

Sr. No. 4093

ENTRANCE TEST-2023

School of Engineering

B.Tech/BE Lateral Entry

Total Questions
Time Allowed

: 60
: 70 Minutes

Roll No.

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1. Write your roll number in the space provided at the top of this page of question booklet and fill up the necessary information in the spaces provided on OMR Answer sheet.
2. OMR Answer sheet has an original copy and a candidate's copy glued beneath it at the top. While making entries in the original copy, candidate should ensure that the two copies are aligned properly so that the entries made in the original copy against each item are exactly copied in the candidate's copy.
3. All entries in the OMR answers sheet including answers to questions are to be recorded in the original/Carbon copy.
4. Use only blue/ black ball point pen to darken the circle of correct / most appropriate response. In no case gel/ ink pen or pencil should be used.
5. Do not darken more the one circle of option for any question. A question with more than darkened response shall be considered wrong.
6. There will be negative marking for wrong answers. Each wrong answer will lead to the deduction of 0.25 marks from the total score of the candidate.
7. Only those candidates who would obtain positive score in entrance test examination shall be eligible for admission.
8. Do not make any stray mark on the OMR sheet.
9. Calculators and mobiles shall not be permitted inside the examination hall.
10. Rough work, if any, should be done on the blank sheets provided with the question booklet.
11. OMR answer sheet must be handled carefully and it should not be folded or mutilated in such case it will not be evaluated.
12. Ensure that your OMR Answer sheet has been signed by the invigilator and the candidate himself/herself.
13. At the end of the examination hand over the OMR answer sheet to the invigilator who will first tear off the original OMR sheet in presence of the candidate and hand over the candidate's copy to the candidate.
14. If any of the information in the response Sheet/Question Paper has been found missing or not mentioned as stated above the candidate is solely responsible for that lapse.

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SEAL

University of Kashmir

B.Tech. (Lateral Entry Examination)
Session 2023

- Q1) The solution of the differential equation $a(p + q) = z$ is
- a) $\phi(x - y, y - az) = 0$
 - b) $\phi(x + y, y + az) = 0$
 - c) $\phi(x - y, y + az) = 0$
 - d) $\phi(x + y, y - az) = 0$

- Q2) The solution of the differential equation $(D^2 + a^2)y = 0$ is
- a) $c_1 \cos ax + c_2 \sin ax$
 - b) $c_1 \cos ax - c_2 \sin ax$
 - c) $(c_1 + c_2 x) \sin ax$
 - d) $(c_1 + c_2 x) \cos ax$

- Q3) The Particular integral of the differential equation $(D^2 + 1)y = \cos 2x$ is
- a) $\frac{1}{3} \sin 2x$
 - b) $-\frac{1}{3} \sin 2x$
 - c) $-\frac{1}{3} \cos 2x$
 - d) $\frac{1}{3} \cos 2x$

- Q4) The solution of the differential equation $(x^2 D^2 - xD + 2)y = 0$ is
- a) $x(c_1 \cos(\log x) - c_2 \sin(\log x))$
 - b) $x(c_1 \cos(\log x) + c_2 \sin(\log x))$
 - c) $(c_1 \cos(\log x) - c_2 \sin(\log x))$
 - d) $(c_1 \cos(\log x) + c_2 \sin(\log x))$

- Q5) The Frobenius method can be used about a point $x = a$ if
- a) $x = a$ is a regular point
 - b) $x = a$ is an irregular point
 - c) both a and b
 - d) None of these

- Q6) The differential equation $x^2 y'' + xy' + (x^2 - n^2)y = 0$ where $2n$ is non integral is known as
- a) Hermit's Equation
 - b) Legendre's Equation
 - c) Bessel's Equation
 - d) None of the above

- Q7) The most general solution of the wave equation is
- a) $y = (A \cos \sqrt{kt} + B \sin \sqrt{kt})(C \cos \sqrt{kx} + D \sin \sqrt{kx})$
 - b) $y = (A \cos \sqrt{kt} + B \sin \sqrt{kt}) + (C \cos \sqrt{kx} + D \sin \sqrt{kx})$
 - c) $y = (A \cos \sqrt{kt} - B \sin \sqrt{kt})(C \cos \sqrt{kx} + D \sin \sqrt{kx})$
 - d) None of the above

- Q8) The p
- a) a
 - b) c
 - c) t
 - d) t

- Q9) The v
- a) t
 - b) t
 - c) t
 - d) t

- Q10) If
- a) a
 - b) t
 - c) t
 - d) t

- Q11) A p
- a) a
 - b) t
 - c) t
 - d) t

- Q12) If t
- a) a
 - b) t
 - c) t
 - d) t

- Q13) W
- a) a
 - b) t
 - c) t
 - d) t

- Q14) Ass
- a) a
 - b) t
 - c) t
 - d) t

Q8) The partial differential equation $\frac{\partial u}{\partial t} = c^2 \frac{\partial^2 u}{\partial x^2}$ represents

- a) one dimensional wave equation
- b) one dimensional heat equation
- c) two dimensional wave equation
- d) two dimensional heat equation

Q9) The value of probability of an event cannot be

- a) 0
- b) 1
- c) 0.5
- d) Negative

Q10) If 4 distinguishable particles are arranged in 2 compartments, then the thermodynamic probability for the macrostate (3, 1) is

- a) 4
- b) 6
- c) 8
- d) 10

Q11) A photon recoils back after striking an electron at rest. What is the change in wavelength of the photon?

- a) 2.2 Å
- b) 4.0 Å
- c) 0.0486 Å
- d) No change

Q12) If the uncertainty in the location of the particle is equal to its De-Broglie wavelength, what is the uncertainty with velocity?

- a) h
- b) v
- c) mv
- d) None of the above

Q13) Wein's displacement law is a special case of

- a) Planck's law
- b) Newton's law
- c) Kirchoff's law
- d) None of the above

Q14) Assuming MB-distribution of molecular speeds, the most probable speed is given by

- a) $\sqrt{\frac{2kT}{m}}$
- b) $\sqrt{\frac{4kT}{m}}$
- c) $\sqrt{\frac{3kT}{m}}$
- d) $\sqrt{\frac{8kT}{\pi m}}$

Q15) Zero-point energy of one-dimensional quantum mechanical harmonic oscillator is

- a) 0
- b) $h\omega$
- c) $0.5h\omega$
- d) $2h\omega$

Q16) In black body spectrum, the Rayleigh-Jeans law agrees with experimental results

- a) At low frequencies
- b) At higher frequencies
- c) At low wavelengths
- d) None of the above

1 \propto

Q17) The correct sequence of bond order among the following oxygen species is:

- a) $O_2^- > O_2^+ > O_2^{2-} > O_2$
- b) $O_2^+ > O_2 > O_2^- > O_2^{2-}$
- c) $O_2 > O_2^{2-} > O_2^- > O_2^+$
- d) $O_2^{2-} > O_2 > O_2^+ > O_2^-$

Q18) The compound having pentagonal bipyramidal geometry with two types of bond angle is

- a) BrF_5
- b) ClF_3
- c) IF_7
- d) ClF_5

4

Q19) A polymer made up of more than one type of monomer units is termed as

- a) Homopolymer
- b) Copolymer
- c) Homochain polymer
- d) Heterochain polymer

5

Q20) Polymer that changes into hard and rigid materials on heating and cannot be reshaped once it sets is called

- a) Thermoplastics
- b) Fibres
- c) Thermosetting plastics
- d) Elastomers

2

Q21) Which of the following elements will exhibit NMR spectroscopy?

- a) $^{12}C_6$
- b) $^{16}O_8$
- c) $^{13}C_6$
- d) $^{32}S_{16}$

Q22) A covalently bonded group that shows a characteristic absorption in the ultraviolet or the visible region is called as

- a) Chromophore
- b) Auxochrome
- c) Saturated group
- d) Polar group

- Q23) The type of lubrication under conditions of slow speed and high load is
- a) Thick film or hydrodynamic lubrication
 - b) Thin film or boundary lubrication
 - c) High-pressure lubrication
 - d) All the above

- Q24) A good lubricant must have
- a) High viscosity and low viscosity index
 - b) Low viscosity and high viscosity index
 - c) Moderate viscosity and low viscosity index
 - d) Moderate viscosity and high viscosity index

- Q25) What is the SI unit of electric current?
- a) Volts (V)
 - b) Watts (W)
 - c) Amperes (A)
 - d) Ohms (Ω)

- Q26) A resistor has a resistance of 150 ohms. If a current of 0.5 amperes flows through it, what is the voltage across the resistor?
- a) 75 V
 - b) 75 A
 - c) 300 V
 - d) 300 A

- Q27) Which of the following statements is true about parallel combination of resistors?
- a) The total resistance is the sum of individual resistances.
 - b) The total resistance is the product of individual resistances.
 - c) The total resistance is always smaller than the smallest individual resistance.
 - d) The total resistance is always larger than the largest individual resistance.

- Q28) An electric appliance at unity power factor consumes 500 watts of power when connected to a 100-volt source. What is the current flowing through the appliance?
- a) 5 A
 - b) 50 A
 - c) 500 A
 - d) 0.5 A

- Q29) According to Ohm's Law, the relationship between voltage (V), current (I), and resistance (R) is given by:
- a) $V = I/R$
 - b) $I = V/R$
 - c) $R = V/I$
 - d) $V = R/I$

Q30) Two resistors with resistances of 4 ohms and 6 ohms are connected in series. What is the total resistance of the combination?

- a) 2 ohms
- b) 10 ohms
- c) 24 ohms
- d) 46 ohms

Q31) Which of the following statements is correct regarding Kirchhoff's Current Law (KCL)?

- a) The algebraic sum of currents at any node is zero.
- b) The algebraic sum of currents in any closed loop is zero.
- c) The algebraic sum of voltages in any closed loop is zero.
- d) The algebraic sum of voltages at any node is zero.

Q32) A circuit contains a 12-volt battery, a 1-ohm resistor, and a 5-ohm resistor connected in series. What is the total current flowing through the circuit?

- a) 2 A
- b) 3 A
- c) 4 A
- d) 5 A

Q33) Which of the following statement is False?

- a) Compiler converts program written in High level language into Low level language.
- b) 'C' Language belongs to class of Structural/procedural language category.
- c) Windows and Linux are the examples of application software.
- d) Microsoft Word, Microsoft Excel are examples of application software.

Q34) Consider the following statements about computer memory:

- (I) USB Drive is an example of magnetic memory device and is a volatile memory.
- (II) RAM is an example of primary storage device and is a volatile memory.
- (III) Hard disk and CD-ROM are examples of secondary storage devices and belong to class of non-volatile memories.

Which of the above statements is TRUE?

- a) Only I is True
- b) Only II is True
- c) Both II and III are True
- d) All three statements are True

Q35) Which of the following statement about computer ports is True?

- a) USB stands for Universal Serial Bus and supports only single device at a time.
- b) VGA connector is a standard connector used for computer video output.
- c) HDMI stands for High Density Magnetic Interface and allows port to only send very low-resolution videos to other compatible devices.
- d) RJ-45 is not suitable for Ethernet networking.

Q36) Which of the following detailed steps related to

- a) C-Program
- b) ER diagram
- c) Program Flowchart
- d) Top Down design

Q37) What will be the output of the following program?

- a) 2
- b) 1
- c) 2,1
- d) None of the above

Q38) What will be the output of the following program?

```
#include <stdio.h>
int main()
{
    int a=10;
    while(a<1)
    {
        printf("hello\n");
        break;
    }
    printf("exit\n");
    return 0;
}
```

- a) hello
- b) hello
- c) exit
- d) None

16 B

4

Q36) Which of the following is a structured programming technique that graphically represents the detailed steps required to solve a computer problem?

- a) C-Program
- b) ER diagram
- c) Program Flowchart
- d) Top Down design diagram.

4

Q37) What will be the output of the following C program?

```
#include <stdio.h>
int main ()
{
    int i=0, a=10, b=20;
    i=(a>b) ? 1 : 2;
    printf("%d", i);
    return 0;
}
```

- a) 2
- b) 1
- c) 2,1
- d) None of the above

Q38) What will be the output of the following C program?

```
#include <stdio.h>
int main()
{
    int a=10;
    while(a<1)
    {
        printf("Hello");
        break;
    }
    printf("exit");
    return 0;
}
```

- a) hello exit
- b) hello hello exit
- c) exit
- d) None of the above

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Handwritten notes: 7, 10, 25, 25

Q39) The C language keyword which is used to transfer control from a function back to the calling function is:

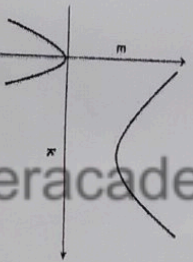
- a) main
- b) goto
- c) getch
- d) return

3

Q40) The magnitude of the current through a practical PN junction diode, which is subjected to a low reverse bias, is observed to increase slowly with the increase in applied voltage in the reverse direction. Which one of the following is the most possible reason for this non-ideal behavior?

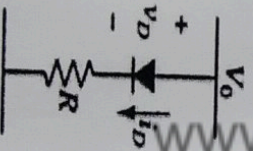
- a) Recombination of the electron-hole pairs in the depletion region.
- b) Impact of series resistance
- c) High level injection of minority carriers that surpass the background doping concentration.
- d) Generation of electron-hole pairs in the depletion region.

Q41) What can you infer about the semiconductor material from the given E-k diagram?



- a) It is a direct bandgap material with effective electron mass greater than hole mass.
- b) It is a direct bandgap material with effective electron mass lesser than hole mass.
- c) It is an indirect bandgap material with effective electron mass greater than hole mass.
- d) It is an indirect bandgap material with effective electron mass lesser than hole mass.

Q42) In the circuit below, $V_0 = 2.02$ volts, and the resistor $R = 0.9K\Omega$. Assume a cut in voltage of 0.65 volts for the diode. Current I_D is ?



- a) $1.82mA$
- b) $1.37mA$
- c) $1.52mA$
- d) $1.67mA$

Q43) The emitter of a transistor is generally doped the heaviest because it

- a)
- b)
- c)
- d)

Q44) In

- a)
- b)
- c)
- d)

Q45) A

- a)
- b)
- c)
- d)

Q46) A

Q47

Q4

- a) Has to dissipate maximum power.
- b) Has to supply the change carriers.
- c) Is the first region of the transistor
- d) Must possess low resistance.

Q44) In an unbiased p-n junction, the junction current at equilibrium is

- a) Due to diffusion of minority carriers only.
- b) Due to diffusion of majority carriers only
- c) Zero, because equal and opposite drift and diffusion currents for electrons and holes cross the junction
- d) Zero, because no charges cross the junction.

Q45) A device whose characteristics are very close to that of an ideal voltage source is

- a) BJT
- b) Resistor
- c) MOSFET
- d) Zener Diode

C

Q46) A BJT is said to be operating in the saturation region if

- a) Both the junctions are reverse biased
- b) Base-emitter junction is reverse biased and base-collector junction is forward biased
- c) Base emitter junction is forward biased and base-collector junction is reverse biased
- d) Both the junctions are forward biased

Q47) A maximum rectification efficiency of full wave rectifier is _____?

- a) 81.2%
- b) 0.2%
- c) 8.2%
- d) 90%

Q48) If a screw thread advances in the nut when turned in a clockwise direction, it is called _____?

- a) left hand helix
- b) right hand helix
- c) clockwise helix
- d) anticlockwise helix

Q49) Vice used for carpentry work has _____ thread.

- a) Square
- b) Buttress
- c) Acme
- d) Square

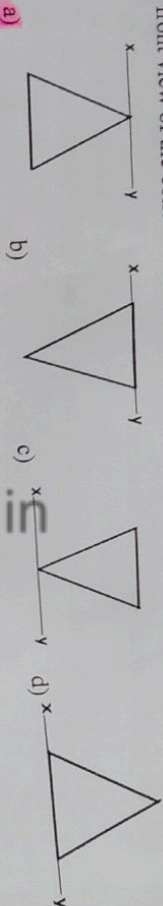
α

Q50) To obtain parallel lines, concentric circles and parallel curves; _____ is used.

- a) Array
- b) Fillet
- c) Copy
- d) Offset

- Q51) A solid steel shaft is to transmit a torque of 10 kN-m. If the shear stress in the shaft is not to exceed 45 MPa, the minimum diameter of the shaft will be _____
- 92 mm
 - 104 mm
 - 78 mm
 - 120 mm

Q52) A cone has its apex on the horizontal plane and the axis of the cone is parallel to the vertical plane. If the cone is in 'third quadrant', then which of the following represents the correct front view of the cone?



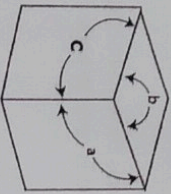
a)

b)

c)

d)

Q53) If the angles between the three axes are ' $a' = 100^\circ$ ', ' $b' = 160^\circ$ ' and ' $c' = 100^\circ$ ', then the cube shown below is drawn in which axonometric projection?



- Isometric
- Dimetric
- Trimetric
- Orthographic

a

Q54) Shear stresses on mutually perpendicular planes are:

- Zero
- Equal
- Maximum
- Minimum

Q55) Which of the following are functions of bearings?

- Ensure free rotation of shaft with minimum friction
- Holding shaft in a correct position
- Transmit the force of the shaft to the frame
- All of the listed

d

Q56) Double row roller Bearings is used _____

- To take axial load
- To take radial load
- To take heavy axial load
- To take heavy radial load

a

Q57) Bolt which consists of only a cylindrical shank threaded at both ends is called _____

- Headless
- Tap-bolt
- Stud-bolt
- Counter

Q58) The ratio of _____ with an ad

- 1/3
- 2/3
- 3/4
- 1/2

Q59) The Cha

- Tough
- Creep
- Fatigue
- Elasticity

Q60) The pro

- Maxi
- Mini
- Zero
- Neg

- a) Headless tapered bolt
- b) Tap-bolt or cap screw
- c) Stud-bolt or Stud
- d) Countersunk-headed bolt

Q58) The ratio of elongation of a prismatic bar due to its total self weight W to that of a similar bar with an additional weight W attached at its free end is:

- a) $1/3$
- b) $2/3$
- c) $3/4$
- d) $1/4$

Q59) The Charpy test is conducted to measure:

- a) Toughness
- b) Creep Strength
- c) Fatigue strength
- d) Elastic strength of a material

Q60) The product of inertia of a body about its axis of symmetry is:

- a) Maximum
- b) Minimum
- c) Zero
- d) Negative