Test Booklet Serial No.: 10268

DON'T BREAK OPEN THE SEAL UNTIL YOU ARE ASKED TO DO.

Total Number of Pages : 48
Number of Questions : 170

MICM

Time Allowed : 3 Hours
Maximum Marks : 170

Roll No. : [redacted]

Date of Examination : 8 June 2014

Name of the Candidate : [redacted]
(in capital letters)

Candidate's Signature : [redacted] **Invigilator's Signature :** [redacted]

SOME IMPORTANT INSTRUCTIONS TO THE CANDIDATES

1. **Fill up the information above by Pen/Ball Point Pen (Black or Blue).**
2. The OMR sheet to mark your answers is placed inside the test booklet. Without breaking the seal of the Test Booklet, take the Answer Sheet out.
3. There are 170 questions. Each correct answer gets a score of one mark. There is no negative marking.
4. Each question is followed by four answers. You should select one answer from A, B, C or D considered by you as the most appropriate or correct answer and fill the circle completely on the OMR Sheet in black/blue ink in the box opposite the question number.
5. Do your rough work only on the blank pages provided at the end of the question booklet.
6. Uses of mobile phone, calculators, calculator-watch, slide rules, mathematical table, etc. are not allowed.
7. Make sure that you do not possess any pages (Blank or Printed) or any unauthorized material. If such material is found in your possession during the examination, you will be disqualified from entrance examination.
8. If you are found copying/helping others you will be disqualified from entrance examination.
9. You are not allowed to leave the examination hall till the end of the entrance exam.
10. At the end of examination, candidate may be permitted to take the question booklet.
11. Only numerical part of Roll No. is to be entered in OMR Sheet.

ICET-2014

Directions: Fill in the blanks with the correct alternative.

Q1. She _____ her talents at the national school of dramatics.

(A) Fine-tuned ✓ make small adjustments to in order to achieve the best
(B) stupefied – make unable to think or feel properly / astonish & shock
(C) abraded – scrape or wear away by friction
(D) turned

Q2. My grandfather is very _____ about my academic performance and I was afraid that if I show him my report card, he would not _____ my abysmal performance in the final year exams.

(A) Fastidious, condone ✓
(B) fallacious, condone
(C) Fastidious, exhume
(D) fallacious, concur

Q3. The pentagon team _____ the crumpled chit of paper and scrutinized it, but it was written in cipher.

(A) tore out
(B) crumpled away
(C) fragmented
(D) smoothened out ✓

Directions: In the following paragraph, parts of the paragraph are left blank. Each blank has been labeled with a number. Beneath the paragraph, four different ways of filling each blank are indicated. Choose the best alternative from among the four so that the paragraph reads coherently.

The house was loaded with recording and Johnny had the two girls work the turn-off and volumes. After they had dinner, Johnny went to work. He had Nino playing the ____4____as _____5_____ and sang all his old songs. He sang them all the way out, not nursing his voice at all. His throat was fine; he felt he could sing forever. In the months he had not been able to sing he had often thought about singing, planned how he would _____6_____ lyrics differently now than as a kid. He had sung the song in his head with more sophisticated variations of emphasis.

Q4. (A) javelin (B) clown behave in a comical or playful way (C) table (D) mandolin musical inst.

Q5. (A) accompaniment (B) fun (C) record (D) well

Q6. (A) phrase (B) sing (C) mumble (D) belt ✓ to speak in low intensity or manner

Directions: Mark the choice that can replace the underlined idiom in the sentence without changing its meaning.

Q.7 The witness went into the dock and got cold feet.

(A) felt cold

(B) developed rheumatism

(C) was very nervous

(D) hunger pangs

Directions: Correct the underlined portion of the sentence. Choose the best alternative.

Q. 8 Any country whose population is growing like India's is destined to be clashing with the environment sooner or later

(A) Likely to be on collision course (B) destined to be clashing

(C) Bound to clashing

(D) bound to clash

Directions: In the questions, mark the antonym for the underlined word as your answer.

Q9. The lassitude of the government led to the worsening of the situation in Gujarat.

(A) alacrity

(B) lackadaisical

(C) Lachrymose

(D) laurel

Q10. The police forced found it difficult to control the obstreperous crowd

(A) Clamorous

(B) naughty

(C) subtle

(D) obstinate

Directions: In each of the following sentence, some part of the sentence is underlined. Beneath each sentence you will find four ways of phrasing the underlined part. Select the best version.

Q. 11. The air force cited the plane crash to show that everyone must be held responsible for their action

(A) to show that everyone must be responsible for their action.

(B) to demonstrate the philosophy that everyone must be held responsible for their action.

(C) to show that everyone is likely to make mistake and they should guard against it.

(D) to show that everyone is responsible for his action.

Q.12. The tantalizing heat of fusion today sizzled a salsa beat.

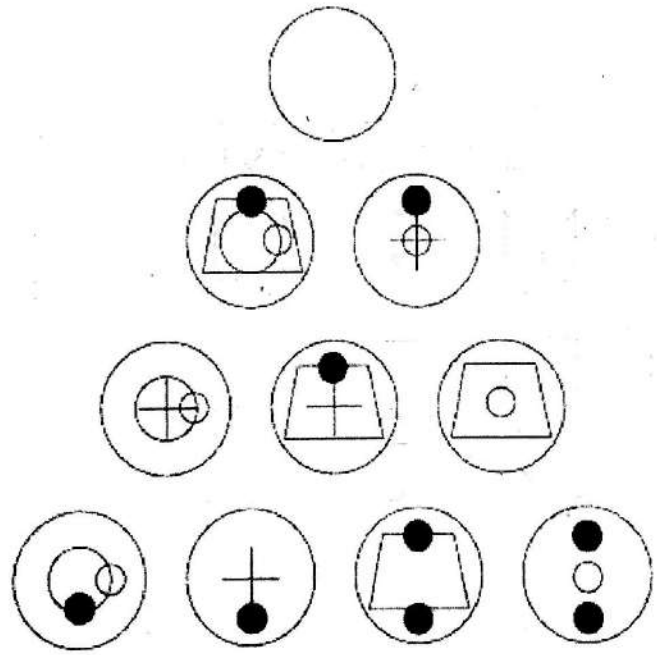
(A) tantalizing heat of fusion today sizzled.

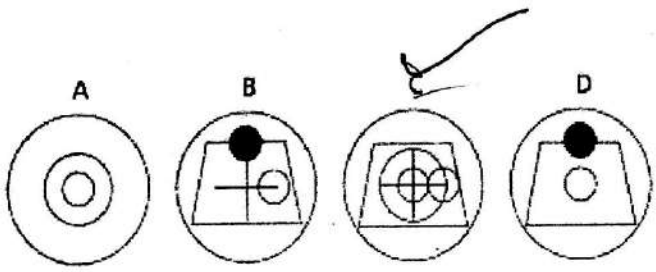
(B) fusion was hot today, sizzling and tantalizing.

(C) the sizzling heat of fusion today is tantalizing.

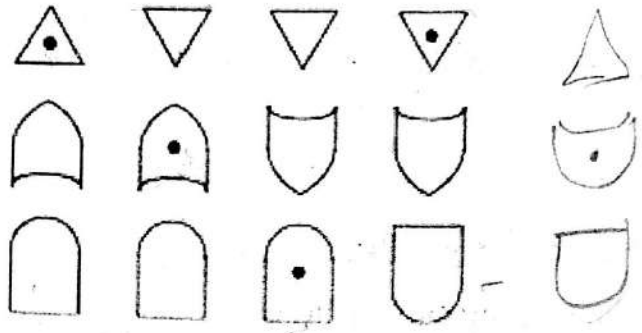
(D) today, fusion is hot sizzling and more tantalizing then.

Q.13. Which of A, B, C or D fits into the blank circle to carry on a logical sequence?

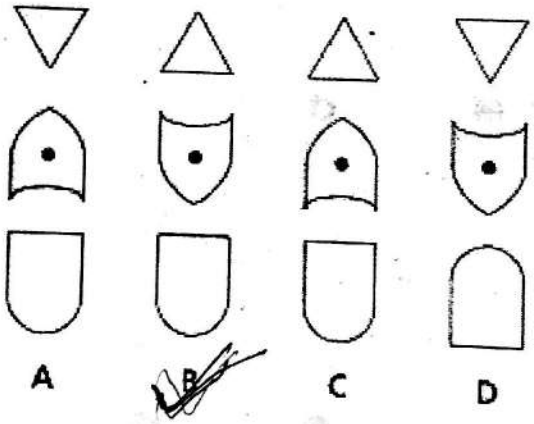




Q.14. Sequence



What comes next in the above sequence?

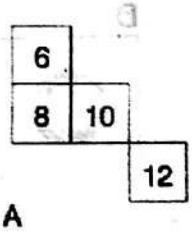


Q.15.

1	2	4	7
4	?	7	10
6	?	?	12
7	8	10	?

Which is the missing section?

A



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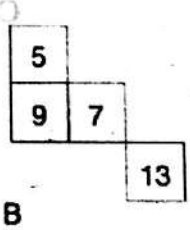
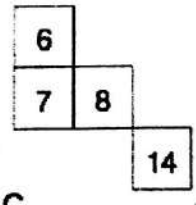
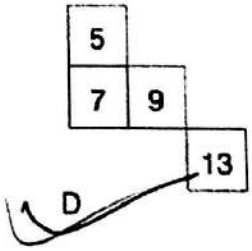


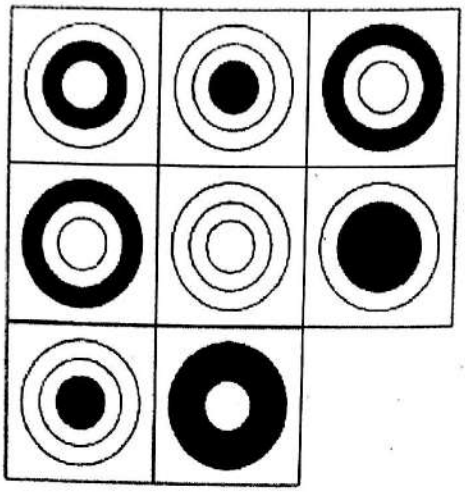
C



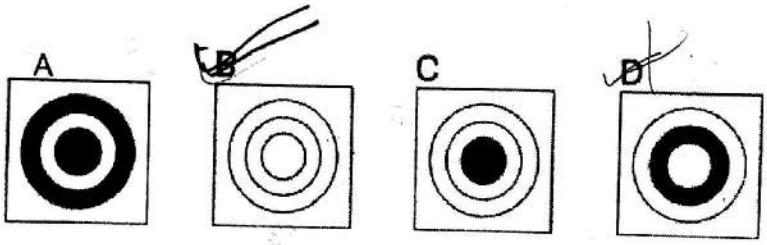
D



Q.16.

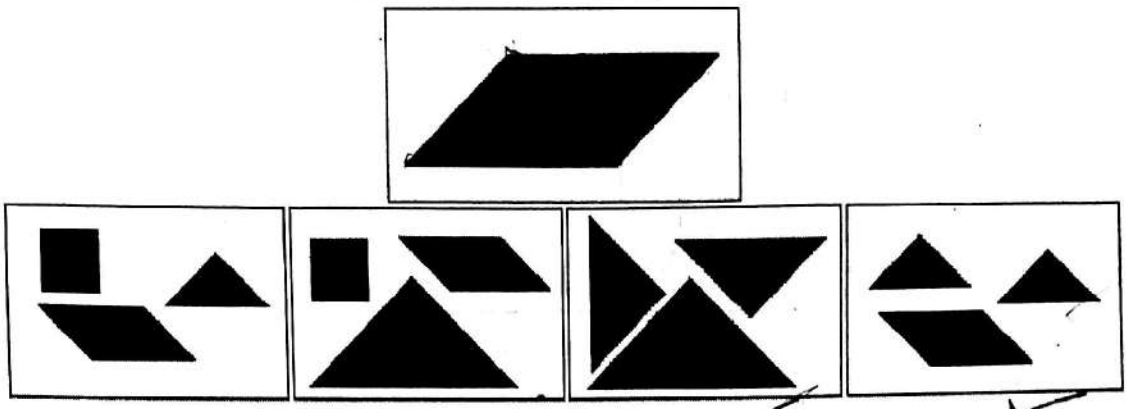


Which is the missing tile?



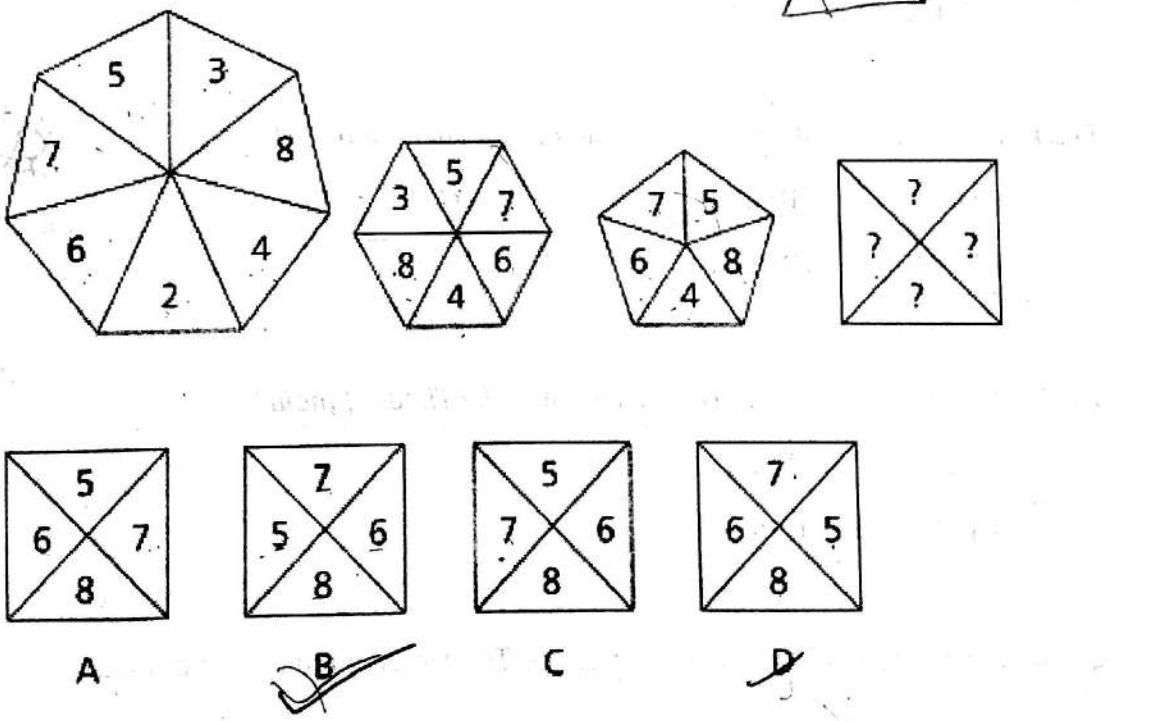
Q.17.

Which group of shapes can be assembles to make the shape shown?

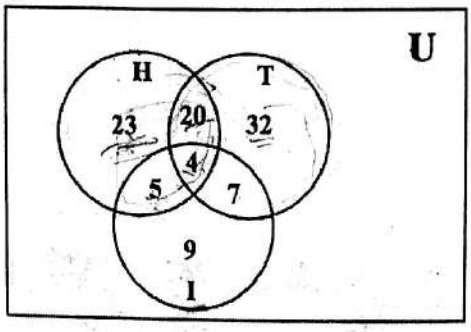


Q.18.

Which box of numbers (A, B, C or D) should replace the box of question marks?



Directions (Q.19-23): The Venn diagram below represents the readership of *Hindustan Times* (*H*), *The Times of India* (*T*) and *Indian Express* (*I*) in a locality of Delhi.



Q.19. How many read *Hindustan Times*?

(A) 47 (B) 51

(C) 9 (D) 29

Q.20. How many read *Hindustan Times* but not *The Times of India*?

(A) 24 (B) 28

(C) 16 (D) 37

Q.21. How many read *Hindustan Times* or *The Times of India*?

(A) 85 (B) 68

(C) 90 (D) 72

Q. 22. How many read *Hindustan Times* and *The Times of India*?

(A) 24 (B) 28

(C) 16 (D) 37

Q.23. How many read *Hindustan Times* and *The Times of India* but not *Indian Express*?

(A) 24 (B) 28

(C) 20 (D) 18

Directions (Q. 24-26): Five educational films A, B, C, D, & E are to be shown to a group of students. The films are to be shown in a particular order, which conforms to the following conditions:

- A must be shown earlier than C.
- B must be shown earlier than D.
- E should be the third film shown.

Q.24. Which among the following is an acceptable order for showing the educational films?

(A) A, C, B, D, E (B) A, C, D, E, B

(C) B, D, C, A, E (D) B, D, E, A, C

Q. 25. Which among the following is a pair of films that CANNOT be shown earlier than E?

(A) A and B (B) A and D

(C) B and C (D) C and D

Q.26. In case D and E are shown as far apart from each other as possible, which among the following will always be true?

(A) A is shown earlier than B.

(B) B is shown earlier than C.

(C) C is shown earlier than E.

(D) E is shown earlier than D.

Q.27. Which number will be next in the series: 1, 7, 25, 61, 121, ?

(A) 225
(B) 221
(C) 211
(D) 231

Q.28. The product of the ages of a mother and her two children is 4125. The difference between the age of the mother of the younger child is

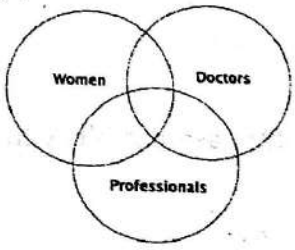
(A) 25
(B) 26
(C) 27
(D) 37

Q.29. In a code X represent addition and Y represents multiplication then 2X3Y5 is equal to

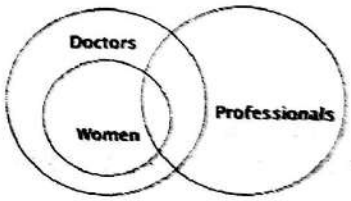
(A) 25
(B) 17
(C) 21
(D) 13

Q.30. Which diagram best represents the relation among doctors, professional and women?

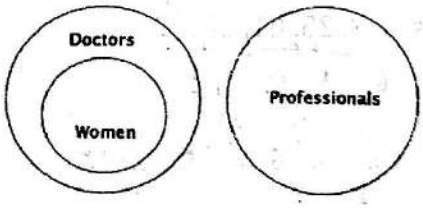
(A)



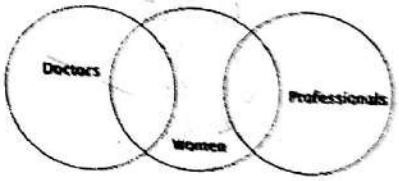
(B)



(C)



(D)



Q.31. If the dimensions of mass, length, time and charge are M, L, T and C respectively, the dimensions of magnetic induction field **B** is

(A) $ML^2T^{-1}C^{-1}$ (B) $L^2T^{-1}C$ (C) $MT^{-1}C^{-1}$ (D) $L^{-1}T^{-1}C$

Q.32. A 30-year-old woman takes a trip on a rocket, leaving her 20-year-old brother behind. She travels at a speed of 0.8 c, and is gone 20 years, according to the younger brother. When she returns, how many years older/younger is she than her brother?

(A) 2 years younger (B) 2 years older (C) 3 years older (D) 10 years older

Q.33. Two particles approach each other with different velocities. After collision, one of them is found to have momentum **p** in their centre of mass frame. In the same reference frame, the other particle must have momentum

(A) Zero (B) $-\mathbf{p}/2$ (C) $-\mathbf{p}$ (D) $-2\mathbf{p}$

Q.34. The root-mean square speed of a particle of mass m in the kinetic theory is given by

(A) $\sqrt{KT/m}$ (B) $\sqrt{2KT/m}$ (C) $\sqrt{3KT/m}$ (D) $\sqrt{8KT/m}$

Q.35. A particle moves in a circular orbit about the origin under action of a central force $\vec{F} = -k\hat{r}/r^3$. If the potential energy is zero at infinity, the total energy of the particle is

(A) $-\frac{k}{r^2}$ (B) $-\frac{k}{2r^2}$ (C) zero (D) $+\frac{k}{r^2}$

Q.36. A rigid frictionless rod rotates anticlockwise in a vertical plane with angular velocity $\vec{\omega}$. A bead of mass m moves outward along the rod with constant velocity $\vec{u_0}$. The bead will experience a coriolis force

(A) $2mu_0\omega\hat{\theta}$ (B) $-2mu_0\omega\hat{\theta}$ (C) $4mu_0\omega\hat{\theta}$ (D) $-mu_0\omega\hat{\theta}$

Q.37. A rigid body is rotating about its centre of mass, fixed at the origin, with an angular velocity $\vec{\omega}$ and angular acceleration $\vec{\alpha}$. If the torque acting on its is $\vec{\tau}$ and its angular momentum is $\vec{L}$, the rate of change of its kinetic energy is

(A) $\frac{1}{2}\vec{\tau}.\vec{\omega}$ (B) $\frac{1}{2}\vec{L}.\vec{\alpha}$ (C) $\frac{1}{2}\vec{L}.\vec{\omega}$ (D) $\frac{1}{2}(\vec{\tau}.\vec{\omega}+\vec{L}.\vec{\alpha})$

Q.38. Which one of the following quantities is invariant under Lorentz transformation?

(A) Charge (B) Charge density (C) Current (D) Electric field

Q.39. The value of the magnetic field required to maintain non-relativistic protons of energy 1 MeV in a circular orbit of radius 100 mm is

$(m_p = 1.67 \times 10^{-27}\text{kg}, e = 1.6 \times 10^{-19}\text{C})$

(A) 3.00 T (B) 2.00 T (C) 1.41 T (D) 2.5 T

Q.40. An electron is moving with a velocity of 0.85c in the same direction as that of a moving photon. The relative velocity of the electron with respect to photon is

(A) –c (B) c (C) 0.15c (D) –0.15c

Q.41. The coefficient of viscosity of oxygen at 15°C is 196μ poise. The diameter of a molecule of this gas is ($R = 8.4\,J\,mol^{-1}K^{-1}$, Molecular weight of oxygen is 32u)

(A) 1.00 A° (B) 1.50 A° (C) 2.00 A° (D) 2.99 A°

Q.42. A rod of length L and mass M is placed along the x-axis with one end at the origin. The rod has linear mass density $\lambda = \frac{2M}{L^2}x$, where x is the distance from the origin. Which of the following gives the x-coordinate of the rod's center of mass?

(A) L/12 (B) L/4 (C) L/3 (D) 2L/3

Q.43. On a frictionless surface, a block of mass M moving at speed u collides elastically with another block of the same mass that is initially at rest. After the collision, the first block moves at an angle Θ to its initial direction and has a speed $\frac{v}{2}$. The second block's speed after the collision is

(A) $\frac{\sqrt{3}}{4}v$ (B) $\frac{v}{2}$ (C) $\frac{\sqrt{3}}{2}v$ (D) $\frac{\sqrt{5}}{2}v$

Q.44. Astronomers observe two separate solar systems, each consisting of a planet orbiting a sun. The two orbits are circular and have the same radius R. It is determined that the planets have angular momenta of the same magnitude L about their suns, and that the orbital periods are in the ratio of three to one; i.e., $T_1 = 3T_2$. The ratio $\frac{m_1}{m_2}$ of the masses of the two planets is

(A) 1 (B) $\sqrt{3}$ (C) 2 (D) 3

Q.45. Newton's ring is formed with sodium light and is viewed normally. What will be the order of the dark ring which will have double the diameter of 10th dark ring?

(A) 5th (B) 20th (C) 30th (D) 40th

Q.46. Two beams of light having intensities I and $4I$ interfere to produce fringe pattern on a screen. The phase difference between the beams is $\pi/2$ at point A and π at point B. Then the difference between resultant intensities at A and B is

(A) $2I$ (B) $4I$ (C) $5I$ (D) $7I$

Q.47. In a Young's double slit experiment, 12 fringes are observed to be formed in a certain segment of the screen when light of wavelength 600 nm is used. If the wavelength of light is changed to 400 nm, number of fringes observed in the same segment of the screen is given by

(A) 12 (B) 18 (C) 24 (D) 30

Q.48. He-Ne laser is a gas laser containing the mixture of helium and neon atoms. What is the ratio of He : Ne

(A) 1:10 (B) 10:1 (C) 3:8 (D) 8:3

Q.49. In a Compton scattering process a photon of wavelength λ scattered of a charged particle of mass m (initially at rest) by an angle θ. If the final wavelength of the photon is λ', the difference $\lambda - \lambda'$

(A) Depends on θ, but not on λ
(B) Depends on λ' but not on m
(C) Depends on both θ and λ
(D) Depends on θ, but not on m

Q.50. The energy of the lowest state in a one-dimensional potential box of dimension a is.

(A) 0 (B) $\frac{2h^2}{8ma^2}$ (C) $\frac{h^2}{8ma^2}$ (D) $\frac{h}{8ma^2}$

Q.51. According to uncertainty relation the minimum uncertainty in the velocity of electron orbiting around the nucleus of radius r is

(A) $\frac{h}{2\pi mr}$ (B) $\frac{\hbar}{2mr}$ (C) $2hmr$ (D) Zero

Q.52. A particle of mass M at rest decays into two particles of masses m_1 and m_2 having non zero velocities. The ratio of the de-Broglie wavelengths of the particles λ_1/λ_2 is

(A) m_1/m_2 (B) m_2/m_1 (C) 1 (D) $\sqrt{m_2}/\sqrt{m_1}$

Q.53. According to Schrodinger, a particle is equivalent to a

(A) Single wave (B) Light wave (C) Wave packet (D) Cannot behave as wave

Q.54. The wave function for the motion of the particle in a one dimensional infinite potential well of length a is given by $\psi_n = A \sin\left(\frac{n\pi x}{a}\right)$. The value of the normalization constant A is

(A) $\frac{2}{a}$ (B) $\frac{1}{a}$ (C) $\sqrt{\frac{a}{2}}$ (D) $\sqrt{\frac{2}{a}}$

Q.55. If the Rydberg constant of hydrogen is R, then the shortest wavelength limit of Paschen series is

(A) 9 R (B) 4/R (C) 9/R (D) 16/R

Q.56. The magnetic moment associated with the first orbit in hydrogen atom is given by

(A) $\frac{h}{4\pi me}$ (B) $\frac{4\pi m}{he}$ (C) $\frac{eh}{4\pi m}$ (D) $\frac{eh}{4\pi m}$ $\frac{Be}{4\pi m}$

Q.57. The relationship between the orbital quantum number l and azimuthal quantum number n_ϕ is

(A) $l = n_\phi$ (B) $l = n_\phi + 1$ (C) $l = n_\phi + \frac{1}{2}$ (D) $l = n_\phi - 1$

Q.58. An X-ray beam of wavelength 1.54 Å is diffracted from the (110) planes of a solid with a cubic lattice of lattice constant 3.08 Å. The first order Bragg diffraction occurs at

(A) $\sin^{-1}\left(\frac{1}{4}\right)$ (B) $\sin^{-1}\left(\frac{1}{2\sqrt{2}}\right)$ (C) $\sin^{-1}\left(\frac{1}{2}\right)$ (D) $\sin^{-1}\left(\frac{1}{\sqrt{2}}\right)$

Q.59. In cylindrical coordinates, $\vec{B} = \left(\frac{2.0}{r}\right)\vec{a}_\Phi(T)$. The magnetic flux Φ crossing the plane surface defined by $0.5 \le r \le 2.5\ m$ and $0 \le z \le 2.0\ m$ is

(A) $4.0\left(ln\frac{2.5}{0.5}\right)$

(B) $ln\left(\frac{2.5}{0.5}\right)$

(C) $4.0\ ln(2.0)$

(D) $\ln(2.0)$

Q.60. A bar magnet 0.2 m long with 10mm diameter has a moment of $500Am^2$. The energy density at the centre of the bar is,

(A) $30mWm^{-2}$

(B) $40mWm^{-2}$

(C) $50mWm^{-2}$

(D) $60mWm^{-2}$

Q.61. The internal inductance per unit length of a cylindrical conductor of radius a is

(A) $\frac{\mu_0}{8}$

(B) $\frac{\mu_0}{4\pi}$

(C) $\frac{\mu_0}{8\pi}$

(D) $\frac{\mu_0}{\pi}$

Q.62. For $\vec{H} = H_m e^{j(\omega t+\beta z)}\vec{a}_x$ in free space, electric field $\vec{E}$ is given by

(A) $\frac{\beta H_m}{\omega} e^{j(\omega t+\beta z)}\vec{a}_x$

(B) $\frac{\beta H_m}{\omega\epsilon_0} e^{j(\omega t+\beta z)}\vec{a}_y$

(C) $\frac{\beta H_m}{\omega\epsilon_0} e^{j(\omega t+\beta z)}\vec{a}_x$

(D) $\frac{\beta H_m}{\omega} e^{j(\omega t+\beta z)}\vec{a}_y$

Q.63. The propagation constant γ for a material having $\mu_r = 1, \epsilon_r = 8$ *and* $\sigma = 0.25ps/m$ with wave frequency 1.6 MHz is,

(A) $j0.948 \times 10^{-2}/m$

(B) $j18.96 \times 10^{-2}/m$

(C) $j9.48 \times 10^{-2}/m$

(D) $j1.896 \times 10^{-2}/m$

Q.64. The skin depth δ in aluminum at 1.6 MHz frequency with $\sigma = 38.2MS/m$ and $\mu_r = 1$ is

(A) 64.4*mm*

(B) 64.4μ*m*

(C) 6.44*mm*

(D) 6.44μ*m*

Q.65. Unpolarized light of intensity I is incident upon a stack of two filters whose transmission axes makes an angle θ. The intensity of the emerging beam is

(A) $I\cos^2\theta$

(B) $I/2\cos^2\theta$

(C) $I/2$

(D) I

Q.66. Two Polaroid sheets are aligned with their axes parallel. One of the sheets is then rotated through an angle of 60^0. What is the ratio of the light intensity transmitted in the first instance to that in the second instance,

(A) 0.5

(B) 1

(C) 2

(D) 4

Q.67. Which of these is not a correct form of the wave $E_x = \cos(\omega t - \beta z)$?

(A) $cos\beta(z - ut)$

(B) $\cos(\beta z - \omega t)$

(C) $\sin(\beta z - \omega t - \frac{\pi}{2})$

(D) $\cos(\frac{2\pi t}{T} - \frac{2\pi z}{\lambda})$

Q.68. The dominant mode for rectangular waveguides is

(A) TE_{10}

(B) TE_{11}

(C) TM_{11}

(D) TE_{101}

Q.69. At microwave frequencies, we prefer waveguides to transmission lines for transporting EM energy because of all the following except that

(A) Transmission lines are larger than waveguides.

(B) Losses in transmission lines are prohibitively large.

(C) Wave guides have larger bandwidths and lower signal attenuation.

(D) Transmission lines support only TEM mode.

Q.70. A long straight tabular conductor of circular cross section with an outside diameter of 5cm and wall thickness of 0.5cm carries a direct current of 200Ampere. $\vec{B}$ just inside the wall of the tube is

(A) $8395.1 \times 10^{-7} Wb/m^2$

(B) $4035.2 \times 10^{-7} Wb/m^2$

(C) $10^{-7} Wb/m^2$

(D) *zero*

Q.71. Order and degree of differential equation

$$\frac{d^2y}{dx^2} = \left\{y + \left(\frac{dy}{dx}\right)^3\right\}^{1/4}$$

(A) 4,2 (B) 1,2 (C) 1,4 (D) 2,4

Q.72. The solution of the differential equation $x^2\frac{d^2y}{dx^2} - x\frac{dy}{dx} + y = 0$ is

(A) $(c_1 + c_2 x)\log x$ (B) $(c_1 x + c_2)\log x$

(C) $(c_1 + c_2 \log x)e^x$ (D) $(c_1 + c_2 \log x)x$

Q.73. A function $u(x, y)$ to be a harmonic function, it should satisfy

(A) Bessel equation (B) Poisson equation
(C) Laplace equation (D) Diffusion equation

Q.74. The harmonic conjugate of $u(x, y) = x^2 - y^2$

(A) $\frac{1}{2}(x^2 - y^2)$ (B) $y^2 - x^2$
(C) $4xy$ (D) $2xy$

Q.75. The possible angular frequency of vibration of a square membrane of side a, (c = velocity of wave and n, m are integers)

(A) $\frac{c\pi}{a}\sqrt{m^2 + n^2}$ (B) $\frac{c\pi}{a}m^2$
(C) $\frac{c\pi}{a}m$ (D) $\frac{a}{c\pi}\sqrt{m^2 + n^2}$

Q.76. A line passing through the origin as per the least square fit, the slope of the straight line of the points (1,3), (3,4), (4,6) is

(A) 0.5 (B) 1 (C) 1.5 (D) 2

Q.77. The precision constant h of the random error has relation with standard error σ as

(A) $\frac{1}{\sqrt{2}\sigma}$ (B) $\frac{\sqrt{2}}{\sigma}$ (C) $\frac{1}{2\sigma}$ (D) $\frac{2}{\sigma}$

Q.78. If $f(x) = -f(-t)$ and $f(t)$ satisfy the Dirichlet's conditions, then $f(t)$ can be expanded in a Fourier series containing

(A) Only sine terms
(B) Only cosine terms
(C) Cosine terms and a constant term
(D) Sine term and a constant term

Q.79. Which of the following cannot have the Fourier Series expansion of a period signal?

(A) $2\cos t + 3\cos 3t$ (B) $2\cos t + 3$
(C) $2\cos \pi t + 3\cos 3t$ (D) $2\cos 1.5\pi t + \sin 3.5\pi t$

Q.80. The value of the series $\sum_{n=1}^{\infty} \frac{1}{n^2}$ is

(A) $\frac{\pi}{3}$ (B) $\frac{\pi^2}{3}$

(C) $\frac{\pi^2}{6}$ (D) $\frac{\pi^2}{8}$

Q.81. Inverse of Laplace transform of $\frac{10}{s^2+5s+4}$ is

(A) $10[e^{-t} + e^{-4t}]$ (B) $10[e^{-t} - e^{-4t}]$

(C) $\frac{10}{3}[e^{-t} + e^{-4t}]$ (D) $\frac{10}{3}[e^{-t} - e^{-4t}]$

Q.82. Laplace Transformation of $t \sin at$ is

(A) $\frac{2as}{(s^2+a^2)^2}$ (B) $\frac{2a}{(s^2+a^2)^2}$

(C) $\frac{2s}{(s^2+a^2)^2}$ (D) $\frac{a}{(s^2+a^2)^2}$

Q.83. If $F(\omega)$ is the Fourier transform of $f(t)$ then the Fourier Transform of a function $f(at)$ is

(A) $aF(\omega)$ (B) $\frac{2}{a}F(\omega)$

(C) $aF\left(\frac{\omega}{a}\right)$ (D) $\frac{1}{a}F\left(\frac{\omega}{a}\right)$

Q.84. The vectors $\mathbf{u} = a_1\mathbf{i} + b_1\mathbf{j} + c_1\mathbf{k}$, $\mathbf{v} = a_2\mathbf{i} + b_2\mathbf{j} + c_2\mathbf{k}$, $\mathbf{w} = a_3\mathbf{i} + b_3\mathbf{j} + c_3\mathbf{k}$ are linearly independent if the matrix $\begin{bmatrix} a_1 & b_1 & c_1 \\ a_2 & b_2 & c_2 \\ a_3 & b_3 & c_3 \end{bmatrix}$ is

(A) Singular (B) symmetric

(C) non-singular (D) skew-symmetric

Q.85. Let $A=\begin{pmatrix} 3 & 1 \\ -1 & 2 \end{pmatrix}$. Then,

(A) $A^2+7A-5I=0$ **(B)** $A^2-7A+5I=0$

(C) $A^2+5A-7I=0$ **(D)** $A^2-5A+7I=0$

Q.86. The inverse of matrix $\begin{pmatrix} 3 & -1 & 1 \\ -15 & 6 & -5 \\ 5 & -2 & 2 \end{pmatrix}$ is

(A) $\begin{pmatrix} -2 & 0 & 1 \\ 5 & 1 & 0 \\ 0 & 1 & 3 \end{pmatrix}$ **(B)** $\begin{pmatrix} 2 & 0 & -1 \\ -5 & 0 & 1 \\ 0 & 1 & 3 \end{pmatrix}$

(C) $\begin{pmatrix} 2 & 0 & -1 \\ 5 & 1 & 0 \\ 0 & 1 & 3 \end{pmatrix}$ **(D)** $\begin{pmatrix} 2 & 0 & 1 \\ 5 & -1 & 0 \\ 0 & 1 & -3 \end{pmatrix}$

Q.87. Which of the following statements is true:

(A) The eigenvalues of a skew – Hermitian matrix are real

(B) The eigenvalues of the symmetric part of a Hermitian matrix are real

(C) The eigenvalues of a skew – Hermitian matrix are imaginary

(D) The trace of a skew – Hermitian matrix is real

Q.88. Let Q be an orthogonal matrix. Then, Q can be given by

(A) $\begin{pmatrix} -\cos\theta & \sin\theta \\ \sin\theta & -\cos\theta \end{pmatrix}$ (B) $\begin{pmatrix} \cos\theta & \sin\theta \\ \sin\theta & -\cos\theta \end{pmatrix}$

(C) $\begin{pmatrix} \cos\theta & \sin\theta \\ -\sin\theta & -\cos\theta \end{pmatrix}$ (D) $\begin{pmatrix} \cos\theta & -\sin\theta \\ -\sin\theta & \cos\theta \end{pmatrix}$

Q.89. The skew-symmetric part of the matrix $A = \begin{bmatrix} -1 & 5 & 7 \\ 3 & -1 & 3 \\ 8 & 1 & -2 \end{bmatrix}$ is given by matrix

(A) $\frac{1}{2}\begin{bmatrix} 0 & -2 & 1 \\ -2 & 0 & 2 \\ 1 & -2 & 0 \end{bmatrix}$ (B) $\frac{1}{2}\begin{bmatrix} 0 & -2 & 1 \\ 2 & 0 & -2 \\ 1 & -2 & 0 \end{bmatrix}$

(C) $\frac{1}{2}\begin{bmatrix} 0 & 2 & -1 \\ -2 & 0 & 2 \\ 1 & -2 & 0 \end{bmatrix}$ (D) $\frac{1}{2}\begin{bmatrix} 0 & 2 & -1 \\ -2 & 0 & 2 \\ -1 & 2 & 0 \end{bmatrix}$

Q.90. For a given a matrix $A = \begin{pmatrix} 1+\sqrt{3} & 0 & 1 \\ 0 & 2 & 0 \\ 1 & 0 & 1-\sqrt{3} \end{pmatrix}$, the eigenvalues are

(A) $\lambda_1 = -3, \lambda_2 = 2, \lambda_3 = -1$ (B) $\lambda_1 = -3, \lambda_2 = 2, \lambda_3 = 1$

(C) $\lambda_1 = 3, \lambda_2 = -2, \lambda_3 = -1$ (D) $\lambda_1 = 3, \lambda_2 = 2, \lambda_3 = -1$

Q.91. Eigenvectors of matrix $A = \begin{pmatrix} 1 & -1 \\ 2 & 4 \end{pmatrix}$ are given by vectors

(A) $\begin{pmatrix} -1 \\ 2 \end{pmatrix}$ and $\begin{pmatrix} -1 \\ 1 \end{pmatrix}$ (B) $\begin{pmatrix} 1 \\ -2 \end{pmatrix}$ and $\begin{pmatrix} -1 \\ 1 \end{pmatrix}$

(C) $\begin{pmatrix} -1 \\ -2 \end{pmatrix}$ and $\begin{pmatrix} 1 \\ 1 \end{pmatrix}$ (D) $\begin{pmatrix} -1 \\ 2 \end{pmatrix}$ and $\begin{pmatrix} 1 \\ -1 \end{pmatrix}$

Q.92. Let $A = \begin{pmatrix} 2 & 2 & 3 \\ 1 & 2 & 1 \\ 2 & -2 & 1 \end{pmatrix}$ and $P^{-1}AP = \begin{pmatrix} 4 & 0 & 0 \\ 0 & 2 & 0 \\ 0 & 0 & -1 \end{pmatrix}$, then matrix P is

(A) $\begin{pmatrix} 8 & -2 & 1 \\ 5 & -3 & 0 \\ 2 & 2 & 1 \end{pmatrix}$ (B) $\begin{pmatrix} 8 & 2 & -1 \\ 5 & -3 & 0 \\ 2 & 2 & 1 \end{pmatrix}$

(C) $\begin{pmatrix} 8 & -2 & -1 \\ 5 & -3 & 0 \\ 2 & 2 & 1 \end{pmatrix}$ (D) $\begin{pmatrix} 8 & -2 & -1 \\ 5 & 3 & 0 \\ 2 & 2 & 1 \end{pmatrix}$

Q.93. For a frequency – distribution mean deviation about the mean is computed by

(A) M. D. $= \frac{\sum fd}{\sum f}$ (B) $\frac{\sum d}{\sum f}$

(C) $\frac{\sum f|d|}{\sum f}$ (D) $\frac{\sum f}{\sum f|d|}$

Q.94. If the standard deviation of 0, 1, 2, 3, ..., 9 is a, then the standard deviation of 10, 11, 12, 13, ..., 19 is

(A) a (B) 10 a

(C) a + 10 (D) a + $\sqrt{10}$

Q.95. The residue of the complex function

$$f(z) = \frac{3}{2z + z^2 - z^3}$$

about the point $z_0 = 0$ is

(A) 1 (B) 3

(C) $\frac{5}{2}$ (D) $\frac{3}{2}$

Q.96. Let C be a closed contour and f (z) be a complex valued function

$$F(z) = \frac{1}{(z^2+1)^2}.$$

Then, $\int_C f(z)\,dz$ is equal to

(A) Π (B) $\frac{\pi}{4}$

(C) $\frac{\pi}{6}$ (D) $\frac{\pi}{2}$

Q.97. The integral $\oint_C \frac{e^{2z}}{(z+1)^4} dz$, where C is the circle $|Z| = 3$ is

(A) $\frac{2}{3}\pi e^2 i$ (B) $\frac{8}{3}\pi e^2 i$

(C) $\frac{8}{3}\pi e^{-2} i$ (D) $\frac{4}{3}\pi e^{-2} i$

Q.98. Assume that a school district has 10,000 6th graders. In this district, the average weight of a 6th grader is 80 pounds, with a standard deviation of 20 pounds. Suppose you draw a random sample of 50 students. Then, the probability that the average weight of a sampled student will be less than 75 pounds is

(A) 0.038 (B) 0.018

(C) 0.032 (D) 0.026

Q.99. The area of the triangle with vertices at $P(2,3,5)$, $Q(4,2,-1)$, $R(3,6,4)$ is,

(A) $\frac{1}{2}\sqrt{426}$ (B) $\sqrt{426}$

(C) $\sqrt{\frac{1}{426}}$ (D) $\frac{2}{3}\sqrt{426}$

Q.100. Find the equation for the plane passing through the points $P(3,1,-2)$, $Q(-1,2,4)$ and $R(2,-1,1)$?

(A) $5x + 3y + 2z = 11$ (B) $5x + 2y + 3z = 11$

(C) $5x + 2y + 2z = 10$ (D) $5x + 3y + 2z = 10$

Q.101. The rectangular form of equations for (i) the tangent plane and (ii) the normal line to the surface $F(x,y,z)=0$ at the point $P(x_0,y_0,z_0)$ are respectively

(A) $F_x|_P(x-x_0)-F_y|_P(y-y_0)+F_z|_P(z-z_0)=0$ and $\frac{(x-x_0)}{F_x|_P}=\frac{(y-y_0)}{F_y|_P}=\frac{(z-z_0)}{F_z|_P}$

(B) $F_x|_P(x-x_0)+F_y|_P(y-y_0)+F_z|_P(z-z_0)=0$ and $\frac{(x-x_0)}{F_x|_P}=\frac{(y-y_0)}{F_y|_P}=\frac{(z-z_0)}{F_z|_P}$

(C) $F_x|_P(x-x_0)+F_y|_P(y-y_0)-F_z|_P(z-z_0)=0$ and $\frac{(x-x_0)}{F_x|_P}=\frac{(y-y_0)}{F_y|_P}=\frac{(z-z_0)}{F_z|_P}$

(D) $F_x|_P(x-x_0)+F_y|_P(y-y_0)+F_z|_P(z-z_0)=0$ and $\frac{(x-x_0)}{F_x|_P}=\frac{(y-y_0)}{F_y|_P}=\frac{(z-z_0)}{F_z|_P}$

Q.102. The equations of the (i) tangent line and (ii) normal line to the surface $x^2+y^2=4z$ at $(2,-4,5)$ are respectively,

(A) $x-2y-z=5$; $\frac{x-2}{1}=\frac{y+4}{-2}=\frac{z-5}{-1}$

(B) $x+2y-z=5$; $\frac{x-2}{1}=\frac{y+4}{-2}=\frac{z+5}{-1}$

(C) $x-2y-z=5$; $\frac{x-2}{1}=\frac{y+4}{-2}=\frac{z-5}{-1}$

(D) $x-2y-z=5$; $\frac{x-2}{1}=\frac{y-4}{-2}=\frac{z-5}{-1}$

Q.103. A particle moves along a curve whose parametric equations are $x=e^{-t}, y=2\cos(3t), z=\sin(3t)$. The velocity and acceleration at $t=0$ are respectively

(A) $-\vec{i}+3\vec{j}\,;\,\vec{i}-18\vec{j}$

(B) $-\vec{i}+3\vec{k}\,;\,\vec{i}-18\vec{j}$

(C) $-\vec{i}-3\vec{k}\,;\,\vec{i}-18\vec{j}$

(D) $-\vec{i}+3\vec{k}\,;\,\vec{i}+18\vec{j}$

Q.104. If $\vec{a}$ is a constant vector and $\vec{r} = x\,\vec{i} + y\,\vec{j} + z\,\vec{k}$, then $\nabla.(\vec{a} \times \vec{r})$ is

(A) zero (B) $|\vec{a}|$

(C) 1 (D) $|\vec{r}|$

Q.105. If $f = (x^2 + y^2 + z^2)^{-n}$, determine n if $\nabla.(\nabla f) = 0$

(A) $n = 0$ (B) $n = \frac{1}{2}$

(C) $n = \frac{2}{3}$ (D) $n = 0$, or $\frac{1}{2}$

Q.106. Find $\nabla^2(r^n)$?

(A) $n(n+1)r^n$ (B) $(n+1)r^{n-2}$

(C) $n(n+1)r^{n-2}$ (D) $(n+1)r^{n+2}$

Q.107. If $\vec{a} = t\,\vec{i} - 3\vec{j} + 2t\,\vec{k}$, $\vec{b} = \vec{i} - 2\vec{j} + 2\,\vec{k}$; $\vec{c} = 3\,\vec{i} + t\vec{j} - \vec{k}$, evaluate $\int_1^2 (\vec{a}.\vec{b} \times \vec{c})dt$

(A) $^1/_2$ (B) $^2/_3$

(C) $^3/_8$ (D) zero

Q.108. A vector field is given by $\vec{F} = (\sin y)\vec{i} + x(1 + \cos y)\vec{j}$. Evaluate the line integral over a circular path given by $x^2 + y^2 = a^2, z = 0$?

(A) $^{a^2}/_{\pi}$

(B) $^{\pi}/_{a^2}$

(C) a^2

(D) πa^2

Q.109. Evaluate

$$\int_{(0,1)}^{(1,2)} [(x^2 - y)dx + (y^2 + x)dy]$$

along the parabola $x = t, y = y^2 + 1$.

(A) $2/3$
(B) $10/3$
(C) -2
(D) 2

Q.110. If $\vec{r} = x\,\vec{i} + y\,\vec{j} + z\,\vec{k}$ and V is the volume enclosed by a closed surface S, then

$$\iint \vec{r}.\vec{n}\ \mathbf{dS}$$

equals

(A) V
(B) $3V$
(C) $1/V$
(D) $3/V$

Q.111. Apply Green's theorem to evaluate

$$\int [\sin y\,.\,dx + x\,(1 + \cos y)]$$

along a closed path C given by $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$.

(A) $\frac{\pi a}{b}$
(B) $\frac{\pi b}{a}$
(C) πab
(D) $\frac{1}{\pi ab}$

Q.112. Examine the convergence of the series $1 + 3 + 5 + \cdots \infty$.

(A) Convergent (B) Divergent

(C) Oscillatory (D) Absolute convergent

Q.113. Examine the convergence of the series

$$1 + \frac{2}{3} + \frac{3}{4} + \frac{4}{5} + \cdots$$

(A) Divergent

(B) Convergent

(C) Oscillatory

(D) Absolute convergent

Q.114. For what value of p the following series is divergent?

$$\sum \frac{1}{n^p}$$

(A) $p \geq 1$

(B) $p > 1$

(C) $p < 1$

(D) $p \leq 1$

$\frac{1}{n^p}$ → $p \leq 1$ divergent

$p > 1$ convergent

Q.115. Find the nature of the series

$$\frac{1}{2} + \frac{\sqrt{2}}{3} + \frac{\sqrt{3}}{8} + \cdots + \frac{\sqrt{n}}{n^2 - 1} + \cdots$$

(A) Convergent

(B) Divergent

(C) Oscillatory

(D) Absolute convergent

Q.116. If $\sum u_n$ is a positive term series such that $\lim_{n\to\infty} \frac{u_{n+1}}{u_n} = k$, then the series $\sum u_n$ is neither convergent nor divergent, if

(A) $k \geq 1$ (B) $k \leq 1$

(C) $k = 1$ (D) $k < 1$

Q.117. In a positive term series $\sum u_n$, if $\frac{u_n}{u_{n+1}}$ can be expanded in the form

$$\frac{u_n}{u_{n+1}} = 1 + \frac{k}{n} + o\left(\frac{1}{n^2}\right)$$

then $\sum u_n$ converges if

(A) $k \leq 1$

(B) $k \geq 1$

(C) $k < 1$

(D) $k > 1$

Q.118. Evaluate

$$\lim_{x\to 1} \frac{x^x - x}{x - 1 - \ln x}$$

(A) $1/2$

(B) $1/5$

(C) 1

(D) 2

Q.119. Evaluate $\lim_{x\to 0} \left(\frac{\tan x}{x}\right)^{1/x^2}$?

(A) $1/3$

(B) $1/e$

(C) $e^{1/3}$

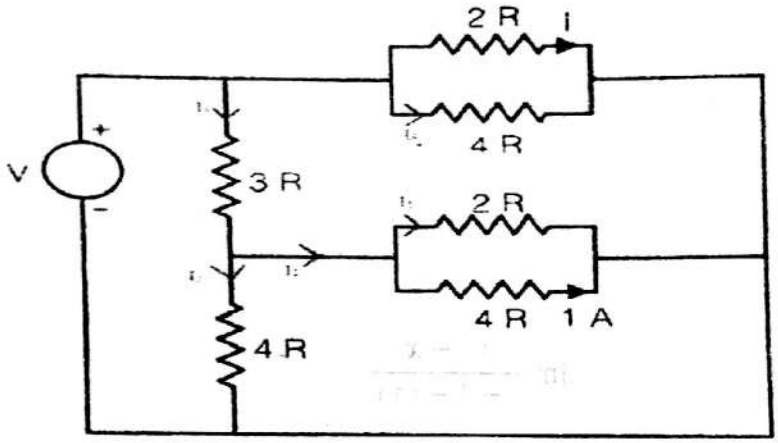
(D) $e^{-1/3}$

Q.120. Evaluate the following limits

$$\lim_{x \to 0} \frac{1 - \cos x}{x + x^2}$$

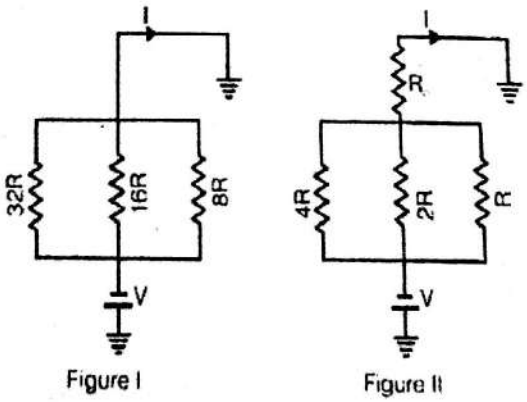
(A) 1
(B) 0
(C) ∞
(D) $1/2$

Q.121 In given below circuit, the current "I" is



(A) 1 A (B) 8A
(C) 3 A (D) 4A

Q.122 The circuit shown in figure-I is replaced by that in figure-II. If current 'I' remains the same, then R_0 will be



(A) 0 (B) R

(C) 28R (D) 4R

Q.123 Voltage Transfer function (V_{out}/V_{in}) of a simple RC integrator has

(A) a finite zero and a pole at infinity

(B) a finite zero and a pole at the origin

(C) a zero at the origin and a finite pole → Single pole $s = \frac{-1}{RC}$

(D) a zero at the infinity and a finite pole

Q.124 Current gain of a bipolar transistor drops at high frequencies because of

(A) transistor capacitance

(B) high current effects in the base

(C) parasitic inductive elements

(D) the early effect

Q.125 The f_T of a BJT is related to its g_m, $C\mu$, and $C\pi$ as follows

(A) $f_T = (C\pi + C\mu) / g_m$

(B) $f_T = g_m / (C\pi + C\mu)$

(C) $f_T = g_m / [2\pi (C\pi + C\mu)]$

(D) $f_T = [2\pi (C\pi + C\mu)] / g_m$

Q.126 The input impedance of a operational amplifier is expected to be of the order of

(A) a few ohms

(B) >> than 100 kΩ

(C) 1 kΩ to 10 kΩ

(D) zero

output impedance → zero
i/p " → infinite

Q.127 The typical practical open loop gain of an operational amplifier is about

(A) 10^5 (B) 100

(C) 10 (D) 10^{10}

Q.128 An operational amplifier has a slew rate of 5V/ μs The largest sine wave output voltage possible at a frequency of 1MHz is

(A) 10 π volts (B) 5 volts

(C) 5 / (2 π) volts (D) 5 / π volts

Q.129 For two port reciprocal network, the output open-circuit voltage divided by the input current is equal to

(A) B (B) Z_{12}

(C) Y_{12} (D) H_{12}

Q.130 The 'h' parameter equivalent circuit of a junction transistor is valid for

(A) low frequency, small signal operation

(B) low frequency, large signal operation

(C) high frequency, small signal operation

(D) high frequency, large signal operation

Q.131 What is the approximate mobility of holes in Germanium at room temperature?

(A) 4500 $cm^2/V.S$

(B) 2400 $cm^2/V.S$

(C) 900 $cm^2/V.S$

(D) 1800 $cm^2/V.S$

Q.132 The mobility of electrons in a semiconductor is defined as the

(A) Diffusion velocity per unit electric field

(B) Drift velocity per unit electric field

(C) Diffusion velocity per unit magnetic field

(D) Drift velocity per unit magnetic field

Q.133 A relaxation oscillator is one which

(A) has two stable states

(B) oscillates continuously

(C) relaxes indefinitely

(D) produce a non-sinusoidal output

Q.134 In a circuit, if open loop gain is 10^6 and output voltage is 10Volt, the differential voltage should be

(A) 10 μV (B) 0.1 μV

(C) 100 μV (D) 1 μV

Q.135 SCR turn off from conducting state to blocking state on

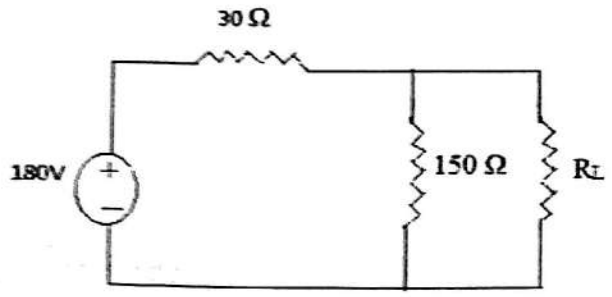
(A) reducing gate current

(B) reducing anode current below holding current value

(C) reversing gate voltage

(D) applying a.c to the gate

Q.136 What is the value of maximum power P_{MAX} through load resistance R_L in the given below circuit ?



(A) 225 Watts ✓

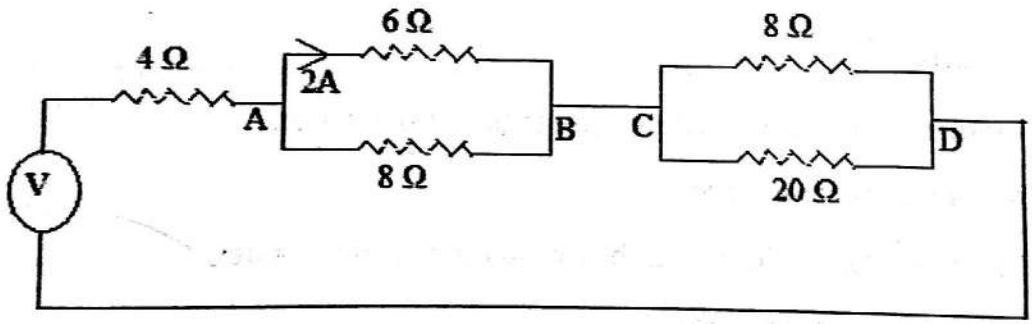
(B) 400 Watts

(C) 150 Wattss

(D) Zero

V = IR
I = V/R = 18/30 = 0.6 A
R = 180

Q.137 The applied Voltage in given figure is



(A) 40 V

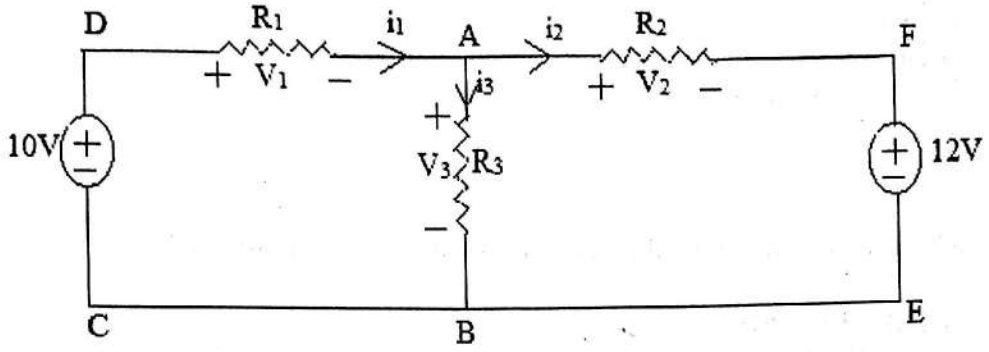
(B) 2 V

(C) 46 V ✓

(D) 1 V

Q.138 In figure , value of the branch current i_2 is ?

$R_1 = 8\ \Omega$, $R_3 = 1\ \Omega$, $V_2 = -10$ V, $i_3 = 2$ A.



(A) 1 A (B) -1 A

(C) 0 A (D) 1.5 A

Q.139 . In 8086 microprocessor the following has the highest priority among all type interrupts.

(A) NMI (B) DIV 0

(C) TYPE 255 (D) OVER FLOW

Q.140 The advantage of memory mapped I/O over I/O mapped I/O is,

(A) Faster

(B) Many instructions supporting memory mapped I/O

(C) Require a bigger address decoder

(D) All the above

Q.141 Which latch is mostly used creating memory register:

(A) SR-Latch (B) JK-Latch

(C) D-Latch (D) T-Latch

Q.142 High level language is also called

(A) Problem oriented language (B) Business oriented language

(C) Mathematically oriented language (D) All of the above

Q.143 What is the maximum length allowed for primary name of a computer file under DOS?

(A) 8
(B) 12
(C) 3
(D) None of the above

Q.144 Which of the following could be a valid DOS file specification?

(A) NOSFILE.POST
(B) NOSFILE.P.OST
(C) NOSFILE.DOC
(D) NOST.FILEDOC

Q.145 Each time you turn on your computer, it will check on the control file

(A) Command.com, io.sys
(B) Command.com, date.com, dir.com
(C) Command.com, io.sys, msdos.sys
(D) Chkdsk.exe

Q.146 ABCD - seven segment decoder / driver in connected to an LED display. Which segments are illuminated for the input code DCBA = 0001.

(A) b, c
(B) c, b
(C) a, b, c
(D) a, b, c, d

Q.147 Which is true for a typical RISC architecture?

(A) Micro programmed control unit.
(B) Instruction takes multiple clock cycles.
(C) Have few registers in CPU.
(D) Emphasis on optimizing instruction pipelines

Q.148 What is the output of the following code

```
AL=00110101
BL= 39H
SUB AL, AL, BL
AAS
```

(A) AL= 00000100, CF=1
(B) BL=00000100, CF=0
(C) AL=11111100 CF=1
(D) BL= 00000100, CF=1

Q.149 In 8086 microprocessor one of the following instructions is executed before an arithmetic operation

(A) AAM
(B) AAD
(C) DAS
(D) DAA

Q.150 When generating physical addresses from logical address the offset is stored in ____.

(A) Translation look-aside buffer
(B) Relocation register
(C) Page table
(D) Shift register

Q.151 Which of the following technique/s used to effectively utilize main memory?

(A) Address binding
(B) Dynamic linking
(C) Dynamic loading
(D) Both b and c

Q.152 Convert to hexadecimal: 1457.11_{10}. Round to two digits past the hexadecimal point.

(A) $5B1.1C_{16}$ (B) $4B1.1C_{16}$
(C) $5B1.1D_{16}$ (D) $4B1.1D_{16}$

Q.153 Which type of error is eliminated through the use of the Gray code?

(A) decoding (B) timing

(C) encoding (D) conversion

Q.154 How many BCD adders would be required to add the numbers 973_{10} + 39_{10}?

(A) 3 (B) 4

(C) 5 (D) 6

Q.155 What would be required for a TTL driver to operate a +20V device?

(A) open collector output (B) pull down resistor

(C) twenty volt logic system (D) additional fan out

Q.156 If the input to T flip-flop is 100 Hz signal, the final output of the three T flip-flops in cascade is

(A) 1000Hz (B) 500Hz

(C) 333Hz (D) 12.5Hz

Q.157 DeMorgan's first theorem shows the equivalence of

(A) OR gate and Exclusive OR gate

(B) NOR gate and Bubbled AND gate

(C) NOR gate and NAND gate

(D) NAND gate and NOT gate

$\overline{A+B} = \overline{A} \cdot \overline{B}$ → (1) law

$\overline{A \cdot B} = \overline{A} + \overline{B}$ → (2) law

Q.158 The A/D converter whose conversion time is independent of the number of bits is

(A) Dual slope (B) Counter type

(C) Parallel conversion (D) Successive approximation

Q.159 In digital ICs, Schottky transistors are preferred over normal transistors because of their

(A) Lower Propagation delay
(B) Higher Propagation delay
(C) Lower Power dissipation
(D) Higher Power dissipation

Q.160 The maximum conversion time of a 10-bit staircase ADC using a 20 kHz clock is:

(A) 500 microseconds
(B) 51.2 milliseconds
(C) 1.0 seconds
(D) 1.023 seconds

Q.161 The MSI chip 7474 is

(A) Dual edge triggered JK flip-flop (TTL).
(B) Dual edge triggered D flip-flop (CMOS).
(C) Dual edge triggered D flip-flop (TTL).
(D) Dual edge triggered JK flip-flop (CMOS).

Q.162 How many select lines will a 16 to 1 multiplexer will have

(A) 4
(B) 3
(C) 5
(D) 1

Q.163 How many flip-flops are required to construct mod 30 counter?

(A) 5
(B) 6
(C) 4
(D) 8

Q.164 How many two-input AND and OR gates are required to realize Y=CD+EF+G

(A) 2,2
(B) 2,3
(C) 3,3
(D) none of these

Q.165 Which of following cannot be accessed randomly?

(A) DRAM (B) SRAM

(C) ROM (D) Magnetic tape

Q.166 A 1000kHz carrier is simultaneously modulated with 300Hz and 2kHz audio sine waves. The frequency which will not be present in the output is

(A) 998kHz (B) 999.7kHz

(C) 1000.3kHz (D) 700kHz

$f_c + f_m$

$f_c - f_m$

Q.167 A FM signal is being broadcast in the 88.108MHz band having a carrier swing of 125kHz. The modulation index is

(A) 100% (B) 83%

(C) 67% (D) 50%

$\frac{125}{250}$

88.108×10^6

25×10^3

25 | 881.08

75

Q.168 A 60Hz carrier is amplitude modulated by the speech band of 300 to 3000Hz. The range of upper side bands will be

(A) 60.3 to 63kHz (B) 60 to 59.7kHz

(C) 57 to 59.7kHz (D) 56.7 to 56.3kHz

Q.169 PAM signals can be demodulated by using a

(A) low pass filter (LPF) alone

(B) a Schmitt trigger followed by a LPF

(C) a differentiator followed by a LPF

(D) a clipper circuit followed by a LPF

$2\Delta f = 125$

$\Delta f_c \frac{125}{2}$

$\frac{\Delta f}{f_m}$

$\Rightarrow \frac{125 \times 1}{2 \times 88.108}$

Q.170 In a PCM, the amplitude levels are transmitted in a 7 unit code. The sampling is done at the rate of 10Hz. The bandwidth should be

(A) 5kHz (B) 35kHz

(C) 70kHz (D) 5MHz

vf_m

$f_s = 2f_m$

$f_m = \frac{10}{2} = 5$

$7 \cdot 5 = 35$