is the time complexity of an algorithm?
13. Do you know about partial derivatives?
14. What is the probability that on tossing a coin we get both heads? Are the two events independent?
15. Describe Random Numbers. Why are Random Numbers generated in programming languages called pseudo-random?
16. Describe an algorithm to generate numbers.
17. What is probability? What is the probability that when you are married, your first child will be a boy? What is the probability that the first 3 children you have will be boys?
18. What is a Prime Number?
19. What is Descartes' rule in algebra?
20. State Fermat's Last Theorem.
21. What are Mersenne Primes?
22. What is the value of zero raised to power zero?
23. What do we mean by indeterminate form? List out the various indeterminate forms.
24. Is $0.9999999\ldots = 1$? Can you prove it?
25. Why is $0! = 1$?
26. Why there is Nobel in mathematics? Do you think it is justified?
27. What do you know about Fields Medal or Abel Prize?
28. Can you explain the Monty Hall Problem?
29. What is the difference between a Theorem and an Axiom?
30. Among the sets N , Z and Q identify the one which is a Monoid, an Integral Domain and a Field.
31. What is the difference between a Field and a Ring?
32. What do we mean by Six Sigma? Explain
33. What do we mean by a random variable?
34. Random variable X is distributed as $N(a, b)$, and random variable Y is distributed as $N(c, d)$. What is the distribution of (1) $X+Y$, (2) $X-Y$, (3) $X*Y$, (4) X/Y ?
35. What's the expectation of a uniform (a, b) distribution? What's its variance?

36. In your bedroom you have a drawer with 2 red, 4 yellow, 6 purple, 8 brown, 10 white, 12 green, 14 black, 16 blue, 18 gray, and 20 orange socks. It is dark, so you cannot distinguish between the colours of the socks. How many socks do you need to take out of the drawer to be sure that you have at least three pairs of socks of the same colour?
37. You have a rectangular chocolate bar, m by n tiles. You start breaking the chocolate bar, always along the lines, until you end up with mn pieces (i.e. all the tiles have been separated). You want to minimise the number of breaks. What's the best strategy?
38. A student calls out an answer to a multiple choice question at random, A, B, C or D, until he is correct (say the correct answer is A). On average, how many times will he have to do this?
39. Differentiate between stratified and cluster sampling?
40. What do we mean by continuous and discrete distributions? Give examples for each.
41. Give situations where Poisson distribution is applicable.
42. Give situations where Exponential distribution applicable.
43. Differentiate between descriptive statistics and inferential statistics
44. What are the different types of measurements scales used in statistics?
45. Differentiate between Type I and Type II errors.
46. State the Central Limit Theorem.
47. 3 persons attend an interview at a company where each person can be either selected or rejected. What is the number of ways of announcing the result?
48. What types of relations are called functions? Give examples of relations which are not functions.
49. At what points is an algebraic function discontinuous?
50. At what points is the greatest integer function discontinuous?
51. Write the algebraic expression for a transfer function.
52. Explain why sine of an angle cannot take a value of more than 1?
53. Is every continuous function differentiable? Explain
54. If an event A is independent of itself then what is the probability of event A to take place?
55. If correlation coefficient of variables x and y is equal, then what can we say about the the two lines of regression?
56. At what point do two lines of regression intersect?
57. If $f(x)$ and $g(x)$ are both continuous at $x=a$, then what is the condition for $f(x)/g(x)$ to be continuous at $x=a$?
58. Is it true to say that the continuity of fg implies continuity of f and g ?
59. Can a null relation be classified as transitive? Justify.
60. Give examples of a one to one function and many to one function?
61. What is Mean? Central Tendency? Mode?
62. What are the types of Mean?
63. Give one example each for the practical application of Arithmetic Mean, Geometric Mean and Harmonic Mean.
64. What do you understand by Standard Deviation? Also write the formula.
65. What term would come if you square the Standard Deviation?
66. What is the difference between Bayesian and 'regular' statistics?
67. State Cayley-Hamilton Theorem.
68. How many zeros are there at the end of $100!$ in base 6?
69. Why is 'e' so important in mathematics? What uses does it have in the real world?
70. What is the difference between correlation and regression?
71. What are Transcendental Numbers? Give some examples
72. What is the difference between Euclidean and Non-Euclidean Geometry?
73. What is the difference between a bar graph and a histogram? What are the similarities?
74. What do we mean by contrapositive, converse and inverse of a given statement?
75. There is a rectangle. Which way should it be rolled to give greater volume?
76. If the perimeter of a rectangle is 20 cm, what is the distribution among length and breadth to maximize the volume?
77. Draw the graph $y = x(x-5)$.
78. What is Reynolds number? What does it signify?

79. What is binomial and normal distribution?
80. What is the inverse of a matrix?

Economics

1. What is demand?
2. What is the shape of the demand curve?
3. What is supply?
4. What is the shape of the supply curve?
5. What are Giffen Goods?
6. What are the determinants of individual demand?
7. What are the determinants of supply?
8. How are prices determined?
9. What is the Law of Diminishing Marginal Utility?
- 10.
11. What is Opportunity Cost?
12. What is a Veblen Good?
13. What is price elasticity of demand?
14. What is income elasticity of demand?
15. What do you mean by cross elasticity of demand?
16. What are complementary goods?
17. What are substitute goods in economics?
18. What are Indifference Curves?
19. What are the properties of Indifference Curves?
20. What is the shape of an Indifference Curve?
21. What do you mean by a deadweight loss?
22. What is demand forecasting?
23. How is demand forecasting done?
24. What are externalities?
25. What do you mean by the 'free-rider' problem?
26. What are positive externalities?
27. Give two examples of positive externalities?
28. What are negative externalities?
29. What is the negative externality associated with a nuclear power plant?
30. What is a Pigovian tax?
31. Is carbon tax an example of a Pigovian tax?
32. What is predatory pricing?
33. Explain the concept of absolute advantage.
34. What is income effect?
35. What do you mean by substitution effect?
36. What is monopoly?
37. Define oligopoly.
38. What is monopsony?
39. Give examples of monopoly, oligopoly, and monopsony.
40. How is a monopoly different from a cartel?
41. What is a Lemon Market?
42. What is asymmetric information?
43. What does the Heckscher-Ohlin Theorem state?
44. What is a tariff? Why are they imposed?
45. What is GDP? How is it measured?

46. What is GNP?
47. What is the difference between GDP and GNP?
48. Between GDP and GNP, which is a better estimate?
49. Define nominal GDP.
50. What is real GDP?
51. What is the multiplier effect?
52. Define inflation.
53. What are the causes of inflation?
54. Explain demand-pull inflation? Does India experience it?
55. What is cost-push inflation? Does India experience it?
56. What is the Fisher Hypothesis?
57. What is BoP?
58. What are isoquants?
59. Explain the Cobb-Douglas Production Function.
60. What is the IS schedule?
61. What is the LM schedule?