Code No.	T – 2129

Entrance Examination for Admission to the P.G. Courses in the Teaching Departments, 2024

CSS

ELECTRONICS (OPTO ELECTRONICS/ARTIFICIAL INTELLIGENCE)

General Instructions

1. The Question Paper is having 100 Objective Questions, each carrying one mark.
2. The answers are to be (✓) 'tick marked' **only** in the "**Response Sheet**" provided.
3. **Negative marking** : **0.25 marks** will be deducted for each wrong answer .

Time : 2 Hours **Max. Marks : 100**

To be filled in by the Candidate									
Register Number	in Figures								
	in words								

Choose appropriate answer from the options in the questions.

(100 × 1 = 100 marks)

1. The charge, Q, present in a capacitor is given by the relationship:

   A. $Q = C / V$ B. $Q = CV$

   C. $Q = \frac{1}{2}CV2$ D. None of the above

DO NOT WRITE HERE

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2. Colour code of 1Ω resistor ±5% is

   A. brown, black, gold, gold.
   B. brown, black, black, gold.
   C. brown, black, black, silver.
   D. brown, black, gold, silver

3. In a pure semiconductor crystal, if current flows due to breakage of crystal bonds, then what is the semiconductor is called?

   A. Acceptor
   B. Donor
   C. Intrinsic semiconductor
   D. Extrinsic semiconductor

4. Which of the following, when added as an impurity, into the silicon, produces n-type semiconductor?

   A. Phosphorous
   B. Aluminum
   C. Magnesium
   D. Sulfur

5. Identify the property which is not characteristic for a semiconductor?
   A. At a very low temperature, it behaves like an insulator
   B. At higher temperatures, two types of charge carriers will cause conductivity
   C. The charge carriers are electrons and holes in the valence band at higher temperatures
   D. The semiconductor is electrically neutral

6. A simple diode rectifier has 'ripples' in the output wave which makes it unsuitable as a DC source. To overcome this one can use
   A. A capacitor in series with a the load resistance
   B. A capacitor in parallel to the load resistance
   C. Both of the mentioned situations will work
   D. None of the mentioned situations will work

7. An AC supply of 230 V is applied to a half-wave rectifier circuit through a transformer of turn ratio 10:1. What is the DC output voltage?
   A. 9V
   B. 10 V
   C. 10.3 V
   D. 9.5 V

8. In a bridge full wave rectifier, the input sine wave is 40s in 100t. The average output voltage is
   A. 22.73 V
   B. 16.93 V
   C. 25.47 V
   D. 33.23 V

9. Zener diodes with breakdown voltages less than 5 V operate predominantly in what type of breakdown?
   A. Avalanche
   B. Zener
   C. Varactor
   D. Schottky

10. A transistor has a typical value of β = 100, the collector current is 40 mA, what is the emitter current?
   A. 39 mA
   B. 40.4 mA
   C. 41.3 mA
   D. 40 mA

11. Heat sinks are used with power transistors to
   A. To increases the collector dissipation rating of the transistor
   B. Increase the gain of the transistor
   C. Increase the output power
   D. Reduces the heat loses in the transistor

12. Voltage shunt feedback amplifiers are also called as
    A. Non-inverting amplifier with feedback
    B. Non-inverting amplifier without feedback
    C. Inverting amplifier with feedback
    D. Inverting amplifier without feedback

13. In amplitude modulation, bandwidth is ———— the audio signal frequency is
    A. Thrice
    B. Four times
    C. Twice
    D. None of the above

14. The IF is 455 kHz. If the radio receiver is tuned to 855 kHz, the local oscillator frequency is
    A. 455 kHz
    B. 1310 kHz
    C. 1500 kHz
    D. 1520 kHz

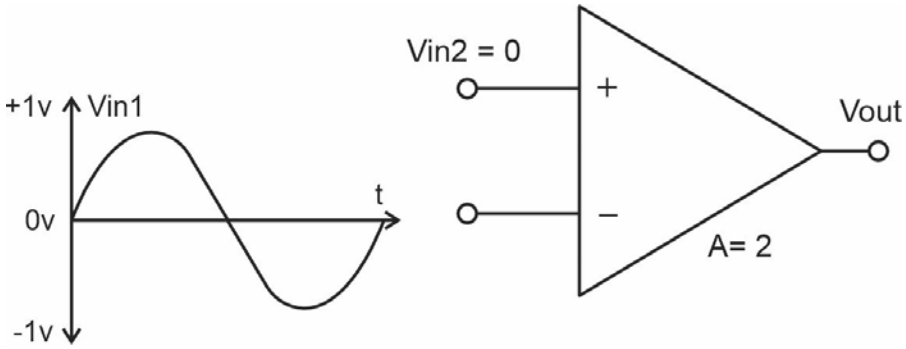
15. A 50 kW carrier is to be amplitude modulated to a level of 85%. What is the carrier power after modulation?
    A. 50 kW
    B. 5 kW
    C. 8 kW
    D. 25 kW

16. The Shockley equation is
    A. $ID = \left(1 - \frac{V_{GS}}{V_p}\right)^2$
    B. $ID = I_{DSS}\left(1 - \frac{V_{GS}}{V_p}\right)^2$
    C. $ID = I_{DSS}\left(1 - \frac{V_{GS}}{V_p}\right)^1$
    D. $ID = I_{DSS}\left(1 + \frac{V_{GS}}{V_p}\right)^2$

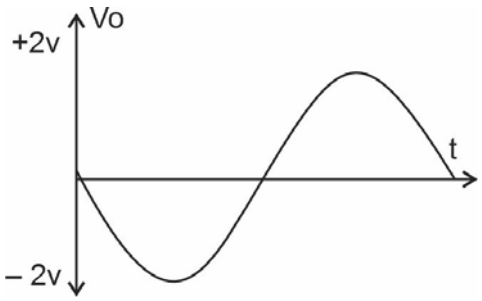
17. What is the intrinsic stand-off ratio (η) of a unijunction transistor when $RB1 = 10k\Omega$ and $RBB = 15k\Omega$?
    A. 0.67
    B. 0.55
    C. 0.80
    D. 0.44

18. Which of the following electrical characteristics is not exhibited by an ideal op-amp?
    A. Infinite voltage gain
    B. Infinite bandwidth
    C. Infinite output resistance
    D. Infinite slew rate

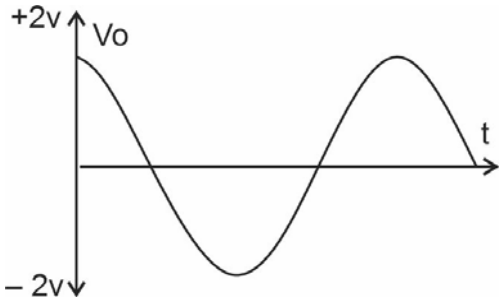
19. Determine the output voltage from the following circuit diagram?



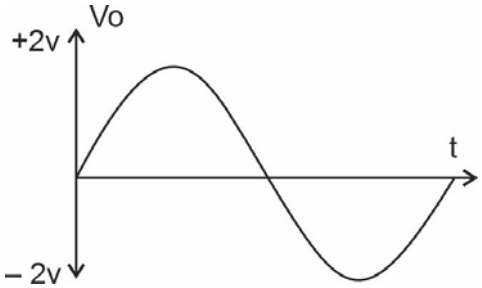
A.



B.



C.



D. None of the mentioned

20. Find the output voltage of an ideal op-amp. If V1 and V2 are the two input voltages

A. $VO = V1 - V2$

B. $VO = A \times (V1 - V2)$

C. $VO = A \times (V1 + V2)$

D. $VO = V1 \times V2$

21. Given the lower and higher cut-off frequency of a band-pass filter are 2.5kHz and 10kHz. Determine its bandwidth.

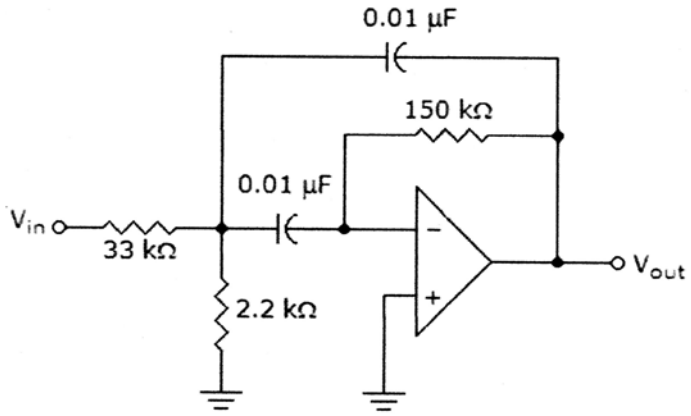
A. 750 Hz

B. 7500 Hz

C. 75000 Hz

D. None of the mentioned

22. Refer to the given figure. The roll-off of this filter is about



A. 20 dB/decade
B. 40 dB/decade
C. 60 dB/decade
D. 80 dB/decade

23. The 7812 regulator IC provides
A. 5 V
B. –5 V
C. 12 V
D. –12 V

24. Calculate the voltage regulation of a power supply having VNL =50 V and VFL = 48 V.
A. 4.17%
B. 5.2%
C. 6.2%
D. 7.1%

25. What is the major advantage of the R/2R ladder digital-to-analog (DAC), as compared to a binary-weighted digital-to-analog DAC converter?
A. It only uses two different resistor values.
B. It has fewer parts for the same number of inputs.
C. Its operation is much easier to analyze.
D. The virtual ground is eliminated and the circuit is therefore easier to understand and troubleshoot.

26. Which of the following is a characteristic of a Schmitt trigger circuit?
A. It has a single threshold level
B. It has two threshold levels
C. It has a linear input-output relationship
D. It has a non-linear input-output relationship

27. Find the input voltage of an ideal op-amp. It's one of the inputs and output voltages are 2v and 12v. (Gain=3)

A. 8v
B. 4v
C. –4v
D. –2v

28. The frequency response of the filter in the stop band.

i. Decreases with increase in frequency
ii. Increase with increase in frequency
iii. Decreases with decrease in frequency
iv. Increases with decrease in frequency

A. i and iv
B. ii and iii
C. i and ii
D. ii and iv

29. Filters with the ———— characteristic provide a very flat amplitude in the passband and a roll-off rate of –20 dB/decade/pole.

A. Butterworth
B. Chebyshev
C. Bessel
D. None of the above

30. Particles that most effects material properties.

A. Neutrons
B. Protons
C. Electrons
D. Valence electrons

31. Which of the following is NOT one of the fourteen Bravais lattices?

A. Cubic
B. Orthorhombic
C. Dodecagonal
D. Triclinic

32. What is the primary mechanism responsible for photoluminescence in a material?

A. Radiative recombination of electron-hole pairs
B. Absorption of photons leading to the ejection of electrons
C. Absorption of photons leading to the excitation of electrons to higher energy levels
D. Absorption of photons leading to the generation of phonons

33. Find the range of band gap energy for conductors.

A. >6 eV
B. 0.2-0.4 eV
C. 0.4-2 eV
D. 2-6 eV

34. The property of superconductor is that it has
    A. Nearly no resistance
    B. Extremely high resistivity
    C. Temperature-dependent resistivity
    D. Resistivity with a moderate value

35. The energy band gap is maximum in which of the following?
    A. Metals
    B. Superconductors
    C. Insulators
    D. Semiconductors

36. Which of the following is the slowest polarisation method?
    A. Ionic polarisation
    B. Orientation polarisation
    C. Electronic polarisation
    D. Space charge polarisation

37. A material of thickness 0.5 mm and dielectric constant 2.5 is subjected to 220 V. What will be the polarization produced?
    A. $2.78 \times 10^{-6} C/m$
    B. $3.91 \times 10^{-6} C/m$
    C. $4.12 \times 10^{-6} C/m$
    D. $5.84 \times 10^{-6} C/m$

38. Which of the following flag condition is used for BCD arithmetic operations in microprocessor?
    A. Sign flag
    B. Auxiliary carry flag
    C. Parity flag
    D. Zero flag

39. How many address lines are present in 8086 microprocessor?
    A. 16
    B. 20
    C. 32
    D. 40

40. Which of the following is a non-vectored input?
    A. TRAP
    B. RST-7.5
    C. RST-6.5
    D. INTR

41. Which of the following is true about stack pointer?
    A. Stack pointer contains the address of the top of the stack memory
    B. Stack pointer is an 8-bit register
    C. Stack pointer stores data permanently
    D. Stack pointer is initialized after stack operation

42. Suppose registers ‘A’ and ‘B’ contain 50H and 40H respectively. After instruction MOV A, B, what will be the contents of registers A and B?

A. 40H, 40H
B. 50H, 40H
C. 50H, 50H
D. 60H, 40H

43. Which of the following is a 2-word instruction set?

A. LDA 2500H
B. MOV A, B
C. IN 01H
D. JMP 2085H

44. What kind of interrupts are RST0 to RST7 in the 8085 microprocessor?

A. Logical interrupts
B. Hardware interrupts
C. Conditional interrupts
D. Software interrupts

45. Identify the non-programmable interfacing device from the following

A. 8295
B. 8257
C. 8212
D. 8255

46. PSW stands for

A. accumulator contents
B. flag byte
C. accumulator and flag register contents
D. None

47. Which instruction is required to rotate the content of accumulator one bit right along with carry?

A. RLC
B. RAL
C. RRC
D. RAR

48. DMA is used between

A. microprocessor and I/O
B. microprocessor and memory
C. memory and I/O
D. None

49. Register pair used to indicate memory

A. B and C
B. D and E
C. H and L
D. W and Z

50. Identify the programmable interval timer from the following

A. 8252 B. 8253

C. 8279 D. 8275

51. The logical expression $Y = A + \overline{A}B$ is equivalent to

A. $Y = AB$ B. $Y = A\overline{B}$

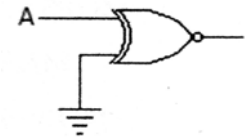
C. $Y = \overline{A} + B$ D. $Y = A + B$

52. 2's Complement of a binary number 1010 is

A. 0110 B. 0101

C. 1110 D. None of the above

53. The output of the following logic gate is



A. 0 B. 1

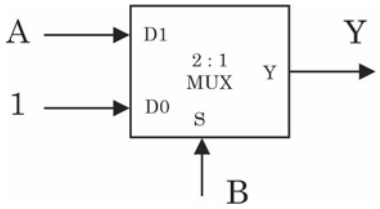
C. A D. $\overline{A}$

54. Number of two input NAND gate required to implement a two input EXOR gate is

A. 1 B. 2

C. 3 D. 4

55. The output of the following multiplexer circuit is



A. $Y = AB$ B. $Y = A + B$

C. $Y = A + \overline{B}$ D. $Y = 1$

56. Which is the following is not a primary function of CPU?

A. Fetch B. Store

C. Execute D. Decode

57. Which of the following is NOT a storage class in C?
    A. Register
    B. Auto
    C. intern
    D. Static

58. Which memory type uses ultraviolet light for erasing stored data?
    A. EEPROM
    B. RAM
    C. EPROM
    D. FLASH

59. D flip flop can be converted into T flip flop using a two input XOR gate.
    A. True
    B. False

60. What is the modulus of a counter?
    A. Number of states in the counting sequence
    B. Number of bits it has
    C. Frequency of clock signal
    D. Number of input signals it can accept

61. In random access memory
    A. Data can be written only once
    B. Data can be read only once
    C. Data can be written only once but data can be read many times
    D. Data can be written and read many number of times

62. Which logic gate outputs TRUE only when all its inputs are FALSE?
    A. AND
    B. OR
    C. NAND
    D. NOR

63. What is the primary function of a flip flop?
    A. To store a binary digit
    B. To amplify signals
    C. To synchronize signals
    D. None of the above

64. Among the following options, which one is different from the rest?
    A. >=
    B. >>
    C. <=
    D. ==

65. Bubbled NOR gate is logically equivalent to

A. AND gate
B. OR gate
C. XOR gate
D. NAND gate

66. An inductor may store energy

A. Its electric field
B. Its magnetic field
C. Both electric and magnetic field
D. Its coil

67. What is the electric field intensity at the centre of a uniformly charged non-conducting sphere of radius R and total charge Q.

A. $E = \frac{1}{4\pi\varepsilon_0}\frac{Q}{R^2}$
B. $E = 0$
C. $E = \frac{1}{4\pi\varepsilon_0}\frac{Q}{R}$
D. None of the above

68. The total internal reflection occurs at

A. Fresnel Angle
B. Critical angle of incidence
C. Right angle
D. Brewster angle

69. In a pure inductive circuit, the current

A. Lags behind the applied emf by an angle π
B. Lags behind the applied emf by an angle $\frac{\pi}{2}$
C. Leads the applied emf by an angle $\frac{\pi}{2}$
D. And the applied voltage are in same phase

70. Lenz's law is consequent of the law of conservation of

A. Charge
B. Momentum
C. Mass
D. Energy

71. Electromagnetic waves are transverse in nature due to

A. Reflection
B. Polarization
C. Diffraction
D. Interference

72. The force between two charges is 180N. If the distance between the charges is doubled, the force will be

A. 45 N
B. 90 N
C. 360 N
D. 60 N

73. "The surface integral of the normal component of the electric displacement D over any closed surface equals the charge enclosed by the surface". The above statement is associated with

A. Coulomb's Law
B. Ampere's Law
C. Gauss' law
D. Lenz's Law

74. Which of the following equation describes Gauss's law for electric fields?

A. $\nabla \times E = 0$
B. $\nabla . D = \rho$
C. $\nabla \times H = J$
D. $\nabla . B = 0$

75. Which is the relation connecting current density 'J' and conductivity σ of the conductor, when an electric field E is applied to it?

A. $J = \sigma E$
B. $J = \sigma E^2$
C. $J = \sigma^2 E$
D. $J = \frac{\sigma}{E}$

76. Electric displacement is a ———— quantity.

A. Scalar
B. Vector

77. Norton's theorem states that a complex network connected to a load can be replaced with equivalent impedance

A. In series with a current source
B. In parallel with a voltage source
C. In series with a voltage source
D. In parallel with a current source

78. Which among the following is also regarded as 'Dual of Norton's Theorem'?

A. Thevenin's Theorem
B. Superposition Theorem
C. Millman's Theorem
D. Maximum Power Transfer Theorem

79. The electric field is ———— to the equipotential lines

A. Normal
B. Tangential
C. Opposite
D. Unrelated

80. The refractive index of cladding of an optic fiber is ———— that of the core

A. Less than
B. Greater than
C. Equals
D. Unrelated to

81. ———— is a refractive type optic fiber

A. Single mode step index fiber
B. Multi mode step index fiber
C. Multi mode graded index fiber
D. None of the above

82. What does the acronym LASER stand for?

A. Light Amplification by Spontaneous Emission of Radiation
B. Light Amplification by Stimulated Emission of Radiation
C. Light Absorption by Spontaneous Emission of Radiation
D. Light Absorption by Stimulated Emission of Radiation

83. A 1024×8 EPROM has

A. 8 address pins and 4 data pins
B. 8 address pins and 8 data pins
C. 10 address pins and 8 data pins
D. 10 address pins and 4 data pins

84. Attenuation in optic fibers specifies in ———— unit.

A. dB
B. μm
C. dB/km
D. $\mu m / km$

85. The fiber optic transmitter has which of the following functions

A. Convert electrical signal to optical signal
B. Amplifies the optic signal
C. Convert optical signal to electrical signal
D. Amplifies the electrical signals

86. The loss of optical power as light travels along the fiber is called

A. Attenuation
B. Scattering
C. Dispersion
D. Absorption

87. Translucent substance ———— light

A. Transmits and reflects
B. Reflects and absorbs
C. Transmits and diffuses
D. Refracts and absorbs

88. Gauss's law is valid for

A. Only regular open surfaces
B. Any open surfaces
C. Only regular closed surfaces
D. Any closed surfaces

89. Multimode step index fiber has

A. large core diameter and large numerical aperture
B. large core diameter and small numerical aperture
C. small core diameter and large numerical aperture
D. small core diameter and small numerical aperture

90. Lorentz force is

A. the magnetic force acting on a moving charge
B. the electrostatic force acting on a moving charge
C. the vector sum of electrostatic and magnetic force acting on a moving charge
D. None of the above

91. The electric potential at a point on the equatorial line of an electric dipole is

A. inversely proportional to distance
B. inversely proportional to square of the distance
C. directly proportional to distance
D. Zero

92. What is the order of the differential equation $\frac{d^2y}{dx^2} + x\frac{dy}{dx} = 3$

A. 1
B. 2
C. 3
D. 0

93. An ordinary differential equation involves

A. Only one independent variable
B. More than one independent variables
C. Only one dependent variable
D. More than one dependent variables

94. The Fourier series of an odd periodic function contains

A. odd harmonics only
B. even harmonics only
C. cosine terms only
D. sine terms only

95. A square matrix all of whose elements except the principal diagonal elements are zeros is called a

A. Diagonal Matrix
B. Singular Matrix
C. Symmetric Matrix
D. Null Matrix

96. Fourier series is applicable

A. Only to non periodic signals
B. Only to periodic signals
C. To both periodic and non periodic signals
D. None of the above

97. Which of the following identity is not true ?

A. $\nabla.(\nabla \times B) = 0$
B. $\nabla \times \nabla A = 0$
C. $\nabla \times (\nabla \times A) = \nabla(\nabla.A) - \nabla^2 A$
D. $\nabla.(\nabla.A) = A.(\nabla.A)$

98. A singular matrix is a square matrix whose

A. Diagonal elements are zero
B. Determinant is zero
C. Elements above the principal diagonal are zero
D. Elements below the principal diagonal are zero

99. What are the necessary and sufficient conditions for the existence of the Laplace transform for a function f(t)?

A. The function f(t) should be piece-wise continuous in the given closed interval and must be of exponential order.
B. The function $f(t)e^{-st}$ should be absolutely integrable
C. Both A. and B.
D. None of these

100. The core of the optical fibres is primarily made of

A. Glass
B. Metal
C. Silicon
D. None of the above

———————

ANSWER SHEET

1	A	B	C	D	E	26	A	B	C	D	E	51	A	B	C	D	E	76	A	B	C	D	E
2	A	B	C	D	E	27	A	B	C	D	E	52	A	B	C	D	E	77	A	B	C	D	E
3	A	B	C	D	E	28	A	B	C	D	E	53	A	B	C	D	E	78	A	B	C	D	E
4	A	B	C	D	E	29	A	B	C	D	E	54	A	B	C	D	E	79	A	B	C	D	E
5	A	B	C	D	E	30	A	B	C	D	E	55	A	B	C	D	E	80	A	B	C	D	E
6	A	B	C	D	E	31	A	B	C	D	E	56	A	B	C	D	E	81	A	B	C	D	E
7	A	B	C	D	E	32	A	B	C	D	E	57	A	B	C	D	E	82	A	B	C	D	E
8	A	B	C	D	E	33	A	B	C	D	E	58	A	B	C	D	E	83	A	B	C	D	E
9	A	B	C	D	E	34	A	B	C	D	E	59	A	B	C	D	E	84	A	B	C	D	E
10	A	B	C	D	E	35	A	B	C	D	E	60	A	B	C	D	E	85	A	B	C	D	E
11	A	B	C	D	E	36	A	B	C	D	E	61	A	B	C	D	E	86	A	B	C	D	E
12	A	B	C	D	E	37	A	B	C	D	E	62	A	B	C	D	E	87	A	B	C	D	E
13	A	B	C	D	E	38	A	B	C	D	E	63	A	B	C	D	E	88	A	B	C	D	E
14	A	B	C	D	E	39	A	B	C	D	E	64	A	B	C	D	E	89	A	B	C	D	E
15	A	B	C	D	E	40	A	B	C	D	E	65	A	B	C	D	E	90	A	B	C	D	E
16	A	B	C	D	E	41	A	B	C	D	E	66	A	B	C	D	E	91	A	B	C	D	E
17	A	B	C	D	E	42	A	B	C	D	E	67	A	B	C	D	E	92	A	B	C	D	E
18	A	B	C	D	E	43	A	B	C	D	E	68	A	B	C	D	E	93	A	B	C	D	E
19	A	B	C	D	E	44	A	B	C	D	E	69	A	B	C	D	E	94	A	B	C	D	E
20	A	B	C	D	E	45	A	B	C	D	E	70	A	B	C	D	E	95	A	B	C	D	E
21	A	B	C	D	E	46	A	B	C	D	E	71	A	B	C	D	E	96	A	B	C	D	E
22	A	B	C	D	E	47	A	B	C	D	E	72	A	B	C	D	E	97	A	B	C	D	E
23	A	B	C	D	E	48	A	B	C	D	E	73	A	B	C	D	E	98	A	B	C	D	E
24	A	B	C	D	E	49	A	B	C	D	E	74	A	B	C	D	E	99	A	B	C	D	E
25	A	B	C	D	E	50	A	B	C	D	E	75	A	B	C	D	E	100	A	B	C	D	E

ROUGH WORK

ROUGH WORK

ROUGH WORK