L-2, JTS (Phy)

भारतीय सूचना प्रौद्योगिकी अभिकल्पना, एवं विनिर्माण संस्थान, कांचीपुरम

INDIAN INSTITUTE OF INFORMATION TECHNOLOGY, DESIGN AND MANUFACTURING, KANCHEEPURAM

Question Booklet

Recruitment for the post of Junior Technical Superintendent

Stream: Physics

Level-2 Test

Application No.	:	
Name of the Candidate	:	
Date of Test	:	**27th November 2025**

Instructions to Candidates:

- The test booklet comprises 100 objective multiple-choice questions (MCQs).
- Candidates must record all responses exclusively on the OMR answer sheet supplied.
- **Each correct answer is awarded one mark, while 0.25 marks will be deducted for every incorrect response.**
- Answers must be marked using only **BLUE or BLACK ballpoint pens.**
- Ensure that the chosen option is clearly shaded in the **OMR sheet** as per the instructions provided on it. Incomplete or ambiguous markings may lead to rejection of the response.
- No additional sheets will be issued for rough work. Candidates may utilize the space provided within the question booklet for any rough calculations or notes.
- At the end of the examination, candidates must return both the OMR answer sheet and the question booklet to the invigilator. Failure to do so may result in disqualification.
- The total duration of the examination is **150** minutes.

Signature of the candidate

For rough work

Indian Institute of Information Technology Design and manufacturing, Kancheepuram

Question paper for the post of Junior Technical superintendent in Physics

The question paper consists of 100 Multiple Choice Questions. Each question carries 1 mark, and any wrong answer will have a negative mark of 0.25 each.

1) Two adjacent sides of a parallelogram are represented by 2 vectors i+2j+3k and 3i- 2j+k. What is the area of the parallelogram?

   A) 8
   B) $8\sqrt{3}$
   C) $3\sqrt{8}$
   D) 192

2) A body is at rest under the action of 3 forces and 2 of which are, F1=4i, F2=6i. The third force is?

   A) 4i+6j
   B) 4i-6j
   C) -4i+6j
   D) -4i-6j

3) A particle moved from position r_1=3i+2j-6k to position r_2 = 4i+j+3kn. What is the work done?

   A) 1J
   B) 0.01J
   C) 10J
   D) 100J

4) Fifty grams of water at zero degree centigrade is mixed with an equal mass of water at 80 degrees centigrade. The resultant increase in entropy is

   A) 6.837 Cal/K
   B) 8.529 Cal/K
   C) 4.64 Cal/K
   D) 2.864 Cal/K

5) If A and B are perpendicular vectors, A= 5i + 7j-3k, B= 2i +2j-ak. Then the value

of a is

A) -2

B) 8

C) -7

D) -8

6) For a particle executing SHM, determine the ratio of average acceleration of the particle between extreme position and equilibrium position with respect to the maximum acceleration

A) $4/\pi$

B) $2/\pi$

C) $1/4\pi$

D) $1/2\pi$ aa

7) A particle executes a SHM of period 10 seconds and amplitude of 1.5 meters. The maximum velocity is ?

A) 0.142 m/s

B) 0.9442 m/s

C) 0.466 m/s

D) 942 m/s.

8) A particle is vibrating in SHM with an amplitude of 4cms. At what displacement from the equilibrium position is its energy half potential and half kinetic?

A) 1cm

B) $\sqrt{2}$ cms

C) 2 cms

D) $2\sqrt{2}$ cms

9) A mass of 0.5kgs hangs from a spring. If the mass is pulled downward and let go it executes SHM. The time period of the same spring is stretched 16cms by 0.4kg mass is

A) 28 sec

B) 2.8 sec

C) 0.28 sec

D) 18 sec

10) The distinction between conductors, semiconductors and insulators is largely concerned with

A) Their ability to conduct current

B) The type of crystal lattice

C) Bonding energy of their electrons

D) Relative widths of their energy gaps

11) If the critical angle for total internal reflection from medium to vacuum is 30^0. The velocity of light in medium is?

A) 3×10^8 m/sec

B) 1.5×10^8 m/sec

C) 6×10^8 m/sec

D) 0.3×10^8 m/sec

12) In a ferro electric material, as the applied electric field is gradually reduced to zero, the polarization still left is known as

A) Coercive polarization

B) Remnant polarization

C) Electronic polarization

D) Ionic polarization

13) Piezo electric effect is the production of electricity by

A) Chemical energy

B) Varying field

C) Temperature

D) Pressure

14) In simple harmonic motion, the acceleration is?

A) Directly proportional to displacement from central position

B) Constant

C) Inversely proportional to displacement from central position

D) Inversely proportional to square of the displacement from central position

15) In order that a thin film of oil floating on the surface of water should show colors due to interference, the thickness of the oil film should be the order of?

A) 1cm

B) 10 A^0

C) 1000 A^0

D) 10000 A^0

16) In young's experiment, with one source of light and 2 slits is performed in water instead of in air.

A) The fringes will be broader

B) The fringes will be smaller in number

C) The fringes will be narrower

D) No fringes will be obtained

17) In case of ferrimagnetic materials the spin moment of 2 sets of atoms are aligned

A) Parallel to each other

B) Anti parallel to each other

C) Anti parallel but unequal magnitude

D) Random

18) In the interference pattern, energy is

A) Conserved but is redistributed

B) Created at the maximum

C) Destroyed at the minima

D) Converted into matter

19) Two coherent waves with same amplitude 'a' interfere, then the maximum intensity expected is as?

A) $2a^2$

B) a^2

C) $4a^2$

D) 2a

20) The dielectric constant of the commonly used ceramic varies between

A) 1 and 3

B) 4 and 10

C) 11 and 16

D) 16 and 25

21) A smaller circular disc is placed in the path of monochromatic light. The center of the geometrical shadow of the object always

A) Bright

B) Dark

C) Colored

D) Half bright and half dark

22) The convex lens in Newton's ring experiment is replaced by an ordinary glass plate, then

A) No interference occurs

B) Circular rings are still obtained

C) Interference takes place but the shape of the fringes is irregular

D) Straight line fringes are obtained

23) The depletion region of an open circuited pn junction contains

A) Electrons

B) Holes

C) Neutralised impurity atoms

D) Uncovered immovable impurity atoms

24) The efficiency of an otto cycle increases as

A) Compression ratio decreases

B) Compression ratio increases

C) Does not depend on compression ratio

D) None of the above

25) When a quartz half wave plate is placed between 2 crossed polaroids such that the half wave plate is oriented 45^0 to the axis of polaroids, the combination will transmit intensity

A) No light

B) One fourth of the intensity of the incident unpolarised light

C) Half of the intensity of the incident unpolarised light

D) None of the above

26) When a beam of unpolarized light passes through a Nicol prism, then O-ray is?

A) Transmitted onwards

B) Totally reflected sideways

C) Partially reflected sideways

D) Absorbed by prism

27) The Boltzmann constant K is given as, if R is the gas constant for molecule of a gas and N is Avogadro number

A) RN

B) R/N

C) N/R

D) R^2N

28) The substances that rotate the plain polarized light are said to be

A) Optically inactive

B) Optically active

C) Opaque

D) Polaroids

29) Polaroid sun glasses decrease glare on a sunny day because they

A) Block a portion of light

B) Have a special colour

C) Completely absorb the light

D) Refract the light

30) The IC chips used in computers and microprocessors are made of Corpuscular nature of light

A) Pure gold

B) Pure silicon

C) Silicon having desired impurities

D) Germanium with silicon and arsenic impurities

31) When a beam of unpolarised light passes through a Nicol prism, then O-ray is?

A) Transmitted onwards

B) Totally reflected sideways

C) Partially reflected sideways

D) Absorbed by prism

32) Nicol prism is based on the action of

A) Refraction

B) Scattering

C) Double refraction

D) None of the above

33) The universal gates are

A) OR and AND

B) NOR and NAND

C) OR and NOT

D) NOT and AND

34) If the Hall Effect is negative, then the semi conductor is

A) P-type

B) Intrinsic

C) N type

D) Extrinsic

35) The law of equipartition of energy was postulated by?

A) Maxwell

B) Boltzmann

C) Stephen

D) Weins

36) Maximum number of orders available with a grating is

A) Independent of grating elements

B) Directly proportional to grating elements

C) Inversely proportional to grating elements

D) Directly proportional to wavelength

37) A diffraction pattern is obtained using a beam of red light. What happens if the red light is replaced by blue light?

A) No change

B) Diffraction bands become narrower and crowded together

C) Bands become broader and further apart

D) Bands disappear

38) When viewed in white light, soap bubbles show colour because

A) Diffraction

b) Interference

C) Scattering

D) Dispersion

39) The condition for observing fraunhoffer diffraction from single slit is that the light wave front incident on the slit should be

A) Cylindrical

B) Spherical

C) Planar

D) All the above wave fronts

40) When white light is incident on diffraction grating, the light that will be deviated from central image will be?

A).Yellow

B) Violet

C) Indigo

D) Red

41) Maximum number of orders available with a grating is

A) Independent of grating elements

B) Directly proportional to grating elements

C) Inversely proportional to grating elements

D) Directly proportional to wavelength

42) An electric iron is marked 220 volts, 500 watts. The units consumed by it in using for 24 hours will be

A) 12

B) 24

C) 5

D) 1100

43) For polyatomic gases such as hydrogen and ozone, the corresponding degree of freedom will be

A) 2,3

B) 5,6

C) 3,4

D) 3,9

44) If an EMF of 10 volts is applied to a circuit having resistance of 10 ohms and inductance of 0.5 henry, the time constant will be?

A) 20 seconds

B) 1/20 seconds

C) 1/10 seconds

D) 10 seconds

45) If the number of turns in primary and also in secondary coils increases two times, the mutual inductance will be?

A) Remain constant

B) Increase 2 times

C) Increase 4 times

D) Reduce 4 times

46) The net gain in entropy of the working substance in a carnot cycle is?

A) Zero

B) Positive

C) Negative

D) May be positive or negative

47) Determine the energy stored in the surface of a soap bubble of radius 2.1cms, if its surface tension is 4.5×10^{-2} N/m

A) 8mJ

B) 4.93×10^{4}J

C) 2.46 mJ

D) None of the above

48) The fuel cut off for increasing efficiency in a diesel engine should be

A) Delayed

B) Should be advanced

C) May be delayed or advanced

D) None of the above

49) For the efficiency of carnot cycle to be maximum

A) Temperature of the source should be infinity

B) Temperature of the sink should be infinity

C) Temperature of the source should be zero

D) None of these

50) If an EMF of 10 volts is applied to a circuit having resistance of 10 ohms and inductance of 0.5 henry, the time constant will be?

A) 20 seconds

B) 1/20 seconds

C) 1/10 seconds

D) 10 seconds

51) At what temperatures the numerical values on the Fahrenheit and Celsius scale is same

A) Zero degrees

B) 32 degrees

C) 180 degrees

D) 40 degrees

52) If the number of turns in primary and also in secondary coils increases two times, the mutual inductance will be?

A) Remain constant

B) Increase 2 times

C) Increase 4 times

D) Reduce 4 times

53) There is a voltage drop of 100 volts across a resistance of 100 ohms. How much power will be consumed?

A) 1000W

B) 100W

C) 10W

D) 0.1W

54) An electric iron is marked 220 volts, 500 watts. The units consumed by it in using for 24 hours will be

A) 12

C) 5

D) 1100

55) The conduction of heat from the hot body to cold body is an example of

A) Reversible process

B) Irreversible process

C) None of the above

D) Both A and B

56) The average value of current (I) in AC circuit is given by

A) 0.637 I_{max}

B) 0.707 I_{max}

C) 2 I_{max}

D) $\sqrt{2}$ I_{max}

57) An engine having compression ratio13.8 and expansion ratio 6, working on diesel cycle. Here γ=1.4. The efficiency is

A) 57.25%

B) 75.24%

C) 64.5%

D) 46.14%

58) When an elastic material with young's modulus E is subjected to a stretching stress S, the elastic energy stored per unit volume of the material is?

A) $S^2/2E$

B) ES/2

C) $S^2 E/2$

D) S/2E

59) A 250W, a 400W and a 1000W lamps are connected in series across the main. The one which will light brightest is?

A) 250W

B) 400W

C) 1000W

D) All will equally bright

60) In a CR circuit, the growth of charge on the condenser is?

A) More rapid if smaller is the product CR

B) More rapid if bigger is the product CR

C) Independent of product CR

D) None of the above

61) The induced emf in a conductor is

A) Inversely proportional to the rate of change of flux

B) Directly proportional to the rate of change of flux

C) Directly proportional to the total flux associated with the conductor

D) None of the above

62) In LCR circuit, the discharge will be oscillatory if?

A) $R^2 = 4L/C$

B) $R^2 > 4L/C$

C) $R^2 < 4L/C$

D) $R^2 < L/4C$

63) The effect of temperature on the value of modulus of elasticity for various substances in general is?

A) It increases with increase in temperature

B) Remains constant

C) Decreases with increase in temperature

D) D)None of the above

64) A spiral spring is stretched by a weight attached to it. The strain will be?

A) Elastic

B) Bulk

C) Shear

D) Tensile

65) The length of H-H bond is

A) 0.074nm

B) 0.01nm

D) 2nm

66) The effect of temperature on the value of modulus of elasticity for various substances in general is?

A) It increases with increase in temperature

B) Remains constant

C) Decreases with increase in temperature

D) None of the above

67) A spiral spring is stretched by a weight attached to it. The strain will be?

A) Elastic

B) Bulk

C) Shear

D) Tensile

68) A simple shear Θ is equivalent to an extension strain and compression strain at right angles to each other of value

A) 2Θ

B) Θ

C) $\Theta/2$

D) $3\Theta/2$

69) The ratio of lateral contraction to longitudinal strain, when a body undergoes linear tensile strain is known as

A) Modulus of elasticity

B) Young's modulus

C) Bulk modulus

D) Poisson's ratio

70) A value of surface tension of 70 dynes/cm is equal to

A) 70 N/m

B) 70×10^{-3} N/m

C) 7×10^2 N/m

D) 7×10^3 N/m

71) A needle floats on the surface of water because of

A) Lighter weight

B) Adhesive force

C) Viscosity

D) Surface tension

72) Which of the following examples can be explained as a result of surface tension?

A) A child sips milk through a straw

B) Spilled mercury forms into small drops

C) Table salt is in the form of cubic crystals

D) The smell of frying fish coming out of the house

73) The viscosity of a gas is directly proportional to

A) Temperature

B) Square root of temperature

C) Characteristic constant

D) Density of gas

74) In super conducting state

A) Entropy alone changes

B) Electronic specific heat changes

C) Both entropy and electronic specific heat changes

D) None of the above

75) Which of the following is not permanent magnetic material

A) Chromium steel

B) Silicon iron

C) Cobalt steel

D) AlNiCo

76) A diesel cycle works at

A) Constant volume

B) Constant pressure
C) Constant temperature
D) None of the above

77) In superconducting state, the energy gap

A) Is large compared to semiconductors and insulators

B) Is zero

C) Is very small compared to semiconductors and insulators

D) Does not change

78) For a given dielectric, the dielectric polarisability

A) Increases with temperature

B) Not affected by temperature

C) Decreases with temperature

D) May increase or decrease with temperature

79) The efficiency of Otto cycle is 50% and γ is 1.5%. The compression ratio is

A) 8

B) 4

C) 6

D) 2

80) Dielectric strength of a material is
A) The capacity to take 2 or more stresses

B) The capacity to withstand higher voltages

C) The capacity to withstand electrical and mechanical shocks

D) None of the above

81) The dielectric constant of the commonly used ceramic varies between

A) 1 and 3

B) 4 and 10

C) 11 and 16

D) 16 and 25

82) The structure of a semi conductor is like that a

Triangle

A) Diamond

B) Circle

C) Rhombus

83) For a given dielectric, the dielectric polarisability

A) Increases with temperature

B) Not affected by temperature

C) Decreases with temperature

D) May increase or decrease with temperature

84) In a dielectric, the power loss is proportional to

A) W

B) W^2

C) 1/W

D) 1/ W^2

85) Dielectric loss in ferrites is?

A) Very high

B) Very low

C) Zero

D) None of these

86) Minimum energy gap required to obtain visible radiation from an LED is

A) One eV

B) 2 eV

C) 3 eV

D) 4eV

87) Piezo electric materials serve as a source of

A) Ultrasonic waves

B) Micro waves

C) Musical waves

D) Resonant waves

88) Ferrites are sub group of?

A) Ferro magnetic materials

B) Ferri magnetic materials

C) Diamagnetic materials

D) Paramagnetic materials

89) The following material is used for making permanent magnets

A) Platinum Cobalt

B) Alnico V

C) Carbon Steel

D) All the three

90) The reverse saturation current in a pn diode

A) Increases

B) Decreases

C) Remains constant with increase of reverse bias

D) Remains constant with decrease of reverse bias

91) When we heat gas keeping volume constant, its pressure changes by

A) 1/273

B) 273

C) 1/2

D) Zero

92) Among the following laser sources, which source will give visible light radiation?

A) Nd YAG laser

B) Nd glass laser

C) CO_2 laser

D) He-Ne laser

93) In He-Ne lasers, the ratio of He-Ne mixture is

A) 10:1

B) 1:10

C) 3:4

D) 1:2

94) Among the following lasers, which laser is widely used in ophthalmology?

A) Ruby laser

B) Nd YAG laser

C) Argon ion laser

D) CO_2 laser

95) Coherence in lasers is coming from

A) Spontaneous emission

B) Stimulated emission

C) Population inversion

D) Non Thermal equilibrium

96) In a ferro electric material, as the applied electric field is gradually reduced to zero, the polarization still left is known as?

A) Coercive polarization

B) Remnant polarization

C) Electronic polarization

D) Ionic polarization

97) Magnetic recording tape is most commonly made from

A) Small particles of iron

B) Iron silicon

C) Ferric oxide

D) Silver nitrate

98) Ferrox cube is most commonly made from

A) Ferric oxide

B) Magnesium manganese ferrite

C) Iron dust

D) None of the above

99) Which of the following sets gives the ferromagnetic curie temperature in ascending order

A) Ni, Fe, Co

B) Co, Ni, Fe

C) Ni, Co, Fe

D) Fe, Co, Ni

100) Magnetic ceramics are

A) Diamagnetic materials

B) Para magnetic materials

C) Ferromagnetic materials

D) Ferrimagnetic materials