JKSSB
JE

Previous Year Paper
2025

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Booklet Serial No. 848377

Test Booklet Series

JUNIOR ENGINEER (SKILL DEVELOPMENT DEPARTMENT) OMR Examination - 2025

A

Time Allowed: 120 Minutes ***Maximum Marks: 120***

INSTRUCTIONS

1. IMMEDIATELY AFTER THE COMMENCEMENT OF THE EXAMINATION, YOU SHOULD CHECK THAT THIS TEST BOOKLET ***DOES NOT*** HAVE ANY UNPRINTED OR TORN OR MISSING PAGES OR ITEMS, ETC. IF SO, GET IT REPLACED BY A COMPLETE TEST BOOKLET.
2. **Please note that it is the candidate's responsibility to encode and fill in the Roll Number, Booklet Serial No. and Test Booklet Series Code A, B, C or D carefully and without any omission or discrepancy at the appropriate places in the OMR Answer /Response Sheet. Any omission/discrepancy will render the Response Sheet liable for rejection.**
3. You have to enter your Roll Number on the Test Booklet in the Box provided alongside.

   DO NOT* write *anything else on the Test Booklet.
4. This Test booklet contains **120** items (questions). Each item comprises of four responses (answers). You will select the response which you want to mark on the Answer Sheet/Response Sheet. In case you feel that there is more than one correct response, mark the response which you consider the appropriate. In any case, choose ***ONLY ONE*** response for each item.
5. You have to mark all your responses ***ONLY*** on the separate Answer /Response Sheet provided. *See directions in the Response Sheet.*
6. ***All*** items carry equal marks.
7. After you have completed filling in all your responses on the Response Sheet and the examination has concluded, you should hand over to the Invigilator ***only the Answer /Response Sheet***. You are permitted to take away with you the Test Booklet and ***Candidate's Copy of the Response Sheet .***
8. Sheets for rough work are appended in the Test Booklet at the end.
9. While writing Centre Code and Roll No. on the top of the Answer Sheet/Response Sheet in appropriate boxes use **"ONLY BLUE/BLACK BALL POINT PEN".**
10. **Penalty for wrong answers:**

    THERE WILL BE PENALTY FOR WRONG ANSWERS MARKED BY THE CANDIDATE IN THE WRITTEN TEST (OBJECTIVE TYPE QUESTIONS PAPERS).

    (i) There are four alternatives for the answer to every question. For each question for which a wrong answer has been given by the candidate, **(¼)** of the marks assigned to that question will be deducted as penalty.

    (ii) If a candidate gives more than one answer, it will be treated as a **wrong answer** even if one of the given answers happens to be correct and there will be same penalty as above for that question.

    (iii) If a question is left blank, i.e., no answer is given by the candidate, there will be **no penalty** for that question.

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(Set - A)

1. _____ are the lines referring to a feature and notes. These are thin continuous lines and terminated by arrowheads or dots.

A) Projection lines

B) Leaders or Pointers lines

C) Arrowheads

D) Dimensions lines

2. A hyperbola revolving around its axis forms a surface called a _____

A) Rectangular hyperbola

B) Boyle's

C) Hyperboloid

D) Projectile's path

3. The major and minor axes of an ellipse are 90 mm and 60 mm respectively. Find the distance between foci?

A) 11 mm

B) 67 mm

C) 104 mm

D) 146 mm

4. _____ is a curve traced by an end of a string or thread, when it is unwound from a circle or a polygon, the thread being kept tight.

A) Cycloids

B) Involutes

C) Spirals

D) Hellices

5. Planes which are inclined to both the horizontal and vertical planes are called

A) Oblique planes

B) Profile planes

C) Reference planes

D) None of the above

6. If a circular plane is inclined at 30° with the horizontal plane and 60° with vertical plane, its side view will be

A) An ellipse

B) A straight line

C) A circle

D) True shape

7. _____ is obtained by revolving a right-angled triangle about its perpendicular side which remains fixed.
   A) Pyramids
   B) Cylinder
   C) Cone
   D) Sphere

8. A square pyramid is resting on a face in the vertical plane (V.P.) The number of dotted lines which will appear in the front view is
   A) One
   B) Two
   C) Three
   D) Four

9. The projection of the section on the principle plane to which the section plane is inclined is known as
   A) Cut surface
   B) Hatching lines
   C) Apparent section
   D) True shape of section

10. In methods of development of solids, which method is generally applied in the development of pyramids and cones?
   A) Parallel line method
   B) Radial line method
   C) Triangulation method
   D) Approximation method

11. Isometric projections cannot be drawn by
   A) Box method
   B) Coordinate method
   C) Offset method
   D) Zone method

12. On isometric plane, a circle appears as
   A) An obolid
   B) A circle
   C) An ellipse
   D) An involute

13. The shape of the section is obtained will depend upon the orientation of the solid and the section plane, with respect to the principle planes of projection. Some of the positions of the section planes are

1. Horizontal plane
2. Auxiliary inclined plane
3. Auxiliary vertical plane
4. Profile plane

From the above, which is/are considered under the types of section planes?

A) 1, 2 and 4
B) 1, 2 and 3
C) 2, 3 and 4
D) 1, 2, 3 and 4

14. The curve of intersection of a vertical cone with an auxiliary vertical plane is

A) Straight line
B) Elliptical curve
C) Parabolic curve
D) Hyperbolic curve

15. Surfaces of various geometrical objects may be classified as given below:

1. Plane surfaces: Surfaces of prisms, pyramids, cube and polyhedral are plane surfaces.
2. Singly curved surfaces: Surfaces of spheres, paraboloid, ellipsoid, hyperboloid are singly curved surfaces.

Choose the correct option.

A) Statement 1 is correct and Statement 2 is incorrect
B) Statement 2 is correct and Statement 1 is incorrect
C) Statement 1 and 2 are correct
D) Statement 1 and 2 are incorrect

16. In Engineering Drawing, the following rules should be observed while lettering:

1. Alphabet should be written in capitals. Lower-case alphabet should be used only when they are accepted in international usage for abbreviations.
2. Alphabet and numerals should neither touch each other nor the lines.

Choose the correct option.

A) Statement 1 is correct and Statement 2 is incorrect
B) Statement 2 is correct and Statement 1 is incorrect
C) Statement 1 and 2 are correct
D) Statement 1 and 2 are incorrect

17. In Engineering Drawing, the following rules should be observed on Dimensioning:

1. Dimensions should be clear and permit multiple interpretations. Numerals and letters should be small enough to ensure simple reading.
2. Dimensions should be placed on the view that most clearly shows the corresponding features.

Choose the correct option.

A) Statement 1 is correct and Statement 2 is incorrect

B) Statement 2 is correct and Statement 1 is incorrect

C) Statement 1 and 2 are correct

D) Statement 1 and 2 are incorrect

18. In Engineering Drawing, the following points are related to Cycloidal curves:

1. Cycloidal curves are generated by a point lying on the circumference of a circle, when it rolls along a fixed straight or a curved path without slipping.
2. Cycloidal curves are commonly used in kinematics (the study of motion) and in mechanisms that work rolling contact.

Choose the correct option.

A) Statement 1 is correct and Statement 2 is incorrect

B) Statement 2 is correct and Statement 1 is incorrect

C) Statement 1 and 2 are correct

D) Statement 1 and 2 are incorrect

19. Match List - I with List-II and select the correct answer using the codes given below the lists:

List I (Representation of line)	**List II (Description)**
i. ----------	1. Long dashed dotted line
ii. —·—·—·—·—·—·—	2. Dashed line
iii.	3. Long dashed double-dotted line
iv. —··—··—··—··—	4. Dotted line

Choose the correct option.

A) (i) - 3, (ii) - 1, (iii) - 4, (iv) - 2
B) (i) - 4, (ii) - 3, (iii) - 2, (iv) - 1
C) (i) - 2, (ii) - 1, (iii) - 4, (iv) - 3
D) (i) - 2, (ii) - 1, (iii) - 3, (iv) - 4

20. Match List - I with List-II and select the correct answer using the codes given below the lists:

List I (Type of Lines)	**List II (Engineering Application)**
i. Dashed narrow lines	1. Dimension line, Extension line, Grid lines
ii. Continuous narrow lines	2. Hidden edges, Hidden outlines
iii. Continuous wide line	3. Visible edges, Visible outlines
iv. Long-dashed double-dotted narrow line	4. Centroidal lines, Parts situated in front of a cutting plane

Choose the correct options:

A) (i) - 3, (ii) - 1, (iii) - 4, (iv) - 2

B) (i) - 4, (ii) - 3, (iii) - 2, (iv) - 1

C) (i) - 2, (ii) - 1, (iii) - 4, (iv) - 3

D) (i) - 2, (ii) - 1, (iii) - 3, (iv) - 4

21. Match List - I with List-II and select the correct answer using the codes given below the lists:

List I (Classification of Solids)	**List II (Descriptions)**
i. Polyhedron	1. It is a solid, having four equal equilateral triangular faces.
ii. Tetrahedron	2. solid bounded by planes called faces, which meet in straight lines called edges.
iii. Dodecahedron	3. It is a solid, having twenty equal equilateral triangular faces.
iv. Icosahedron	4. It is a solid, having twelve equal pentagonal faces.

Choose the correct options:

A) (i) - 3, (ii) - 1, (iii) - 4, (iv) - 2

B) (i) - 4, (ii) - 3, (iii) - 2, (iv) - 1

C) (i) - 2, (ii) - 1, (iii) - 4, (iv) - 3

D) (i) - 2, (ii) - 1, (iii) - 3, (iv) - 4

22. Match List - I with List-II and select the correct answer using the codes given below the lists:

List I (Descriptions)		**List II (Section name)**	
i.	When the cutting planes is inclined to the axis and cuts all the generators of the cone, the section is	1.	Circle
ii.	When the cutting plane is inclined to the axis and is parallel to one of the generators of the cone, the sections is	2.	Hyperbola
iii.	When the cutting plane cuts both the parts of the double cone, the section is	3.	Parabola
iv.	When the cutting plane is perpendicular to the axis of the cone, the curve of the intersection obtained is	4.	Ellipse

Choose the correct options:

A) (i) - 3, (ii) - 1, (iii) - 4, (iv) - 2

B) (i) - 4, (ii) - 3, (iii) - 2, (iv) - 1

C) (i) - 2, (ii) - 1, (iii) - 4, (iv) - 3

D) (i) - 2, (ii) - 1, (iii) - 3, (iv) - 4

23. The following terms are used in connection to a spiral. Match List - I with List-II and select the correct answer using the codes given below the lists:

List I (Terms)		**List II (Descriptions)**	
i.	Pole	1.	It is the angle between the initial position of the line and the instant position of the line
ii.	Radius Vector	2.	It is the fixed end of the line about which the line rotates
iii.	Vectorial Angle	3.	It is the line joining any point of the curve with the pole

Choose the correct options:

A) (i) - 3, (ii) - 1, (iii) - 2

B) (i) - 1, (ii) - 3, (iii) - 2

C) (i) - 2, (ii) - 1, (iii) - 3

D) (i) - 2, (ii) - 3, (iii) - 1

24. The term used very frequently for sections of solids are given bellow:

1. The projection of the section on a plane parallel to the section plane is known as true shape of section.
2. Section planes are the imaginary planes which cut the objects completely or partially to show their invisible and interior details clearly.

Choose the correct option.

A) Statement 1 is correct and Statement 2 is incorrect
B) Statement 2 is correct and Statement 1 is incorrect
C) Statement 1 and 2 are correct
D) Statement 1 and 2 are incorrect

25. For controlling measures on air pollution in industries, which are the mechanical devices used in the manufacturing process?

A) Electrostatic precipitator
B) Cyclone separator
C) Wet scrubber
D) All of the above

26. _____ are specific sites which directly discharge effluents to water sources through pipes, ditches and sewers.

A) Point sources
B) Photochemical smog meta sources
C) DDTA sources
D) Meta controls

27. Which of the following gases are called Greenhouse gases?

A) Methane
B) Nitrogen
C) Carbon dioxide
D) Both (A) and (C)

28. Consider the following statements related to noise pollution:

1. The unpleasant, unwanted and disagreeable sound that causes discomfort for all living beings is called noise pollution.
2. Exposure to noise pollution adversely affects the physiological health of a person and not affects the psychological health of a person.

Choose the correct option.

A) Statement 1 is correct and Statement 2 is incorrect
B) Statement 2 is correct and Statement 1 is incorrect
C) Statement 1 and 2 are correct
D) Statement 1 and 2 are incorrect

29. Match List - I with List-II and select the correct answer using the codes given below the lists:

List I (Pollutants of water pollution)	**List II (Sources of pollutants)**
i. Pathogens or Infectious agents	1. Industrial effluents and house hold cleansers
ii. Sediment	2. Sewage, Paper mill wastes, Animal feedlots
iii. Oxygen demanding wastes	3. Surface run off
iv. Toxic compounds	4. Human and animal wastes

Choose the correct option.

A) (i) - 3, (ii) - 1, (iii) - 4, (iv) - 2

B) (i) - 4, (ii) - 3, (iii) - 2, (iv) - 1

C) (i) - 2, (ii) - 1, (iii) - 4, (iv) - 3

D) (i) - 2, (ii) - 1, (iii) - 3, (iv) - 4

30. The environment can be divided into four segments. The segments are _____

A) Atmosphere, Hydrosphere, Elansphere, Melonshphere

B) Lithosphere, Biosphere, Melonshphere, Deltosphere

C) Atmosphere, Hydrosphere, Lithosphere, Biosphere

D) Hydrosphere, Lithosphere, Deltosphere, Shalesphere

31. A car is travelling along a circular path having a radius of 15 m. Determine the magnitude of the car's acceleration if at a given instant the car's speed is $v = 3$ m/s and the rate of increase in speed is $v = 2$ m/s^2.

A) 1.04 m/s^2 B) 2.09 m/s^2

C) 2.64 m/s^2 D) 3.06 m/s^2

32. A motorist is travelling on a curved portion of a highway of radius 400 m at a speed of 90 km/h. The brakes are suddenly applied, causing the speed to decrease at a constant rate of 1.5 m/s^2. Determine the magnitude of the acceleration of the automobile immediately after the brakes have been applied.

A) 2.17 m/s^2 B) 3.00 m/s^2

C) 2.56 m/s^2 D) 4.33 m/s^2

33. The polar coordinates of a particle are given by ($r = 2 + 3t^2$) and ($\theta = 2 + 1.5t^2$) where r is in meters, θ is in radians and t is in seconds. Determine the magnitude of the velocity (v) when $t = 3$ s.

A) 215 m/s B) 261 m/s

C) 334 m/s D) None of the above

34. If a body is rotating about an axis, passing through its centre of mass then its angular momentum is directed along its:

A) Radius
B) Tangent
C) Axis of rotation
D) None of the above

35. A mass is moving with a constant velocity with respect to X-axis, then its angular momentum with respect to origin will _____

A) Decreases
B) Increases
C) Remain constant
D) Zero

36. _____ of a rigid body is easily demonstrated by rolling a right circular cylinder or disk along a flat surface in such a way that its geometric axis always remains parallel to itself.

A) Segment rotation
B) Plane motion
C) Particle translation rotate
D) None of the above

37. Consider the following statements related to Kinematics of rigid bodies:

1. The instantaneous centre is not a fixed point. Its location keeps changing at every instant and the path traced (locus) by it is called centrode.
2. The instantaneous centre is a point identified within the body where the velocity is zero.

Choose the correct option.

A) Statement 1 is correct and Statement 2 is incorrect
B) Statement 2 is correct and Statement 1 is incorrect
C) Statement 1 and 2 are correct
D) Statement 1 and 2 are incorrect

38. Which of the following statements of D'Alembert's principle are correct?

1. The net external force F actually acting on the body and the inertia force F_1 together keep the body in a state of fictitious equilibrium.
2. It tends to give solution of a static problem an appearance akin to that of a dynamic problem.

Choose the correct option.

A) Statement 1 is correct and Statement 2 is incorrect
B) Statement 2 is correct and Statement 1 is incorrect
C) Statement 1 and 2 are correct
D) Statement 1 and 2 are incorrect

39. Consider the following statements related to momentum and impulse:

1. Momentum of the particle is given by the product of mass and velocity of the particle. The unit of momentum is kg m/s
2. Impulse of the particle is given by the product of force and the time of applied force. The unit of impulse is N s or kg m/s

Choose the correct option.

A) Statement 1 is correct and Statement 2 is incorrect
B) Statement 2 is correct and Statement 1 is incorrect
C) Statement 1 and 2 are correct
D) Statement 1 and 2 are incorrect

40. Match List - I with List-II and select the correct answer using the codes given below the lists:

List I (Concept/theory)	**List II (Explanation)**
i. Chasle's theorem	1. A rigid body is said to have translatory motion if an imaginary straight line drawn on the body remains parallel to the original position during its motion
ii. General plane motion	2. Any plane motion which is neither a rotation nor a translation
iii. Translation	3. Any general displacement of a rigid body can be represented by a combination of a translatory motion and rotational motion

Choose the correct option.

A) (i) - 3, (ii) - 2, (iii) - 1
B) (i) - 2, (ii) - 1, (iii) - 3
C) (i) - 1, (ii) - 2, (iii) - 3
D) (i) - 3, (ii) - 1, (iii) - 2

41. Match List - I with List-II and select the correct answer using the codes given below the lists:

List I (Newton's Laws of Motion)	**List II (Concepts)**
i. Newton's 1st Law of Motion	1. $F = ma$
ii. Newton's 2nd Law of Motion	2. $F_{AB} = -F_{BA}$
iii. Newton's 3rd Law of Motion	3. A particle remains at rest or continuous to move in a straight line with a constant speed if the resultant force acting on it is zero

Choose the correct option.

A) (i) - 3, (ii) - 2, (iii) - 1
B) (i) - 2, (ii) - 1, (iii) - 3
C) (i) - 1, (ii) - 2, (iii) - 3
D) (i) - 3, (ii) - 1, (iii) - 2

42. The equation of motion will be integrated with respect to _____ rather than _____ and the resulting equation is called the principle of _____ and _____.

Choose the correct answer in correct order.

A) displacement, angular movement, general, plane motion

B) time, displacement, impulse, momentum

C) time, angular movement, general, plane motion

D) angular movement, plain movement, impulse, momentum

43. Electromagnetic waves are produced by

A) a static charge

B) a moving charge

C) an accelerating charge

D) chargeless particles

44. An electromagnetic wave going through vacuum is described by $E = E_0 \text{ Sin}(Kx - \omega t); B = B_0 \text{ Sin}(kx - \omega t)$. Then

A) $E_0 k = B_0 \omega$

B) $E_0 B_0 = \omega k$

C) $E_0 \omega = B_0 k$

D) None of the above

45. The electric field component of a time harmonic plane EM wave travelling in a nonmagnetic lossless dielectric medium has an amplitude of 1 V/m. If the relative permittivity of the medium is 4, the magnitude of the time-average power density vector is

A) $\frac{1}{30\pi} \text{W}/m^2$

B) $\frac{1}{60\pi} \text{W}/m^2$

C) $\frac{1}{120\pi} \text{W}/m^2$

D) $\frac{1}{240\pi} \text{W}/m^2$

46. The Poynting vector P is equal to

A) E . H

B) E x H

C) E / H

D) H / E

47. A series resonant circuit has $R = 2\ \Omega$, $L = 1$ mH and $C = 0.1\ \mu$F, the value of quality factor Q is

A) 25

B) 30

C) 40

D) 50

48. In a viscous damping vibrating system, the amplitude of vibration reduces to 0.125 of its initial value after six oscillations. What will be the ratio of amplitudes after eighth oscillation to that of after fourth oscillations?

A) 0.125 B) 0.25
C) 0.50 D) 0.75

49. A particle of mass "m" is confined to a one-dimensional box between x = 0 and x = L. Find the expectation value of the position x of the particle in the ground state.

A) L/2 B) L/4
C) L/3 D) None of the above

50. Diffusion current in a p-n junction is greater than the drift current in magnitude _____

A) if the junction is forward-biased
B) if the junction is reverse-biased
C) if the junction is unbiased
D) in no case

51. Hall effect principle is employed in the following cases:

1. Magnetic field sensing equipment
2. Proximity detectors
3. Hall effect Sensors and Probes
4. Linear or Angular displacement transducers

From the above, which is/are considered the applications of Hall Effect?

A) 3 Only
B) 1, 2, and 3
C) 1, 3, and 4
D) 1, 2, 3 and 4

52. A thin transparent film with refractive index n = 1.3 is spread on a window glass with a refractive index of 1.5. The thickness of the film should be multiples of which value such that the reflected light does not contain red? (Take the wavelength of red light as 700 nm)

A) 95 nm
B) 135 nm
C) 185 nm
D) None of the above

53. In an experiment of a single slit diffraction, the width of the slit is 1.2 μm and the angular width of central maxima is observed to be equal to π/3. Find the wavelength of light.

A) $6\times10^{-6}m$ B) $6\times10^{-7}m$
C) $6\times10^{-8}m$ D) $6\times10^{-9}m$

54. Under logarithmic decrement, the amplitude of successive vibrations are

A) Constant

B) In arithmetic progression

C) In geometric progression

D) In logarithmic progression

55. Consider the following statements regarding a linearly polarized, plan electromagnetic wave:

1. The electric field and the magnetic field have equal average values.
2. The electric energy and the magnetic energy have equal average values.

Choose the correct option.

A) Statement 1 is correct and Statement 2 is incorrect

B) Statement 2 is correct and Statement 1 is incorrect

C) Statement 1 and 2 are correct

D) Statement 1 and 2 are incorrect

56. For Poynting vector, following are given:

1. Poynting Vector around a point source is radial.
2. Poynting vector does not exist around a point source.

Choose the correct option.

A) Statement 1 is correct and Statement 2 is incorrect

B) Statement 2 is correct and Statement 1 is incorrect

C) Statement 1 and 2 are correct

D) Statement 1 and 2 are incorrect

57. Consider the following Statements:

Statement 1: The oscillation of a body whose amplitude goes on decreasing with time is defined as a damped oscillation.

Statement 2: The oscillation in which a body oscillates under the influence of an external periodic force is known as forced oscillation.

Choose the correct option.

A) Statement 1 is correct and Statement 2 is incorrect

B) Statement 2 is correct and Statement 1 is incorrect

C) Statement 1 and 2 are correct

D) Statement 1 and 2 are incorrect

58. Kirchhoff's laws:

1. The Junction Law: The sum of all the currents directed towards a point in a circuit is equal to the sum of all the currents directed away from the point.
2. The Loop Law: The algebraic sum of all the potential differences along a closed loop in a circuit is negative to infinite.

Which of the above statements are correct?

A) Statement 1 is correct and Statement 2 is incorrect

B) Statement 2 is correct and Statement 1 is incorrect

C) Statement 1 and 2 are correct

D) Statement 1 and 2 are incorrect

59. Consider the following statements

1. Waves created on the surfaces of a water pond by a vibrating source
2. Wave create by an oscillating electric filed in air
3. Sound waves travelling under water

Which of these can be polarized?

A) 1 only

B) 2 only

C) 1 and 2

D) 1, 2, and 3

60. Match List - I with List-II and select the correct answer using the codes given below the lists:

List - I (Law)	**List - II (Descriptions)**
i. Ampere Maxwell's Law	1. Law specifically describes the generation of an electric field due to a changing magnetic field, not vice versa.
ii. Kirchhoff's Law	2. Law relates to the generation of electromagnetic waves by oscillating charges, not specifically to the relationship between electric and magnetic field
iii. Faraday's Law	3. Laws describe the behavior of electrical circuits and do not directly relate to the relationship between electric and magnetic fields
iv. Hertz's Law	4. Fundamental law of electromagnetism that describes the relationship between a changing electric field and a magnetic field

Choose the correct option:

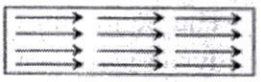
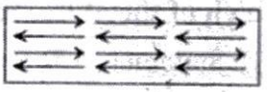
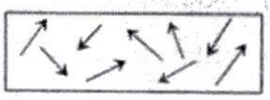
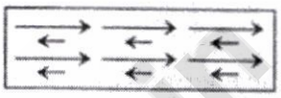
A) i - 1, ii - 4, iii - 3, iv - 2

B) i - 4, ii - 3, iii - 1, iv - 2

C) i - 2, ii - 1, iii - 4, iv - 3

D) None of the above

61. Match List - I with List-II and select the correct answer using the codes given below the lists:

List - I (Type of Magnetic Materials)	**List-II (Schematic Arrange ments)**
i. Paramagnetic	1. 
ii. Ferromagnetic	2. 
iii. Antiferromagnetic	3. 
iv. Ferrimagnetic	4. 

Choose the correct option:

A) (i) - 1, (ii) - 4, (iii) - 3, (iv) - 2
B) (i) - 4, (ii) - 3, (iii) - 1, (iv) - 2
C) (i) - 2, (ii) - 1, (iii) - 4, (iv) - 3
D) (i) - 3, (ii) - 1, (iii) - 2, (iv) - 4

62. Match List - I with List-II and select the correct answer using the codes given below the lists:

List I (Material)	**List II (Type of Semiconductors)**
i. Copper	1. Conductor
ii. Silicon	2. p-type semiconductor
iii. Silicon doped with phosphorus	3. n-type semiconductor
iv. Silicon doped with aluminum	4. Intrinsic Semiconductor

Choose the correct option:

A) (i) - 1, (ii) - 4, (iii) - 3, (iv) - 2
B) (i) - 1, (ii) - 2, (iii) - 3, (iv) - 4
C) (i) - 4, (ii) - 1, (iii) - 2, (iv) - 3
D) (i) - 4, (ii) - 1, (iii) - 3, (iv) - 2

63. Polarized light can be produced by

A) NaCI crystal
B) Biprism
C) Nicol Prism
D) Prism with flint glass

64. Schrodinger wave equation:

1. Schrodinger wave equation is a mathematical expression describing the energy, momentum and position of the electron in space and time.
2. The Schrödinger equation is a partial differential equation that describe the dynamics of quantum mechanical systems via the wave function.

Which of the above statements are correct?

A) Statement 1 is correct and Statement 2 is incorrect

B) Statement 2 is correct and Statement 1 is incorrect

C) Statement 1 and 2 are correct

D) Statement 1 and 2 are incorrect

65. The energy bands which are completely filled at 0 K are called _____. The bands with higher energies are called _____.

A) conduction bands, valence bands

B) valence bands, conduction bands

C) conduction bands, drift and diffusion

D) valence bands, drift and diffusion

66. In Fraunhofer diffraction, the source of light and the screen on which diffraction pattern is obtained is at _____ distance from the diffracting system. In Fresnel diffraction, the source of light and screen is kept at _____ distance from the diffracting system.

A) infinite, finite

B) finite, infinite

C) 0, infinite

D) infinite, 0

67. Which one is considered as a multi-user computer system which is capable of supporting hundreds of users simultaneously?

A) Personal Computer

B) WorkStation

C) Main Frame

D) None of the above

68. Which of the following software helps the users to detect the errors while executing program?

A) Language Translator

B) Debugger

C) Loader

D) Linker

69. Which one of the following is typed in the Run dialog box to access MS word?

A) winword

B) word

C) msword

D) wordprogram

70. MS PowerPoint is an application software included in the MS Office package that allows us to ____

A) Perform mathematical model analysis
B) Create a technical report
C) Create presentations
D) All of the above

71. What is the combination of several worksheets in MS Excel called?

A) Workbook
B) Spread sheet
C) Excel sheet
D) None of above

72. Which topology is the combination of multiple topologies, used for constructing a single large topology?

A) Star topology
B) Bus topology
C) Hybrid topology
D) Mesh topology

73. The following statements are major functions of Operating System (OS):

1. Interpretation of commands and instructions
2. Providing a friendly interface between the computer and the user
3. Coordination and assignment of different hardware devices to the programs
4. Ensuring security of access to computer resources

Which are the statements considered a function of OS

A) 1 and 3
B) 1, 3, and 4
C) 2, 3, and 4
D) 1, 2, 3 and 4

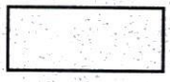
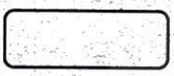
74. Based on the type of control structures, the following statements are given:

1. Selection structure: In the selection structure, two sets of statement blocks are written in a program along with one or more conditions. The execution of a particular block's statements occurs only if the conditional statement specified at the beginning of the block is true. A selection structure is also known as looping structure.
2. Repetition structure: In the repetition structure, a block of two or more instructions is specified along with a conditional statement. The execution of these instructions is repeated many times if the conditional statement is true. This structure is also known as branching structure.

Based on the above, which statements are correct?

A) Statement 1 is correct and Statement 2 is incorrect
B) Statement 2 is correct and Statement 1 is incorrect
C) Statement 1 and 2 are correct
D) Statement 1 and 2 are incorrect

75. Match List - I with List-II and select the correct answer using the codes given below the lists:

List - I (Function)	**List -II (Symbol of flowchart)**
i. Start and end	1. 
ii. Input or output	2. 
iii. Action or process	3. 
iv. Decision or condition	4. 

Choose the correct option:

A) (i) - 1, (ii) - 4, (iii) - 3, (iv) - 2
B) (i) - 4, (ii) - 3, (iii) - 1, (iv) - 2
C) (i) - 2, (ii) - 1, (iii) - 4, (iv) - 3
D) (i) - 3, (ii) - 1, (iii) - 2, (iv) - 4

76. Match List - I with List-II and select the correct answer using the codes given below the lists:

List - I (Operation)	**List - II (Description)**
1. Store data	i. Performing arithmetic, and logical operations on data in order to convert them into useful information
2. Processing data	ii. Directs the manner and sequence in which all of the operations (input, store, process, output) are performed.
3. Control the workflow	iii. Saving data and instructions so that they are available for processing as and when required

Choose the correct option:

A) 1 - i, 2 - ii, 3 - iii
B) 1 - ii, 2 - iii, 3 - i
C) 1 - iii, 2 - i, 3 - ii
D) 1 - iii, 2 - ii, 3 - i

77. Match List - I with List-II and select the correct answer using the codes given below the lists:

List - I (Software)	List - II (Task Performed)
i. System management programs	1. designed for performing common application jobs
ii. System development programs	2. developed by the users themselves to support their specific needs
iii. Standard application programs	3. developing and executing application software
iv. Unique application programs	4. managing both the hardware and software systems

Choose the correct option:

A) (i) - 1, (ii) - 4, (iii) - 3, (iv) - 2
B) (i) - 4, (ii) - 3, (iii) - 1, (iv) - 2
C) (i) - 2, (ii) - 1, (iii) - 4, (iv) - 3
D) (i) - 3, (ii) - 1, (iii) - 2, (iv) - 4

78. Based on the history of internet, arrange the following facilities in chronological order of development (developed or introduced):

A) NSFNET, ARPANET, X.25, Eunet, World Wide Web
B) ARPANET, NSFNET, X.25, Eunet, World Wide Web
C) ARPANET, X.25, Eunet, NSFNET, World Wide Web
D) NSFNET, Eunet, ARPANET, X.25, World Wide Web

79. Green's theorem is used to _____

A) Transform the line integral in xy - plane to a surface integral on the same xy - plane
B) Transform double integrals into triple integral in a region v
C) Transform surface integral into line integral
D) None of the above

80. $\frac{d}{dx}\left(\cot h^{-1}x\right) =$

A) $\frac{1}{\sqrt{x^2-1}}$
B) $\frac{1}{x^2-1}$
C) $-\frac{1}{x\sqrt{x^2-1}}$
D) None of the above

81. Find the minimum value of function $f(x) = x^2 - x + 2$

A) 1/2 B) 3/4

C) 7/4 D) 1/4

82. If $x = t^2$, $y = t^3$, then $\frac{d^2y}{dx^2}$ is

A) $\frac{3}{2}$

B) $\frac{3}{4t}$

C) $\frac{3}{2t}$

D) $\frac{3}{4}$

83. The value of $\int_0^{\pi} \frac{dx}{1+e^{\cos x}}$ is

A) π

B) $\pi / 2$

C) $\pi / 3$

D) $\pi / 4$

84. Taylor's series of $f(x,y) = e^x \log(1+y)$ in powers of x and y up to second degree is

A) $1+y+\frac{1}{2}(2xy-y^2)$

B) $y+\frac{1}{2}(xy-y^2)$

C) $y+\frac{1}{2}(2xy-y^2)$

D) None of the above

85. A differential equation is considered to be ordinary if it has

A) One dependent variable

B) More than one dependent variable

C) One independent variable

D) More than one independent variable

86. Find the directional derivative of the function f (x, y, z) = 2xy + z^2 at the point (1, -1, 3) in the direction of the vector i + 2j + 2k.

A) 28/21 B) 14/3

C) 3/22 D) 14/8

87. If $\vec{F} = \frac{xi + yj + zk}{\sqrt{x^2 + y^2 + z^2}}$, Find the value of divergence $\vec{F}$.

A) $\frac{1}{\sqrt{x^2 + y^2 + z^2}}$

B) $\frac{2}{\sqrt{x^2 + y^2 + z^2}}$

C) $\frac{6}{\sqrt{x^2 + y^2 + z^2}}$

D) None of the above

88. If $\vec{F} = \frac{xi + yj + zk}{\sqrt{x^2 + y^2 + z^2}}$, Find curl $\vec{F}$

A) 0

B) 1

C) $\frac{1}{\sqrt{x^2 + y^2 + z^2}}$

D) None of the above

89. Suppose $\vec{F}(x, y, z) = x^3 i + yj + zk$ is the force field. Find the work done by along the line from the (1, 2, 3) to (3, 5, 7).

A) 124 / 4 B) 202 / 4

C) 308 / 4 D) None of the above

90. Find the area bounded by xy-plane, the cylinder $x^2 + y^2 = 1$ and the plane $x + y + z = 3$.

A) $2\pi - \frac{3}{2}$

B) $3\pi - \frac{4}{3}$

C) $3\pi - \frac{3}{2}$

D) $2\pi - \frac{4}{3}$

91. Consider the following statements:

Statement 1: Green's theorem is a particular case of Stokes theorem.

Statement 2: Stokes' theorem is a particular case of Green's theorem

Statement 3: Both Stokes' theorem and Green's theorem are same

Choose the correct option:

A) Statement 1 is correct and Statement 2 and 3 are incorrect

B) Statement 2 is correct and Statement 1 and 3 are incorrect

C) Statement 3 is correct and Statement 1 and 2 are incorrect

D) Statement 1, 2 and 3 are incorrect

92. Consider the following statements:

Stokes theorem is valid irrespective of

1. Shape of closed curve C
2. Type of vector A
3. Type of coordinate system
4. Whether the surface is closed or open

Which of the above statements are correct?

A) 1, 2 and 4 B) 1, 3, and 4

C) 1, 2 and 3 D) 1, 2, 3 and 4

93. If a continuous function f(x) does not have a root in the interval [a, b], then which one of the following statements is TRUE?

A) f(a). f(b) = 0 B) f(a). f(b) < 0

C) f(a). f(b) > 0 D) f(a). f(b) < = 0

94. Consider the following statements:

Statement 1: Euler's integral of first kind is nothing but the Beta function and Euler's integral of second kind is nothing but Gamma function. These integrals were considered by L.Euler.

Statement 2: The value of $\int_0^1 \log(y)^8 dy = 8!$

Choose the correct option

A) Statement 1 is correct and Statement 2 is incorrect

B) Statement 2 is correct and Statement 1 is incorrect

C) Statement 1 and 2 are correct

D) Statement 1 and 2 are incorrect

95. Consider the following statements:

Statement 1: The function $f(x)=4x+3,\ x\in R$ is an increasing function

Statement 2: The function $f(x)=\log(\cos x)$ is increasing function for $\left[0, \frac{\pi}{2}\right]$

Choose the correct option:

A) Statement 1 is correct and Statement 2 is incorrect

B) Statement 2 is correct and Statement 1 is incorrect

C) Statement 1 and 2 are correct

D) Statement 1 and 2 are incorrect

96. Match List - I with List-II and select the correct answer using the codes given below the lists:

List I (Derivatives)	**List II (Result)**
1. $\frac{d}{dx}(\tan x)$	i. sec x tan x
2. $\frac{d}{dx}(\cos x)$	ii. $\sec^2 x$
3. $\frac{d}{dx}(\sec x)$	iii. - sin x

Choose the correct option:

A) (1) - i, (2) - ii, (3) - iii

B) (1) - ii, (2) - iii, (3) - i

C) (1) - iii, (2) - i, (3) - ii

D) (1) - iii, (2) - ii, (3) - i

97. Find the value of c in Rolle's theorem for the given function in List I and match with List II. Select the correct answer using the codes given below the lists:

List I (Function)	**List II (Value of c)**
1. $f(x)=e^x \sin x,\ x\in[0, \pi]$	i. 2π
2. $f(x)=\cos\frac{x}{2}$ on $[\pi, 3\pi]$	ii. 1
3. $f(x)=x^3-3x$ *in the interval* $\in\left[0, \sqrt{3}\right]$	iii. $\frac{3\pi}{4}$

Choose the correct option:

A) (1) - i, (2) - ii, (3) - iii

B) (1) - i, (2) - iii, (3) - ii

C) (1) - iii, (2) - i, (3) - ii

D) (1) - iii, (2) - ii, (3) - i

98. Match List - I with List-II and select the correct answer using the codes given below the lists:

List - I (Problem) **List - II (Answer)**

1. Area of double integral in Cartesian co-ordinate is equal to — i. $\iint_R f(r\cos\theta, r\sin\theta) r dr d\theta$
2. Area of the double integral in Polar co-ordinate is equal to — ii. $\iint_R r dr d\theta$
3. Identify the appropriate formula for changing cartesian to polar co-ordinates in the double integration $\iint_R f(x, y) dx\, dy \text{ over } R$ — iii. $\iint_R dy dx$

Choose the correct option:

A) (1) - i, (2) - ii, (3) - iii
B) (1) - ii, (2) - iii, (3) - i
C) (1) - iii, (2) - ii, (3) - i
D) None of the above

99. Match List - I with List-II and select the correct answer using the codes given below the lists:

Properties of a Gradient: If are the scalar point functions, and C is a constant.

List -I **List - II**

1. $\nabla(\varphi\ \psi) =$ — i. $\varphi = c$
2. $\nabla(c\ \varphi) =$ — ii. $\varphi\nabla\psi + \psi\nabla\varphi$
3. $\nabla\varphi = c$ if — iii. $c\nabla\varphi$

Choose the correct option:

A) (1) - i, (2) - ii, (3) - iii
B) (1) - ii, (2) - iii, (3) - i
C) (1) - iii, (2) - i, (3) - ii
D) None of the above

100. Match List - I with List-II and select the correct answer using the codes given below the lists:

List -I **List -II**

1. $\int_0^1 \int_0^{x^2} e^{\frac{y}{x}} dy\, dx$ — i. $\frac{1}{2}$
2. $\int_0^1 \int_{x^2}^{x} xy\,(x+y)\, dy\, dx$ — ii. $\frac{3}{56}$
3. $\int_0^1 \int_0^{x^2} (x^2 + y^2)\, dx\, dy$ — iii. $\frac{26}{105}$

Choose the correct option:

A) (1) - i, (2) - ii, (3) - iii
B) (1)- ii, (2) - iii, (3) - i
C) (1) - iii, (2) - i, (3) - ii
D) (1)- iii, (2) - ii, (3) - i

101. The extreme values if any of the function given by $f(x) = \sin 2x + 5$ is

A) Maximum value 4 and minimum value 6
B) Maximum value 6 and minimum value - 6
C) Maximum value 6 and minimum value 4
D) Maximum value 4 and minimum value 4

102. Use the method of Lagrange's multipliers to find the extreme value of $f(x, y, z) = 2x+3y+z$ subject to $x^2 + y^2 = 5$ and $x + z = 1$.

A) $1 - 5\sqrt{2}$
B) $1 - 3\sqrt{2}$
C) $1 - \sqrt{2}$
D) None of the above

103. Mahatma Gandhi gave the title of Sardar to Vallabhbhai Patel for his great organizational skill in

A) The Kheda Sathyagraha
B) The Bardoli Sathyagrah
C) The Salt Sathyagraha
D) The Individual Sathyagraha

104. UNESCO stands for _____

A) United Nations Economic, Scientific and Cultural Organization
B) United Nations Educational, Scientific and Commercial Organization
C) United Nations Economic, Scientific and Commercial Organization
D) United Nations Educational, Scientific and Cultural Organization

105. Which one is not considered under the Sustainable Development Goals in India?

A) Sustainable Cities and Communities
B) Life Below Water
C) Peace, Justice and Strong Institutions
D) None of the above

106. Which disease spreads through open defecation?

A) Cholera
B) Malaria
C) Dengue
D) Elephantiasis

107. Rabindranath Tagore won the Nobel Prize for literature in _____

A) 1903
B) 1911
C) 1913
D) 1917

108. Which country held the FIFA World Cup 2022?

A) Brazil

B) France

C) Qatar

D) Paris

109. The 770 MW (7 × 110 MW) Srisailam Hydro Electric Project is constructed across the river _____

A) Krishna

B) Kaveri

C) Godavari

D) Thamirabarani

110. In which district of Himachal Pradesh 'Prashar Lake' is situated?

A) Kullu

B) Kinnar

C) Shimla

D) Mandi

111. Who was the first Indian to win an individual medal in Olympics?

A) Milkha Singh

B) P.T. Usha

C) K. D. Jadhava

D) Karnan Malleshwari

112. Consider the following statements:

Statement 1: The World Health Organization (WHO) has declared India the first country in the world to eliminate leprosy, a major public health achievement.

Statement 2: Headquarters of UNESCO are located at Paris.

Choose the correct option

A) Statement 1 is correct and Statement 2 is incorrect

B) Statement 2 is correct and Statement 1 is incorrect

C) Statement 1 and 2 are correct

D) Statement 1 and 2 are incorrect

113. Consider the following statements:

Statement 1: The famous Lucknow pact of 1916 was signed between Bal Gangadhar Tilak and Muhammad Ali Jinnah.

Statement 2: Green color in Indian National Flag signifies fertility, growth and auspiciousness of the land.

Choose the correct option

A) Statement 1 is correct and Statement 2 is incorrect

B) Statement 2 is correct and Statement 1 is incorrect

C) Statement 1 and 2 are correct

D) Statement 1 and 2 are incorrect

114. Consider the following statements:

Statement 1: The Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation (BIMSTEC) is a regional organization that was established on 06 June 1997 with the signing of the Bangkok Declaration.

Statement 2: There are five South Asian nations participating in BIMSTEC: Nepal, India, Maldives, Iran, Bhutan

Choose the correct option:

A) Statement 1 is correct and Statement 2 is incorrect

B) Statement 2 is correct and Statement 1 is incorrect

C) Statement 1 and 2 are correct

D) Statement 1 and 2 are incorrect

115. Which of the following statements regarding Isolation during COVID-19 is/are correct?

1. It is used for people suffering from COVID-19 symptoms or who have tested positive for the virus.
2. In isolation means being separated from other people, mainly in a medical facility where you can receive clinical care.

A) Statement 1 is correct and Statement 2 is incorrect

B) Statement 2 is correct and Statement 1 is incorrect

C) Statement 1 and 2 are correct

D) Statement 1 and 2 are incorrect

116. Match List - I with List-II and select the correct answer using the codes given below the lists:

List I (State)	**List II (Official Language)**
1. Meghalaya	i. English
2. Daman and Diu	ii. Konkani
3. Nagaland	iii. Garo and Khasi

Choose the correct option:

A) (1) - ii, (2) - i, (3) - iii

B) (1) - ii, (2) - iii, (3) - i

C) (1) - iii, (2) - i, (3) - ii

D) (1) - iii, (2) - ii, (3) - i

117. Match List - I with List-II and select the correct answer using the codes given below the lists:

List - I (State)	**List - II (Classical Dance)**
1. Kathak	i. Andhra Pradesh
2. Kuchipudi	ii. Uttar Pradesh
3. Bharatanatyam	iii. Kerala
4. Kathakali	iv. Tamil Nadu

Choose the correct option:

A) (1) - ii, (2) - i, (3) - iv, (4) - iii

B) (1) - ii, (2) - iii, (3) - iv, (4) - i

C) (1) - ii, (2) - i, (3) - iii, (4) - iv

D) (1) - iii, (2) - ii, (3) - i, (4) - iv

118. Match List - I with List-II and select the correct answer using the codes given below the lists:

List - I (Name of the organization)	**List - II (any one founder)**
1. Servant of Indian Society	i. Raja Ram Mohan Roy
2. Servants of the People Society	ii. Gopal Krishna Gokhale
3. Brahmo Samaj	iii. Lala Lajpat Rai

Choose the correct option:

A) (1) - i, (2) - ii, (3) - iii

B) (1) - ii, (2) - iii, (3) - i

C) (1) - iii, (2) - i, (3) - ii

D) (1) - iii, (2) - ii, (3) - i

119. Match List - I with List-II and select the correct answer using the codes given below the lists:

List - I (Recipients)	**List - II (Nobel Prize Category)**
i. C.V. Raman	1. Physiology or Medicine
ii. Kailash Satyarthi	2. Economic Sciences
iii. Har Gobind Khorana	3. Nobel Peace Prize
iv. Amartya Sen	4. Physics

Choose the correct option:

A) (i) - 1, (ii) - 4, (iii) - 3, (iv) - 2
B) (i) - 4, (ii) - 3, (iii) - 1, (iv) - 2
C) (i) - 2, (ii) - 1, (iii) - 4, (iv) - 3
D) (i) - 3, (ii) - 1, (iii) - 2, (iv) - 4

120. Consider the following events: Choose the correct chronological sequence.

1. Royal Indian Navy Revolt
2. Announcement of Cabinet Mission
3. Interim Government Formation

A) 2, 1, 3
B) 3, 2, 1
C) 1, 2, 3
D) 1, 3, 2

ROUGH WORK