

Question Booklet Serial No.: 220419

PUMEET – 2022

Important: Please consult your Admit Card/Roll No. slip before filling your Roll Number on the Test Booklet and Answer Sheet.

Roll No. (In Figure) (In Words)

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O.M.R. Answer Sheet Serial No.

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Signature of Candidate: _____

Signature of Invigilator: _____

Time: 100 Minutes

Number of Questions: 100

Maximum Marks: 100

DO NOT OPEN THE SEAL ON THE BOOKLET UNTIL ASKED TO DO SO.

INSTRUCTIONS:

1. Write your Roll No. on the Questions Booklet and also on the OMR Answer Sheet in the space provided and nowhere else.
2. Enter the Question Booklet Serial No. on the OMR Answer Sheet. Darken the corresponding bubbles with **Black Gel Pen**.
3. Do not make any identification mark on the Answer Sheet or Question Booklet.
4. Please check that this Question Booklet contains **100** Questions. In case of any discrepancy, inform the Assistant Superintendent within 10 minutes of the start of Test.
5. Each question has four alternative answer (A,B,C,D) of which only one is correct. For each question, darken only one bubble (A or B or C or D), whichever you think is the correct answer, on the Answer Sheet with **Black Ball Point/Black Gel Pen**. **There shall be negative marking for wrong answer, $\frac{1}{4}$ of the marks of the question will be deducted for every wrong answer.**
6. If you do not want to answer a question, leave all the bubbles corresponding to that question blank in the Answer Booklet. No marks will be deducted in such cases.
7. The mediums of examination shall be English only.
8. **35 minutes extra would be given to the visually handicapped/PwD Candidates.**
9. **Darken** the bubbles in the OMR Answer Sheet according to the Serial No. of the question given in the Question Booklet.
10. If you want to change an already marked answer, erase the shade in the darkened bubble completely.
11. For rough work only the blank sheet at the end of the Question Booklet be used.
12. The University will provide Logarithmic table. Borrowing of log table or other material is not allowed.
13. The Answer Sheet is designed for computer evaluation. Therefore, if you do not follow the instructions given on the Answer Sheet, it may make evaluation by the computer difficult. **Any resultant loss to the candidate on the above account, i.e. not following the instructions completely, shall be of the candidate only.**
14. After the test, hand over the Question Booklet and the Answer Sheet to the Assistant Superintendent on duty.
15. In no case the Answer Sheet, the Question Booklet, or its part or any material copied/noted from this Booklet is to be taken out of the examination hall. Any candidate found doing so would be expelled from the examination.
16. A candidate who creates disturbance of any kind or changes his/her seat or is found in possession of any paper possibly of any assistant or found giving or receiving assistant or found using any other unfair means during the examination will be expelled from the examination by the Centre Superintendent/Observer whose decision shall be final.
17. **Communication equipment such as mobile phones, pager, wireless set, scanner, camera or any electronic/digital gadget etc., is not permitted inside the examination hall. Use of calculators is not allowed.**
18. The candidates will not be allowed to leave the Examination Hall/Room before the expiry of the allotted time.

(PUMEEET)

1. The series $\sum_{n=1}^{\infty} \left(-\frac{1}{2}\right)^n$ is
(A) Divergent (B) Absolutely convergent
(C) Conditionally convergent (D) Oscillatory
2. The p-series $\sum_{n=1}^{\infty} \frac{1}{n^p}$, where p is a real constant converges if
(A) $p = 1$ (B) $p > 1$ (C) $p < 1$ (D) $p \geq 1$
3. The power series: $\sum_{n=1}^{\infty} (-1)^{n-1} \frac{x^{2n-1}}{2n-1}$ converges for
(A) $-1 < x < 1$ (B) $-1 \leq x \leq 1$
(C) $-1 < x \leq 1$ (D) For all $x \in \mathbb{R}$
4. Which of the following series can be used to compute $\log_e(0.8)$?
(A) $\log_e(1-x)$ expanded about $x = 0$ (B) $\log_e(x)$ expanded about $x = 0$
(C) $\log_e(x)$ in powers of $(1-x)$ (D) $\log_e(1-x)$ in powers of $(1-x)$
5. If $px^3 + qy^3 - 3rxy = 0$, where p, q, r are constants, then $\frac{dy}{dx}$ is
(A) $\frac{px^2 - ry}{qy^2 + rx}$ (B) $-\frac{px^2 - ry}{qy^2 + rx}$ (C) $-\frac{px^2 - ry}{qy^2 - rx}$ (D) $\frac{px^2 - ry}{qy^2 - rx}$
6. The linearization of function: $f(x, y) = x^2 - xy + \frac{1}{2}y^2 + 3$ at the point (3, 2) is
(A) $4x - y - 2$ (B) $4x + y + 2$ (C) $x - y - 5$ (D) $10x - 5y - 12$
7. The derivative of $w = xy$ with respect to t along the path $x = \cos t$, $y = \sin t$ is
(A) $\cos 2t$ (B) $\cos t$ (C) $\sin t$ (D) $\sin 2t$
8. The greatest value that a function $f(x, y) = xy$ takes on the ellipse $\frac{x^2}{8} + \frac{y^2}{2} = 1$ is
(A) 4 (B) 1 (C) 2 (D) 8
9. The divergence of a vector point function:
 $\vec{V} = (x + 3y)\mathbf{i} + (y - 2z)\mathbf{j} + (9 - 2z)\mathbf{k}$ is
(A) 0 (B) 1 (C) 2 (D) 3
10. The directional derivative of $\phi(x, y, z) = 2z^2y - xy^2$ at the point (2, 1, 1) in the direction of $3\mathbf{i} + 6\mathbf{j} + 2\mathbf{k}$ is
(A) -1 (B) 1 (C) 2 (D) -2
11. The flux of $\vec{F} = (x - y)\mathbf{i} + x\mathbf{j}$ across the circle $x^2 + y^2 = 1$ in the xy -plane is
(A) π (B) 2π (C) $\pi + 2$ (D) $\pi - 2$
12. The value of integral $\oint xy dy - y^2 dx$ along a curve c, where c is the square cut from the first quadrant by the lines $x = 1$ and $y = 1$ is
(A) 2 (B) $\frac{3}{2}$ (C) $\frac{2}{3}$ (D) 3

13. The area of a region R bounded by the parabola $y = x^2$ and the line $y = x + 2$ is
 (A) $\frac{2}{9}$ (B) $\frac{9}{2}$ (C) $\frac{7}{2}$ (D) $\frac{2}{7}$
14. The volume of the region D enclosed by the surfaces $z = 8 - x^2 - y^2$ and $z = x^2 + 3y^2$ is
 (A) 8π (B) $8\pi\sqrt{5}$ (C) $8\pi\sqrt{2}$ (D) $8\pi\sqrt{3}$
15. The value of double integral $\int_0^1 \int_0^x e^{\frac{y}{x}} dy dx$ is
 (A) $\frac{1}{2}(e - 1)$ (B) $\frac{1}{2}(e + 1)$ (C) $(e - 1)$ (D) $(e + 1)$
16. Conditions for expansion of a function in Fourier series are known as
 (A) Initial conditions (B) Laplace conditions
 (C) Dirichlet's conditions (D) Boundary conditions
17. If $f(x) = |x|$, $-\pi < x < \pi$, then Fourier coefficients (a_1, b_1) is
 (A) $(\frac{1}{\pi}, 1)$ (B) $(-\frac{2}{\pi}, \pi)$ (C) $(-\frac{4}{\pi}, 0)$ (D) $(0, \frac{1}{2})$
18. An integrating factor transforms a first-order differential equation to
 (A) Homogeneous form (B) Higher order differential equation
 (C) An exact equation (D) Leibnitz linear equation
19. Which of the following is not an integrating factor of $x dy - y dx$?
 (A) $\frac{1}{x^2}$ (B) $\frac{1}{xy}$ (C) $\frac{1}{x^2+y^2}$ (D) $\frac{1}{x+y}$
20. Determine the type of the differential equation: $\frac{d^2y}{dx^2} + \sin(x+y) = \sin x$
 (A) Linear, homogeneous (B) Nonlinear, homogeneous
 (C) Linear, non-homogeneous (D) Nonlinear, non-homogeneous
21. A differential equation associated with the primitive $y = a + be^{5x} + ce^{-7x}$ is
 (A) $\frac{d^3y}{dx^3} + 2\frac{d^2y}{dx^2} - \frac{dy}{dx} = 0$ (B) $\frac{d^3y}{dx^3} + 2\frac{d^2y}{dx^2} - 35\frac{dy}{dx} = 0$
 (C) $4\frac{d^3y}{dx^3} + 5\frac{d^2y}{dx^2} - 20\frac{dy}{dx} = 0$ (D) $5\frac{d^3y}{dx^3} + 2\frac{d^2y}{dx^2} - 2\frac{dy}{dx} = 0$
22. The particular integral of $(D^2 + 1)y = e^{2x} \sin 3x$ is
 (A) $-\frac{1}{40}(3 \cos 3x + \sin 3x)e^{2x}$ (B) $\frac{1}{40}(3 \cos 3x + 3 \sin 3x)e^{2x}$
 (C) $-\frac{1}{40}(3 \cos 3x + 10 \sin 3x)e^{2x}$ (D) $\frac{1}{40}(3 \cos 3x + 10 \sin 3x)e^{2x}$
23. The solution of a partial differential equation $x p + y q = x$ is
 (A) $\phi\left(\frac{x^2}{2} - y, y - z^2\right) = 0$ (B) $\phi(x + y, x + z) = 0$
 (C) $\phi(x^2 + y^2, y - z) = 0$ (D) $\phi(x - y, x - z) = 0$

24. The general solution of a PDE: $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 0$ is of the form
 (A) $u = f(x + y) + g(x - y)$ (B) $u = g(x + iy)$
 (C) $u = c f(x - iy)$ (D) $u = f(x + iy) + g(x - iy)$
25. The solution of a partial differential equation: $\frac{\partial u}{\partial x} + u = \frac{\partial u}{\partial t}$ if $u = 4 e^{-3t}$ when $t = 0$ is
 (A) $u = 4 e^{-3x-2t}$ (B) $u = 4 e^{-3x+2t}$ (C) $u = 4 e^{3x-2t}$ (D) $u = 6 e^{-3x-2t}$
26. The Laplace transform of $f(t) = \sinh at$ is
 (A) $\frac{a}{s^2 - a^2}$ (B) $\frac{a}{s^2 + a^2}$ (C) $\frac{s}{s^2 - a^2}$ (D) $\frac{s}{s^2 + a^2}$
27. The Laplace transform of unit step function $u(t - 5)$ is
 (A) e^{-5s} (B) $\frac{e^{-5s}}{s}$ (C) $\frac{e^{5s}}{s}$ (D) $\frac{e^{-5s}}{s^2}$
28. The inverse Laplace transform of the function $f(s) = \frac{4s-5}{s^2-s-2}$ is
 (A) $e^{2t} + 5e^{-t}$ (B) $e^{2t} - 5e^{-t}$ (C) $e^{2t} + 3e^{-t}$ (D) $e^{-2t} - 5e^{-t}$
29. The Laplace transform of the function $f(t) = t^2 \cos t$ is
 (A) $\frac{2s(s^2+3)}{(s^2+1)^2}$ (B) $\frac{s}{s^2+1}$ (C) $\frac{2s(s^2-3)}{(s^2+1)^3}$ (D) $\frac{s}{s^2-1}$
30. If $f(t) = L^{-1}\{f(s)\}$, then mark the false statement
 (A) $L^{-1}\{f(s-a)\} = e^{at} f(t)$ (B) $L^{-1}\{f(as)\} = \frac{1}{a} f\left(\frac{t}{a}\right)$
 (C) $e^{-at} f(t) = e^{-at} L^{-1}\{f(s)\}$ (D) $L^{-1} L \neq L L^{-1}$
31. Quality factor of a tuning fork of frequency 256 is 1000. It is made to vibrate, the time during which its energy is reduced to $(1/e)$ times its initial energy, is equal to
 (A) $(1/e)$ times the relaxation time (B) half of relaxation time
 (C) twice the relaxation time (D) relaxation time
32. Lissajous figure for two perpendicular SHM of same time period and differing phase by $\pi/4$ will be
 (A) oblique ellipse (B) straight line
 (C) circle (D) parabola
33. The mass, velocity, potential energy and kinetic energy terms in a general mechanical simple harmonic oscillator system has equivalent terms in the electrical simple harmonic oscillator system, as
 (A) inductance, current, magnetic energy and electric energy, respectively. (B) inductance, capacitance, electric energy and magnetic energy, respectively.
 (C) inductance, current, electric energy and magnetic energy, respectively. (D) inductance, current, resistance and electric energy, respectively.

34. In an undamped simple harmonic motion, the graphs of kinetic energy, potential energy and total energy vs displacement are
 (A) all straight line (B) parabola, constant and parabola, respectively
 (C) all parabola (D) parabola, parabola and constant, respectively
35. Volume of the hcp unit cell ($a = b = c$) is
 (A) $\frac{\sqrt{3}}{2}a^3$ (B) $3\sqrt{3}a^3$
 (C) $3\sqrt{2}a^3$ (D) $\frac{3\sqrt{3}}{2}a^3$
36. Number of atoms per fcc unit cell is
 (A) 6 (B) 2
 (C) 8 (D) 4
37. Frenkel defect is a type of point imperfection in a solid, which is caused by
 (A) Substitutional impurity of some other ion/atom. (B) an atom/ion moved out of its own lattice site making it vacant.
 (C) an atom/ion moved out of its own lattice site making it vacant while occupying another intermediary vacant site on the same crystal. (D) Interstitial impurity of some other ion/atom.
38. Distance between the planes with Miller indices (010) and (020) is
 (A) 1 unit (B) $\frac{1}{2}$ unit
 (C) $\frac{1}{2\sqrt{2}}$ unit (D) $\frac{1}{\sqrt{2}}$ unit
39. In case of Newton's rings observed in reflected light in an experiment involving glass plano-convex lens ($\mu = 1.5$) and green laser of wavelength 500 nm, the observed radius of the 10th dark ring is 0.25 cm. Then, the expected radius of the 50th dark ring will be
 (A) 0.11 cm (B) 1.25 cm
 (C) 1.87 cm (D) 0.56 m
40. The maximum possible order in the diffraction pattern that can be observed in case of diffraction grating with 15000 lines/inch and laser light of 500 nm is
 (A) 3 (B) 1
 (C) 2 (D) 4
41. In case of the calcite birefringent crystal, the
 (A) velocity of the E-ray is same in all directions and that of the O-ray is different in different directions. (B) wavelength of the O-ray is same in all directions and that of the E-ray is different in different directions.
 (C) velocity of the E-ray and O-ray is different in different directions. (D) frequency of the O-ray is same in all directions and that of the E-ray is different in different directions.

42. Which of the following is correct?
- (A) In case of He-Ne laser, role of He atoms is to efficiently excite Ne atom and cause population inversion. (B) In case of He-Ne laser, role of Ne atoms is to efficiently excite He atom and cause population inversion.
- (C) In case of He-Ne laser, role of Ne atoms is to have population inversion and He is used for cooling purpose. (D) In case of He-Ne laser, role of He atoms is to have population inversion and Ne is used for cooling purpose.
43. An electron is moving with speed of 2.4×10^8 m/s in a direction opposite to that of moving photon. The relative velocity of the electron with respect to the photon is
- (A) 3.6×10^8 m/s (B) 3×10^8 m/s
(C) Zero (D) 0.6×10^8 m/s
44. According to the relativistic mechanics for a particle with zero rest mass, the energy (E) and momentum (p) are related as
- (A) $p = Ec$ (B) $E = pc^2$
(C) $p = Ec^2$ (D) $p = \frac{E}{c}$
45. A vector in a laboratory system S_1 is represented by $6\hat{i} + 10\hat{j}$. In a frame S_2 moving with velocity, $0.8c$, along the y-axis of laboratory frame S_1 , the length of the vector will be
- (A) 8.5 m (B) 12 m
(C) 6 m (D) 6.9 m
46. A ball has velocity $(4\hat{i} - 5\hat{j} + 10\hat{k})$ m/sec with respect to a train. The train is also moving with velocity $(4\hat{i} - 5\hat{j} + 10\hat{k})$ m/sec relative to an observer on the ground. The velocity of the ball relative to the ground will be
- (A) Zero (B) $(8\hat{i} - 10\hat{j} + 20\hat{k})$
(C) $(8\hat{i} - 5\hat{j} + 10\hat{k})$ (D) $(8\hat{i} - 10\hat{j} + 10\hat{k})$
47. The correct order of photons performing photoelectric effect in sodium (work function = 2.3 eV) with increasing energy of emitted photoelectrons is
- (A) UV, Red, Infrared (B) Microwaves, Infrared, Visible, UV
(C) Microwaves, Infrared, Visible (D) Violet, UV, X-rays
48. The shortest wavelength present in the e.m. radiation emitted from an x-ray machine having Cu anode (K-shell binding energy = 8.98 keV, L_3 subshell binding energy = 0.98 keV) and accelerating potential of 50 kV, is (Given $h = 4.1 \times 10^{-15}$ eV s)
- (A) ~ 0.138 nm (B) ~ 13.80 nm
(C) ~ 0.025 nm (D) ~ 0.155 nm
49. In case of a incident particle of energy E incident on a quantum rectangular potential barrier of height ($V_0 > E$) and width, x, the transmission probability will vary with the width, x, as
- (A) $\exp(-x)$ (B) $1/x$
(C) $\log_e(x)$ (D) $1/x^2$

50. Given the de Broglie wavelength of an electron and wavelength of a photon is same $2 \text{ \AA}$. The ratio of their momenta, respectively, will be (Given $h = 6.625 \times 10^{-34} \text{ J.sec}$ and mass of electron $= 9.1 \times 10^{-31} \text{ kg}$).
- (A) 1 : 2.1
(C) 1 : 6
(B) 1 : 1
(D) 1 : 3
51. Match the following correctly
- | Catalyst | Industrial product |
|---------------------------|------------------------------|
| 1. V_2O_5 | p) high density polyethylene |
| 2. Ziegler-Natta | q) polyacrylonitrile |
| 3. Peroxide | r) NH_3 |
| 4. Finely divided Fe | s) H_2SO_4 |
- Correct match is:
- (A) 1-s, 2-p, 3-q, 4-r
(C) 1-s, 2-r, 3-q, 4-p
(B) 1-r, 2-s, 3-q, 4-p
(D) 1-s, 2-p, 3-r, 4-q
52. Ethylenediamine tetraacetic acid is an example of
- (A) monodentate ligand
(C) tridentate ligand
(B) hexadentate ligand
(D) pentadentate ligand
53. The oxidation state of Fe in the brown ring complex $[\text{Fe}(\text{H}_2\text{O})_5\text{NO}]\text{SO}_4$
- (A) +1
(B) +2
(C) +3
(D) +4
54. Considering entropy (S) as a thermodynamic parameter, the criterion for the spontaneity of any process is
- (A) $\Delta S_{\text{system}} + \Delta S_{\text{surrounding}} = 0$
(C) $\Delta S_{\text{system}} + \Delta S_{\text{surrounding}} < 0$
(B) $\Delta S_{\text{system}} + \Delta S_{\text{surrounding}} > 0$
(D) $\Delta S_{\text{system}} = \Delta S_{\text{surrounding}}$
55. The correct statement about second law of thermodynamic is
- Heat cannot spontaneously pass from a colder to a warmer body
 - In an adiabatic process the entropy either increases or remains unchanged
 - Heat can be completely converted into work but work cannot be completely converted into heat
 - In any irreversible process the total entropy of all bodies concerned is increased
- (A) 1, 2, 3, 4
(B) 2, 3
(C) 1, 3
(D) 1, 2, 4
56. In NaCl type structure, the co-ordination number ratio of Na^+ and Cl^- is :
- (A) 6:6
(B) 8:8
(C) 6:8
(D) 4:4
57. Bakelite is a polymer of
- (A) benzaldehyde and phenol
(C) acetaldehyde and phenol
(B) formaldehyde and phenol
(D) formaldehyde and benzyl alcohol
58. Find the pair with sp^2 hybridisation of the central molecule
- (A) NH_3 and NO_2^-
(C) BF_3 and NO_2^-
(B) BF_3 and NH_2^-
(D) NH_2^- and H_2O
- (6)

59. In which mode of expression, the concentration of solution remains independent of temperature
 (A) Molality (B) Normality (C) Formality (D) Molarity

60. For an ideal solution which combination is correct (where ΔV_{mix} is volume change on mixing and ΔH_{mix} is enthalpy change on mixing)

- (A) $\Delta V_{\text{mix}} > 0$, $\Delta H_{\text{mix}} > 0$ (B) $\Delta V_{\text{mix}} < 0$, $\Delta H_{\text{mix}} < 0$
 (C) $\Delta V_{\text{mix}} = 0$, $\Delta H_{\text{mix}} = 0$ (D) $\Delta V_{\text{mix}} > 0$, $\Delta H_{\text{mix}} < 0$

61. Sodium metal crystallizes in a body centred cubic lattice with a unit cell edge of 4.29 Å. The radius of sodium atom is approximately

- (A) 5.72 Å (B) 0.93 Å (C) 3.22 Å (D) 1.85 Å

62. Match the process given in column I with its description in column II

Column I	Column II
1. Isobaric process	p) process in which driving force is very different than opposing force
2. Isothermal process	q) process in which no heat enters or leaves the system
3. Adiabatic process	r) process in which temperature of the system remain constant
4. Irreversible process	s) A process in which pressure of the system is kept constant

Correct match is:

- (A) 1- p, 2-q, 3-r, 4- s (B) 1-r, 2-s, 3-q, 4-p
 (C) 1-s, 2-r, 3-q, 4-p (D) 1- s, 2-p 3-r, 4-q

63. The pH of a 0.005 molar aqueous solution of sulphuric acid is approximately

- (A) 0.005 (B) 1 (C) 0.1 (D) 2

64. A compound is formed by elements P and Q crystallizes in the cubic arrangement in which P atoms are at the corners of a cube and Q atoms are at the face centers. What is the formula of the compound?

- (A) PQ (B) PQ₂ (C) PQ₃ (D) P₈Q₆

65. Match the type of colloidal systems given in column I and column II

Column I	Column II
I. Solid in liquid	(a) Foam
II. Liquid in solid	(b) Sol
III. Liquid in liquid	(c) Gel
IV. Gas in liquid	(d) Emulsion

- (A) I-(b), II-(c), III-(d), IV-(a) (B) I-(c), II-(b), III-(a), IV-(d)
 (C) I-(b), II-(c), III-(a), IV-(d) (D) I-(d), II-(b), III-(a), IV-(c)

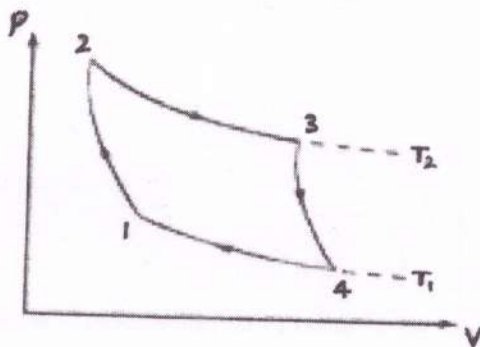
66. 5 mL of 1.0 N HCl, 20 mL of N/2 H_2SO_4 and 30 mL of N/3 HNO_3 are mixed together and the volume is made to one litre. The normality of the resulting solution is
 (A) N/5 (B) N/40 (C) N/20 (D) N/25

67. Which of the following is the incorrect statement about Zeise's salt
 (A) Zeise's salt is diamagnetic
 (B) Oxidation of Pt in Zeise's salt is +2
 (C) All the Pt-Cl bond length in Zeise's salt are equal
 (D) C-C bond length of ethylene moiety in Zeise's salt longer than that of free ethylene molecule

68. Ozone in the stratosphere is depleted by

- (A) CF_2Cl_2 (B) C_7F_{16} (C) $\text{C}_6\text{H}_6\text{Cl}_6$ (D) C_6F_6

69.



The figure above describes a Carnot engine work. Which path show adiabatic compression.

- (A) 3 to 4 (B) 2 to 3 (C) 1 to 2 (D) 4 to 1
70. During roasting which of the following poisonous gas is mainly produced
 (A) CO (B) CO_2 (C) SO_2 (D) N_2O
71. Under conditions of maximum power transfer from an ac source to a variable load
 (A) the load impedance must also be inductive, if the generator impedance is inductive
 (B) the sum of the source reactance and load reactance is zero
 (C) the sum of the source and load impedance is zero
 (D) the load impedance has the same phase angle as the generator impedance
72. If T_a be the torque and I_a the armature current for a D.C. motor, then which of the following relation is valid before saturation?

- (A) $T_a \propto I_a$ (B) $T_a \propto \frac{1}{I_a}$ (C) $T_a \propto I_a^2$ (D) $T_a \propto \frac{1}{(I_a)^2}$

73. A transformer can have regulation closer to zero

- (A) on full-load (B) on overload
(C) on leading power factor (D) on zero power factor

74. The figure 1 given below performs _____.

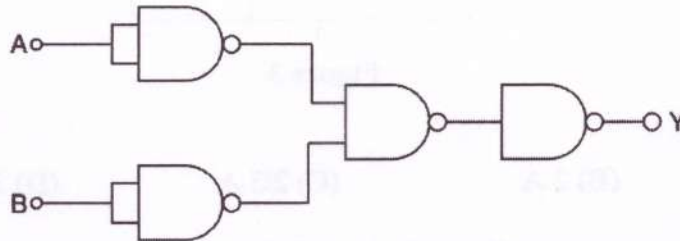


Figure 1

- (A) NAND (B) AND (C) OR (D) NOR

75. When both the J and K inputs of an edge triggered JK flip-flop are 1, then the flip-flop is in

- (A) asynchronous condition (B) synchronous condition
(C) race condition (D) toggle condition

76. A group of flip-flops connected in cascade to store a binary word is termed as a

- (A) register (B) decoder (C) multiplexer (D) counter

77. The mean value of the current $I = 20 \sin t$ from $t = 0$ to $t = \pi/2$ is

- (A) 40π (B) $40/\pi$ (C) $1/40$ (D) $\pi/40$

78. The value of R in figure 2 is

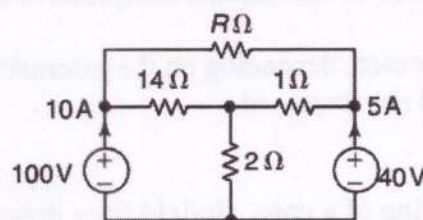


Figure 2

- (A) 10Ω (B) 18Ω (C) 24Ω (D) 12Ω

79. In the circuit of figure 3, the value of I_s for $I = 0$ is

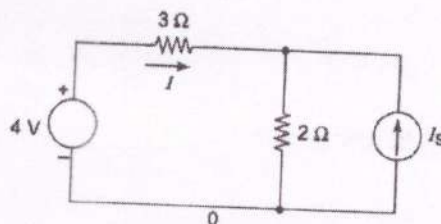
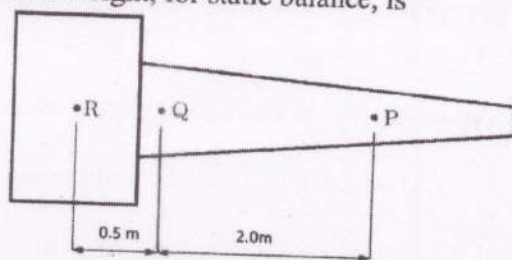


Figure 3

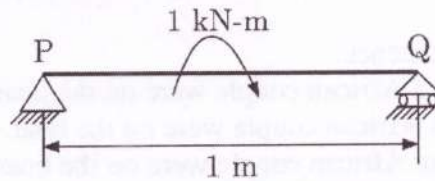
- (A) 4 A (B) 2 A (C) $2/5$ A (D) $2/3$ A
80. A transformer operates most efficiently at $3/4$ full load. Its iron loss (P_i) and full load copper loss (P_c) are related as
- (A) $P_i/P_c = 16/9$ (B) $P_i/P_c = 4/3$ (C) $P_i/P_c = 3/4$ (D) $P_i/P_c = 9/16$

81. A cantilever type gate hinged at Q is shown in the figure. P and R are the centers of gravity of the cantilever part and the counterweight respectively. The mass of the cantilever part is 75 kg. The mass of the counter weight, for static balance, is



- (A) 75 kg (B) 150 kg (C) 225 kg (D) 300 kg
82. An axial residual compressive stress due to a manufacturing process is present on the outer surface of a rotating shaft subjected to bending. Under a given bending load, the fatigue life of the shaft in the presence of the residual compressive stress is
- (A) decreased
 (B) increased or decreased, depending on the external bending load
 (C) neither decreased nor increased
 (D) increased
83. In an engineering drawing of a cone, straight lines drawn from the apex to the circumference of the base-circle are all equal and are called _____
- (A) edges (B) generators (C) connecting lines (D) projectors

84. A simply supported beam PQ is loaded by a moment of 1 kNm at the mid-span of the beam as shown in the figure. The reaction forces R_P and R_Q at supports P and Q respectively are



- (A) 1 kN downward, 1 kN upward (B) 0.5 kN upward, 0.5 kN downward
(C) 0.5 kN downward, 0.5 kN upward (D) 1 kN upward, 1 kN downward
85. Which one among the following welding processes uses non-consumable electrode?
(A) Gas metal arc welding (B) Submerged arc welding
(C) Gas tungsten arc welding (D) Flux coated arc welding
86. Which of the following is not conserved for the flow of an incompressible liquid in a pipe with variable area?
(A) Mass (B) Volume (C) Velocity (D) Flow Rate
87. The velocity of water in a pipe of area 5 m^2 is 10 m/s, what will be the flow rate of water?
(A) $25 \text{ m}^3/\text{s}$ (B) $50 \text{ m}^3/\text{s}$ (C) $75 \text{ m}^3/\text{s}$ (D) $100 \text{ m}^3/\text{s}$
88. Which of the following does the concept of material balance based upon?
(A) Conservation of mass (B) Conservation of energy
(C) Conservation of momentum (D) Conservation of Volume
89. A combustion reaction has reactants 1 mole of C_xH_y and 2 moles of O_2 and products 1 mole of CO_2 and 2 mole of H_2O , what is $x + y$?
(A) 1 (B) 3 (C) 4 (D) 5
90. Which of the following represents vaporization?
(A) Change of vapor to liquid (B) Change of vapor to solid
(C) Change of solid to vapor (D) Change of liquid to vapor
91. Pick out the sentence that is correct:
(A) Went we a walk for Eight Thirty at yesterday.
(B) Yesterday we went for a walk at Eight Thirty.
(C) Eight Thirty we went for a walk at yesterday.
(D) Walk we went at Eight Thirty for yesterday.
92. Select the correct sentence:
(A) They have been living here since five years.
(B) They have been living here for five years.
(C) They have been living here since more than five years.
(D) They have been lived here for five years.

93. Fill in the blanks with the correct word:
The children were _____ in the park.
(A) Play (B) Plays (C) Played (D) Playing
94. Pick out the correct sentence:
(A) An European and a African couple were on the boat.
(B) A European and a African couple were on the boat.
(C) A European and an African couple were on the boat.
(D) European and African couple were on the boat.
95. Pick out the sentence that means the same as this one:
The men finished the work
(A) The work was finished by the men. (B) The men tried to finish the work.
(C) The men worked fast to finish the book. (D) The work finished the men.
96. The shaking of hands is studied by the science of non-verbal communication called
(A) Proxemics (B) Haptics (C) Oculesics (D) Kinesics
97. Paralinguistic communication refers to the study of
(A) language used by special children
(B) language of parachuters
(C) artefacts and jewelry
(D) features of voice such as pitch and stress
98. Pick out the sentence with the maximum number of pronouns:
(A) He told her about the promise they had made to his parents.
(B) Ram told her about the promise they had made to the parents.
(C) He told her about the promise Seema and Jayant had made to the parents.
(D) Ram told Rita about the promise Ram had made to his parents.
99. Grapevine communication is always
(A) informal (B) formal (C) verbal (D) non verbal
100. Pick out the formal communication situation out of the following:
(A) Reporting to your boss on the telephone
(B) Writing a letter to your brother
(C) Chatting with your colleague on social media
(D) Sending a 'good morning' to a friend

x-x-x