OJEE 2014 Question Paper

Odisha Joint Entrance Examination

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OJEE 2014 (Lateral Entry to M.Pharm)

1. Morphine is present in

   (A)   Atropa belladonna   (B) Papaver somniferum

   (C)   Ricinus communis   (D) Solanum nigrum

2. Gray baby syndrome is due to the indiscriminate use of

   (A) Streptomycin (B) Chloramphenicol (C) Penicillin (D) Tetracycline

3. Which of the following is not a neurotransmitter ?

   (A) Heparin (B) Nor adrenaline (C) Hydroxytryptamine (D) Prostaglandin

4. Wagner's test is used to detect the presence of

   (A) Steroids   (B) Alkaloids   (C) Glycosides   (D) Terpenes

5. One nanometer (nm) is equal to

   (A) 10^{10} cm   (B) 10^{12} cm   (C) 10^{-7} cm   (D) 10^{-4} cm

6. Indian and African Senna leaves differ from each other with respect to

   (A) Vein islet number (B) Stomatal index (C) Colour (D) All of the above

7. The conc. of sucrose in Simple Syrup BP is

   (A) 85% w/w   (B) 60.7% w/w   (C) 66.7% w/w   (D) 66.7% w/v

8. The HLB value of Sodium lauryl sulphate is

   (A) 4.0   (B) 4.7   (C) 7.4   (D) 40.0

9. The disintegration time for enteric coated tablet is

   (A) 15 minutes   (B) 30 minutes   (C) 105 minutes   (D) 135 minutes

10. Antibiotic which interacts with calcium ion is

    (A) Erythromycin   (B) Streptomycin   (C) Tetracyclin   (D) Ampicillin

11. Flow rate of granules from the hopper can be improved by adding

   (A) Lubricant   (B) Disintegrant   (C) Binder   (D) Glidant

12. Sterilization temperature for aqueous solution in autoclave is

   (A) 60ºc   (B) 121ºc   (C) 160ºc   (D) 180ºc

13. The vitamin administered with isoniazid to minimize its adverse reaction is

   (A) Vitamin A   (B) Pyridoxine   (C) Biotin   (D) Pantothenic acid

14. State Pharmacy council should have the following number of elected members

   (A) Six   (B) Nine   (C) Five   (D) Seven

15. Synthesis of Urea takes place exclusively

   (A) Kidney   (B) Liver   (C) Gall bladder   (D) Urinary bladder

16. How many parts of 10% alcohol be mixed with 2 parts of 15% alcohol to get 12% alcohol ?

   (A) 2   (B) 3   (C) 5   (D) 6

17. The UV- Visible region in the electromagnetic spectrum of radiation is

   (A) 200-400 nm   (B) 300-600 nm   (C) 400-800 nm   (D) 200-800 nm

18. In Drugs & Cosmetics Act and Rules there under, list of substances that should by retail on prescription of Registered Medical Practitioner is given in

   (A) Schedule H   (B) Schedule G   (C) Schedule J   (D) Schedule O

19. Alkaloids in cinchona bark are detected by

   (A) Iodine test   (B) Thalleioquin test

    (C) Liebermann-Burchard test   (D) Nessler's test

20. The sweetening agent commonly used in chewable tablet formula is

   (A) Sucrose (B) Cyclamate sodium (C) Saccharin sodium (D) Mannitol

21. The pH of a Pharmaceutical buffer system can be calculated by

   (A) pH partition theory   (B) Noyes-Whitney law

   (C) Henderson-Hasselbatch equation (D) Michaelis-Menten equation

22. The Pharmacy Council of India is constituted by the

   (A) Central Government   (B) State Government

   (C) Parliament   (D) Legislative assembly

23. Sigma blade mixers are commonly used in

   (A) Wet granulation   (B) Dry granulation

   (C) Powder mixing   (D) Crude fibre mixing

24. Water for injection differs from sterile distilled water as it is free from

   (A) carbon dioxide (B) pyrogens (C) preservatives (D) antioxidant

25. Which of the following steroids shows predominant mineralocorticoid action?

   (A) Hydrocortisone   (B) Spiranolactone

   (C) Dexamethasone   (D) Fludrocortisone

26. The Shick test is used to determine susceptibility to

   (A) Measles   (B) Diptheria   (C) Polio   (D) Typhoid

27. Disposable syringes are made up of

   (A) Polypropylene   (B) Transparent polystyrene

   (C) Glass   (D) Poly Tetra Chloro Ethylene

28. Choose the correct pH of the lachrymal fluid

(A) 8.0   (B) 6.2   (C) 7.4   (D) 9.0

29. A drug which has antipyretic, anti-inflammatory and antiplatelet activity is

(A) Sulfinpyrazone (B) Aspirin (C) Ticlopidine (D) Acetaminophen

30. Cocaine is used as a

(A) Topical anaesthetic   (B) Cough suppressant

 (C) Stimulant   (D) Respiratory infections

31. Penicillinase resistant penicillin is

(A) Amoxycillin (B) Ampicillin   (C) Penicillin V   (D) Methicillin

32. Tyndallisation means

(A) Successive autoclaving with a bactericide

(B) Successive heating with a bactericide

(C) Successive heating at low temperature

(D) Successive heating at low temperature and incubation

33. Vincristine and vinblastine act by

(A) Binding with the protein tubulin and arrest at metaphase

(B) Inhibiting the protein synthesis

(C) Acting as antimetabolite

(D) Inhibiting the enzyme system

34. Sulphonamide tragedy was due to its combination with

(A) Penicillin (B)Streptomycin (C)Diethylene hydrochloride (D)Bicarbonate

35. Cholinergic receptor present on intestinal muscle is

   (A) Histamine receptor   (B) Muscarinic receptor

   (C) Nicotine receptor   (D) Beta receptor

36. Metronidazole inhibits anaerobic bacteria and protozoa by

   (A) Affecting the structure of DNA molecule of the organism

   (B) Destroying the ribosomes

   (C) Inhibiting the cytochrome system

   (D) Inhibiting the protein synthesis

37. Antihypertensive drug inhibits the renin-angiotensin system is

   (A) Reserpine   (B) Captopril (C) Methyl dopa (D) Propanolol

38. Titanium dioxide is commonly present in

   (A) Vanishing cream   (B) Sunscreen cream

   (C) Aqueous calamine cream   (D) Opthalmic cream

39. Powdered digitalis is dried at a temperature

   (A) Not exceeding 60ºc   (B) 65ºc   (C) 75ºc   (D) 100ºc

40. The Mantoux test uses

   (A) Old tuberculin   (B) Diptheria toxin

   (C) Serum antigen   (D) Polysaccharide antigen

41. The neurotransmitter released at the end of sympathetic nerve fibre is

   (A) Epinephrine (B) Nor-epinephrine (C) Acetylcholine (D) Physostigmine

42. Rancidity of a fat is due to

   (A) Oxidation (B) Saponification   (C) Hydrolysis (D) Neutralisation

43. The vitamin which has deodorant property is

    (A) Vitamin A   (B) Vitamin C   (C) Vitamin D (D) Vitamin E

44. Erythromycin is an antibiotic. It belongs to the class of

    (A) ß-lactum (B) Aminoglycosides (C) Macrolide   (D) Peptide

45. The principal structural component of the cell wall in bacteria ia made up of

    (A) simple protein   (B) peptidoglycan polymer

    (C) complex polysaccharides   (D) glycoprotein

46. Tetracyclines are avoided during pregnancy because

    (A) It is teratogenic   (B) it may affect the bone growth of foetus

    (C) it causes discolouration of mothers teeth (D) it may cause abortion

47. The tear secretion contains an antibacterial enzyme known as

    (A) Zymase   (B) Diastase (C) Lysozyme   (D) Lipase

48. Schedule M as per Drugs and Cosmetics Act is concerned with

    (A) Opthalmic preparations   (B) Life period of drugs

    (C) Requirements of factory premises (D) List of prescription drugs

49. Varicella zoster is the causative organism for

    (A) Small pox   (B) Dermatophytosis   (C) Herpes   (D) Tuberculosis

50. The statement 'store in a cold place' as per IP, means

    (A) store at room temperature   (B) store between $2°$ to $8°c$

    (C) store between $8°$ to $25°c$ (D) store at $0°c$

51. Durability of a tablet to combined effects of shock and abrasion is evaluated by using

(A) Hardness tester   (B) Disintegration test apparatus

(C) Friabilator   (D) Screw Gauge

52. Emetine is the predominant alkaloid of

(A) Rauwolfia serpentina   (B) Vinca rosea

(C) Cephaelis ipecacuanha   (D) Swertia chirata

53. The entire plant of Swertia chirata is used as

(A) Cardiotonic (B) Bitter tonic   (C) Diuretic   (D) Anti diabetic

54. Clark's formula for calculation of dose of a drug is based on

(A) Age (B) Body weight (C) Surface area   (D) Drug activity

55. The organism that enter the body only through an injury is

(A) Salmonella typhi   (B) Clostridium tetani

(C) Clostridium botulinum   (D) Streptococcus pyrogenes

56. The pH range of methyl orange is

(A) 2.9-4.6   (B) 1.9-3.6   (C) 3.9- 5.6   (D) 4.2-6.3

57. In the preparation of ointments, macrogols are used as

(A) Water soluble base   (B) Hydrocarbon base

(C) Absorption base   (D) Oleogenous base

58. The particle size of the dispersed solids in a suspension is usually greater than

(A) 0.5 µm   (B) 1 µm   (C) 5 µm   (D) 10 µm

59. In the extemporaneous preparation of a suspension, Levigation is used to

(A) Reduce the zeta potencial   (B) avoid bacterial growth

(C) reduce particle size   (D) enhance viscosity

60. In order to produce characteristic pharmacological action, a drug must always

(A) reach high blood levels   (B) absorbed from GIT readily

(C) achieve adequate conc. at site of action (D) excrete unchanged in urine

Answers:

1. B	21. C	41. B
2. B	22. A	42. A
3. A	23. C	43. B
4. B	24. B	44. C
5. C	25. D	45. B
6. D	26. B	46. C
7. C	27. B	47. C
8. D	28. C	48. C
9. D	29. B	49. C
10. C	30. A	50. B
11. D	31. D	51. C
12. B	32. C	52. C
13. B	33. A	53. B
14. D	34. A	54. B
15. A	35. B	55. B
16. B	36. A	56. A
17. D	37. B	57. A
18. A	38. B	58. A
19. B	39. A	59. C
20. D	40. A	60. C

OJEE 2014 (Lateral Entry B.Sc)

Physics

1. Assume that a tunnel is dug along the diameter of the earth poles. A small body is dropped in to it so that the body performs simple harmonic motion. Neglect all the frictional forces and assume that earth has uniform density of ρ. The period of oscillation will be

(a) $\dfrac{2\pi}{\sqrt{\dfrac{4}{3}\pi G\rho}}$

(b) $\dfrac{2\pi}{\sqrt{\dfrac{4}{3}\pi\rho}}$

(c) $\dfrac{2\pi}{\sqrt{\dfrac{4}{3}\pi G}}$

(c) $\dfrac{2\pi}{\sqrt{G\rho}}$

2. A 1 g mass is suspended from a vertical spring. It executes simple harmonic motion with period 0.1 sec. By how much distance had the spring stretched when the mass was attached?

(a) 0.5 cm　　　　　　(b) 0.25 cm　　　(c) 0.75 cm　　　　　　(d) 1.25 cm

3. A spherical soap bubble of radius 1.0 cm is formed inside another radius of 2.0 cm. The radius of single soap bubble which maintains the same pressure difference as inside the smaller and outside the large soap bubble is

(a) 6.67×10^{-5}m　　(b) 2.67×10^{-5}m　　(c) 2.67×10^{-3}m　　　(d) 6.67×10^{-3}m

4. Twelve equal charges, q (same nature), are situated at the corners of a regular 12-sided planner polygon (for instance, one on each numeral of a clock face). The net force on a test charge Q at the center is (let r= be the distance between the charge 'q' to the test charge Q)

(a) Zero　　　　(b) $\dfrac{12qQ}{4\pi\varepsilon_0 r^2}$　　　　　　(c) $\dfrac{6qQ}{4\pi\varepsilon_0 r^2}$　　　　　(d) $\dfrac{qQ}{4\pi\varepsilon_0 r^2}$

5. The potential at a point x (measured in μm) due to some charges situated on the x- axis is given by : $V(x) = \dfrac{20}{(x^2-4)}$ $volt$. The electric field E at x= 4 μm is given by

(a) $\dfrac{5}{3}$ V/ μm and in the –ve x direction.

(b) $\dfrac{5}{3}$ V/ μm and in the +ve x direction

(c) $\dfrac{10}{9}$ V/ μm and in the –ve x direction

(d) $\dfrac{10}{9}$ V/ μm and in the +ve x direction

6. In an AC circuit, the voltage applied is $E = E_0 \sin \omega t$. The resulting current in the circuit is $I = I_0 \sin\left(\omega t - \dfrac{\pi}{2}\right)$. The power consumption in the circuit is given by

(a) $P = \dfrac{E_0\, I_0}{\sqrt{2}}$ (b) P = 0   (c) $P = \dfrac{E_0\, I_0}{2}$ (d) $\sqrt{2}\, E_0 I_0$

7. A charged particle of mass m and charge q travels on a circular path of radius r that is perpendicular to a magnetic field B. The time taken by the particle to complete one revolution is
(a) $2\pi mq/\,B$ (b) $2\pi q^2 B/m$ (c) $2\pi qB/\,m$ (d) $2\pi m/qB$

8. An air cored solenoid has 300 turns, its length is 25 cm and its cross section is 3 cm^2. The self-inductance in Henry (given that $\mu = 4\pi \times 10^{-7}$).

(a) 5.1356×10^{-3} (b) 0.1356×10^{-5} (c) 0.1356×10^{-3} (d) 5.1356×10^{-5}

9. In electromagnetic wave the phase difference between electric and magnetic field vector **E** and **B** in a perfectly dielectric medium is
(a) 0   (b) $\pi/2$.   (c) π (d) 2π.

10. A sphere of radius $\sqrt{7}$ cm at 727°C is suspended in a vacuum in an enclosure at 227°C. Find out the rate of loss of heat of the sphere assuming that it is a black body. Take $\sigma = 5.7 \times 10^{-8}\ \text{W m}^{-2}\ \text{K}^4$.

(a) 475 Watt   (b) 470 Watt
(c) 465 Watt   (d) 460 Watt

11. The *r.m.s* velocity of the molecule of a gas at 27°C is 1.82×10^3 m/s. What will be the *r.m.s.* velocity at 127°C?

(a) 2.1×10^4 m/s   (b) 2.1×10^5 m/s.   (c) 22.1×10^3 m/s   (d) 2.1×10^3 m/s

12. When an unpolarized light of intensity I_0 is incident on a polarizing sheet, the intensity of the light which does not get transmitted is
(a) $I_0/2$ (b) $I_0/4$ (c)zero   (d) I_0

13. The wave function of a particle at a given time is

$$\psi(x) = \begin{cases} \sqrt{\dfrac{2}{L}} \sin \dfrac{\pi x}{L} & \text{for } 0 < x < L \\ 0 & \text{otherwise} \end{cases}$$

Find the probability of finding the particle in the range $\frac{L}{4} < x < \frac{3L}{4}$ at this time.

(a) 0.82　　　　　　　(b) 0.52　　　　　　　(c) 0.72　　　　　　　(d) 0.92

14. Calculate the longest wavelength that can be analyzed by a rock salt crystal of spacing $d = 2.82$ Å in the first order?

(a) 2.82 Å　　　　　　(b) 5.64 Å　　　　　　(c)　1.88 Å　　　　(d) 8.86 Å

15. In intrinsic semiconductor, the Fermi level lies

(a) Near conduction band
(b) Near valence band
(c) At midway of energy gap
(d) None of these

Chemistry

1. Vaska's complex is

A. six coordinate with Ir(III)	B. four coordinate with Ir(I)
C. four coordinate with Rh(I)	D. four coordinate with Rh(III)

2. In diborane the B-H-B angles are about

A. 100°	B. 90°
C. 93°	D. 83°

3. In a commercial preparation dry heating of Na_2CO_3 with urea gives

A. $NaCN$, CO_2 and NH_3	B. $NaOCN$, CO_2 and NH_3
C. $NaCN$, CH_4 and NO_2	D. $NaOCN$, CO and N_2H_4

4. Arrange the following Lewis acids in the order of increasing softness

Cu$^+$, Au$^+$, Ag$^+$ and K$^+$

A. Au$^+$<K$^+$<Ag$^+$<Cu$^+$	B. K$^+$<Ag$^+$<Au$^+$<Cu$^+$
C. K$^+$<Ag$^+$<Cu$^+$<Au$^+$	D. K$^+$<Cu$^+$<Ag$^+$<Au$^+$

5. Electronic configuration of the central metal ion in the compound [W(CO)$_6$] is

A. d^5, t$_{2g}$^{5}, S=1/2	B. d^6, t$_{2g}$^{6}, S=0
C. d^4, t$_{2g}$^{4}, S=1	D. d^6, t$_{2g}$^{4}e$_g$^{2}, S=2

6. A solution of (-)-2-chloro-2-phenylethane in toluene racemises slowly in the presence of small amount of SbCl$_5$, due to the formation of

A. Carbanion	B. Carbene
C. Free radical	D. Carbocation

7. Which of the following alcohol will react faster with Lucas reagent at room temperature is

A. Butan-1-ol	B. Butan-2-ol
C. 2-Methylpropan-1-ol	D. 2-Methylpropan-2-ol

8. Which of the following statement is true about this molecule?
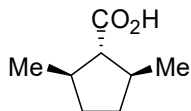
A. Chiral	B. Achiral due to presence of plane of symmetry
C. It is racemic	D. Chiral but optically inactive

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9. Which of the following statement is true about maleic acid and fumaric acid?

Maleic acid   Fumaric acid
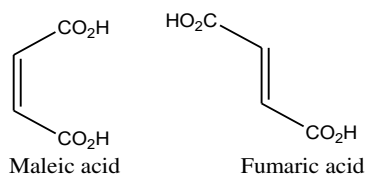
A. Maleate mono anion is much more stabilized than fumarate mono anion.	B. Fumarate mono anion is much more stabilized than maleate mono anion.
C. Both the mono anions have same stability.	D. None of the above is true

10. The following reaction follows a
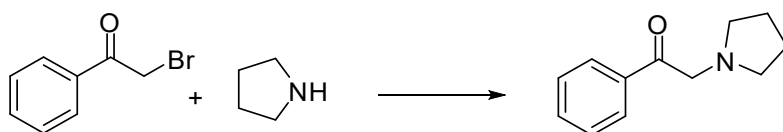
A. S_N1 pathway	B. S_N2 pathway
C. Mixed S_N1 and S_N2 pathway	D. None

11. A vapor at 39 atm and 25 °C was allowed to expand adiabatically to a final pressure of 1.00 atm through a porous wall. Calculate the final temperature. The Joule–Thomson coefficient, μ, at 25°C is 0.32 K atm^{-1}; assume that it remains constant over this temperature range.

A. 13 °C	B. 18 °C
C. 28 °C	D. 30 °C

12. Which one of the following is an extensive quantity?

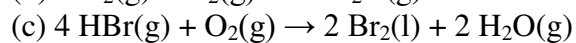| A. density	B. Heat capacity
C. pressure	D. specific heat capacity

13. In the gas-phase reaction $A + B \rightleftharpoons 2C + 3D$, it was found that when 15.0 mol A, 18.0 mol B, were mixed and allowed to come to equilibrium at 600 K, the resulting mixture contained 10 mol C at a total pressure of 1 bar. What is the value of K^0_p at 600 K

A. 0.023	B. 0.037
C. 1.500	D. 0.500

14. Given: $E°$ (Ag^+/Ag) = 0.8 V at 298 K and $E°$ (Zn^{+2}/Zn) = - 0.76 V at 298 K . An $AgNO_3$ solution containing a silver electrode is connected by means of a salt bridge to a $ZnCl_2$ solution containing a zinc electrode. Find the correct answer for the constructed cell at 298 K.

A. Ag (anode), Zn (cathode), flow of electrons Ag→ Zn	B. Zn (anode), Ag (cathode), flow of electrons Ag → Zn
C. Zn (anode), Ag (cathode), flow of electrons Zn → Ag	D. Ag (anode), Zn (cathode), flow of electrons Zn → Ag

15. Given the reactions (a) and (b) below, determine $\Delta H°_r$ for reaction (c) at 298 K.
(a) $H_2(g) + Br_2(l) \rightarrow 2\ HBr(g)$ $\Delta H°_r$ = - 72.80 kJ mol^{-1} at 298 K
(b) $2\ H_2(g) + O_2(g) \rightarrow 2\ H_2O(g)$ $\Delta H°_r$ = –483.64 kJ mol^{-1} at 298 K
(c) $4\ HBr(g) + O_2(g) \rightarrow 2\ Br_2(l) + 2\ H_2O(g)$

A. -338 kJ mol^{-1}	B. 338 kJ mol^{-1}
C. 243 kJ mol^{-1}	D. -243 kJ mol^{-1}

Mathematics

1. If an equivalence relation R on $A = \{1,2,3,4,5\}$ partitions A as $\{1\} \cup \{2\} \cup \{3,4,5\}$ then total number of elements in R is
    A. 3
    B. 6
    C. 8
    D. 11

2. Let $\mathbb{Z}$ be the set of all integers and for any integer $n > 1, H = \{0, \pm n, \pm 2n, \pm 3n, ...\}$. Then total number of left cosets of H in $(\mathbb{Z}, +)$ is
    A. 1
    B. n
    C. 2n
    D. infinity

3. Total number of elements x in a integral domain D which satisfy $x^2 = x$ is
    A. 2
    B. 1
    C. 0
    D. infinity

4. If A and B are symmetric matrices, then which of the following is certainly symmetric?
    A. AB
    B. ABA
    C. $(A + B)(A - B)$
    D. $ABAB$

5. Which of the following is true for the system: $2x - 2y + 3z + 4w = -1$,
$$-x + y + 2z + 5w = 2, -z - 2w = 3, x - y + 2z + 3w = 0.$$
    A. consistent and has finite number of solutions
    B. consistent and has infinite number of solutions
    C. has unique solution.
    D. inconsistent

6. General solution of the differential equation $(x^2 - 4xy - 2y^2)dx + (y^2 - 4xy - 2x^2)dy = 0$ is
    A. $y^3 + 6xy^2 + 6x^2y + x^3 = c$
    B. $y^3 - 6xy^2 - 6x^2y + x^3 = c$
    C. $y^3 - 6xy^2 - 6x^2y - x^3 = c$
    D. $y^3 - 6xy^2 + 6x^2y - x^3 = c$

7. The differential equation $y \sin 2x\, dx - (1 + y^2 + \cos^2 x)dy = 0$ is
    A. exact
    B. not exact
    C. separable
    D. homogenous

8. General solution of the differential equation $\frac{d^2y}{dx^2} + 9\frac{dy}{dx} + 20y = 0$ is

    A. $y = c_1 e^{-4x} + c_2 e^{-5x}$
    B. $y = c_1 e^{x} + c_2 e^{-x}$
    C. $y = c_1 e^{-4x} + c_2 e^{5x}$
    D. $y = c_1 e^{x} + c_2 e^{-x}$

9. The value of $\lim_{x\to 1} \frac{2x-2}{\sqrt[3]{26+x}-3}$ is

    A. 1
    B. ∞
    C. 24
    D. 54

10. The function $f(x) = \frac{x^3+1}{x+1}$

    A. is continuous anywhere on the real line
    B. not continuous anywhere on the real line
    C. is discontinuous at $x = -1$ and is not a removable discontinuity
    D. has removable discontinuity at $x = -1$

11. Which of the following is an asymptote of the curve $= xe^{\frac{1}{x}}$?

    A. $y = x - 1$
    B. $y = x$
    C. $y = x + 1$
    D. $y = 2$

12. The value of $\int \ln\left(\sqrt{1-x} + \sqrt{1+x}\right) dx$ is

    A. $x \ln\left(\sqrt{1-x} + \sqrt{1+x}\right) + \frac{1}{2}x + \frac{1}{2}\sin^{-1}x + c$
    B. $x \ln\left(\sqrt{1-x} + \sqrt{1+x}\right) - \frac{1}{2}x + \frac{1}{2}\sin^{-1}x + c$
    C. $x \ln\left(\sqrt{1-x} + \sqrt{1+x}\right) + \frac{1}{2}x - \frac{1}{2}\sin^{-1}x + c$
    D. $x \ln\left(\sqrt{1-x} + \sqrt{1+x}\right) - \frac{1}{2}x - \frac{1}{2}\sin^{-1}x + c$

13. The area of the region bounded by the curves $y = (x-4)^2, y = 16 - x^2$ and the x-axis is

    A. $\frac{64}{3}$
    B. $\frac{32}{3}$
    C. $\frac{16}{3}$
    D. $\frac{8}{3}$

14. The directional derivative of $f = xyz$ at $P = (-1,1,3)$ in the direction of the vector $\vec{a} = \hat{\imath} - 2\hat{\jmath} + 2\hat{k}$ is

    A. $\frac{1}{3}$
    B. $\frac{5}{3}$
    C. $\frac{7}{3}$
    D. $\frac{10}{3}$

15. If $v = yz\hat{\imath} + 3zx\hat{\jmath} + z\hat{k}$ then curl v with respect to right handed cartesian coordinates is

    A. $3x\hat{\imath} - y\hat{\jmath} + 2z\hat{k}$

    B. $-3x\hat{\imath} + y\hat{\jmath} - 2z\hat{k}$

    C. $-3x\hat{\imath} + y\hat{\jmath} + 2z\hat{k}$

    D. $3x\hat{\imath} + y\hat{\jmath} + 2z\hat{k}$

16. $\lim_{x \to 0} \frac{1 - \cos x + \cos 2x}{x^2}$ is equal to

    A. 1

    B. -1

    C. 0

    D. 2

17. If $f(x,y) = \begin{cases} \frac{x^2 - xy}{x+y}, & for\ (x,y) \neq (0,0) \\ 0, & for\ (x,y) = (0,0) \end{cases}$ then $f_y(0,0)$ is equal to

    A. 1

    B. 0

    C. -1

    D. does not exist

18. The function $xy - x^2 - y^2 - 2x - 2y$ has

    A.   maximum at $(2,2)$

    B. minimum at $(2,2)$

    C. minimum at $(-2,-2)$

    D. maximum at $(-2,-2)$

19. Value of the beta function $B\left(\frac{1}{3}, \frac{2}{3}\right)$ is equal to

    A. $\frac{2\pi}{\sqrt{3}}$

    B. $-\frac{2\pi}{\sqrt{3}}$

    C. $\frac{\pi}{\sqrt{3}}$

    D. $-\frac{\pi}{\sqrt{3}}$,

20. Which of the following sequences $\{a_n\}$ diverges ?

    A. $a_n = \left(\frac{3n+1}{3n-1}\right)^n$

    B. $a_n = \left(\frac{1}{3}\right)^n + \frac{1}{\sqrt{2^n}}$

    C. $a_n = \frac{n!}{10^{6n}}$

    D. $a_n = \frac{3^n 6^n}{2^{-n} n!}$

21. Laplace transform of $t^2 \cos t$ is equal to

  A. $\dfrac{2s^3 - 6s}{(s^2+1)^3}$

  B. $\dfrac{2s^3 + 6s}{(s^2+1)^3}$

  C. $\dfrac{2s^3 - 6s}{(s^2-1)^3}$

  D. $\dfrac{2s^3 + 6s}{(s^2-1)^3}$

22. If $L\left(\dfrac{d^2Y}{dt^2}\right) + L\left(\dfrac{dY}{dt}\right) = \dfrac{1}{s^2}$, where L stands for Laplace transform, then which of the following
    values of y is true

  A. $y = L^{-1}\left(\dfrac{1}{s^2} + \dfrac{s+3}{s^2+1}\right)$

  B. $y = L^{-1}\left(\dfrac{1}{s^2} - \dfrac{s+3}{s^2+1}\right)$

  C. $y = L^{-1}\left(\dfrac{1}{s^2} + \dfrac{s-3}{s^2+1}\right)$

  D. $y = L^{-1}\left(\dfrac{1}{s^2} + \dfrac{s+3}{s^2-1}\right)$

23. Dimension of the vector space of all 3×3 real symmetric matrices with usual matrix addition
    and scalar multiplication, is

  A. 4

  B. 6

  C. 9

  D. 3

24. Inverse of the linear transformation $T(x, y) = (x + y, 2x - y)$ is

  A. $T^{-1}(u, v) = \dfrac{1}{3}(u - v, 2u - v)$

  B. $T^{-1}(u, v) = \dfrac{1}{3}(u - v, 2u + v)$

  C. $T^{-1}(u, v) = \dfrac{1}{3}(u + v, 2u - v)$

  D. $T^{-1}(u, v) = \dfrac{1}{3}(2u - v, u + v)$

25. Nullity of the linear transformation $T: \mathbb{R}^3 \to \mathbb{R}^2$ defined by $T(x, y, z) = (x + y, y + z)$ is

  A. 2

  B. 3

  C. 0

  D. 1

26. If $\{x_n\}$ is the sequence of Secant's iterates to compute $\sqrt[3]{7}$ if then x_{n+1} is equal to

  A. $x_n x_{n-1}(x_n - x_{n-1}) - 7$

  B. $x_n x_{n-1}(x_n - x_{n-1}) + 7$

  C. $x_n x_{n-1}(x_n + x_{n-1}) + 7$

  D. $x_n x_{n-1}(x_n + x_{n-1}) - 7$

27. If $ax^2 + bx + c$ is the Lagrange polynomial which interpolates the data

x	0	1	-1
$f(x)$	0	1	1

   then $a + b + c$ is equal to
   A. 0
   B. 1
   C. 2
   D. 3

28. Value of $\int_0^1 \left(\int_0^1 \frac{x-y}{(x+y)^3} dy \right) dx$ is equal to
   A. 1
   B. 2
   C. 0
   D. $\frac{1}{2}$

29. Equation of the line passing through $(1,2,3)$ and parallel to the line, which is the intersection of the planes $x - y + 2z = 5, 3x + y + z = 6$, is
   A. $\frac{x-1}{-3} = \frac{y-2}{5} = \frac{z-3}{4}$
   B. $\frac{x+1}{-3} = \frac{y+2}{5} = \frac{z-3}{4}$
   C. $\frac{x-1}{3} = \frac{y-2}{5} = \frac{z-3}{4}$
   D. $\frac{x+1}{3} = \frac{y+2}{5} = \frac{z=3}{4}$

30. If the chord of hyperbola $x^2 - y^2 = a^2$ touches the parabola $y^2 = 4ax$ then locus of their mid point is
   A. $y^2(x + a) = x^3$
   B. $y^2(a - x) = x^3$
   C. $y^2(x - a) = x^3$
   D. $x^2(x + a) = y^3$

OJEE 2014 (Lateral Entry to B Tech)

Mechanics Engineering

1. What would be the value of F1 to balance the system if F2=20N?
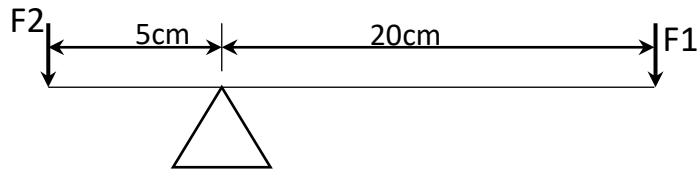
   (a) 3 N
   (b) 5 N
   (c) 4N
   (d) None of the above

2. The stress in a wire of diameter 2 mm, if a load of 100 gram is applied to the wire is
   (a) 3.1×10^5 N/m^2
   (b) 6.2×10^5 N/m^2
   (c) 1.5×10^5 N/m^2
   (d) 12.4×10^5 N/m^2

3. In the pulley system, shown here what should be the tension T in order to lift the weight of 20kg?
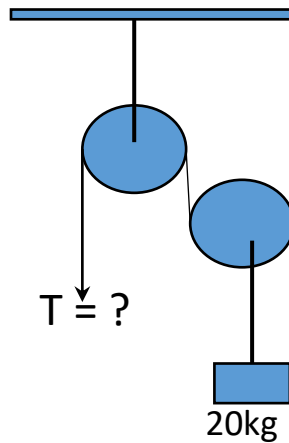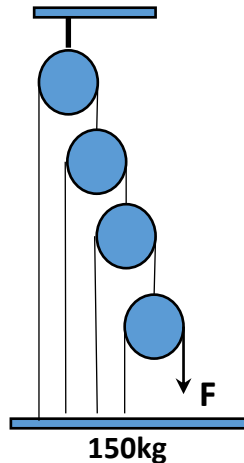

   (a) 40kg
   (b) 30kg
   (c) 20kg
   (d) 10kg

4. Figure here shows a pulley system. What would be the value of F to lift up the load
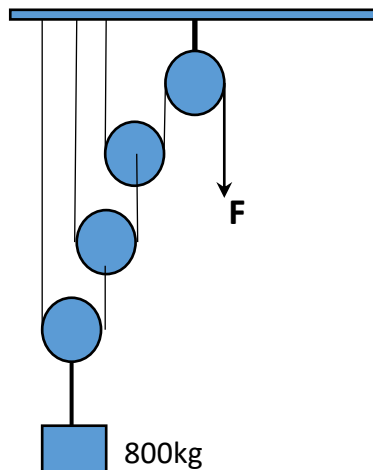
(a) 100kg
(b) 200kg
(c) 800/3 kg
(d) 400kg

5. What would be the value of F to lift up the load as shown in figure.

150kg

(a) 30kg
(b) 10kg
(c) 15kg
(d) 20kg

6. The diameter of a screw is 5mm add the lead of the screw thread (pitch) is 1mm. What is the mechanical advantage of the screw?
   (a) 3.141
   (b) 9.42
   (c) 12.56
   (d) 15.71

7. Two shafts are neither parallel nor intersecting. If we intend to transmit power between the two then which type of gear is mostly preferred?
   (a) Straight bevel
   (b) Worm and worm
   (c) Double helical herringbone
   (d) Crossed helical

8. Two spur gears have pitch circle diameters of 10cm and 2cm. The larger gear has a rotational speed of 100RPM. Then what is the rotational speed of the smaller one?
   (a) 200RPM
   (b) 500RPM
   (c) 1000RPM
   (d) 400RPM

9. Figure shows a compound gear train, where the number of teeth in gears 1, 2, 3 and 4 are $N1, N_2, N_3 and N_4$ respectively. What would be the ration $\frac{\omega_1}{\omega_4}$ in terms of the teeth?
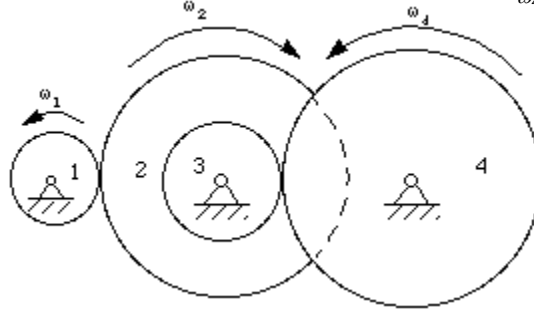

(a) $\frac{N_1}{N_4}$

(b) $\frac{N_1 N_4}{N_3 N_2}$

(c) $\frac{N_2 N_4}{N_1 N_3}$

(d) $\frac{N_1 N_3}{N_2 N_4}$

10. Two wires A and B have same dimensions (area and length same) and are stretched by the same amount of force. Young's modulus of A is twice that of B. The relation $\frac{\Delta l_2}{\Delta l_1}$ would be equal to :

    (a) 1
    (b) ½
    (c) 2
    (d) ¼

11. Practical value of Poisson's ratio for a steel wire subjected to a longitudinal force can be within:

    (a) 0 to .5
    (b) -.5 to 0
    (c) -1 to .5
    (d) -.5 to .5

12. Figure here shows a weight of 2kg resting on a rough floor which is acted upon by a force of 10N as shown. If the coefficient of friction between the floor and the mass is 0.2 then would system start to move? Assume g=10m/s^2.
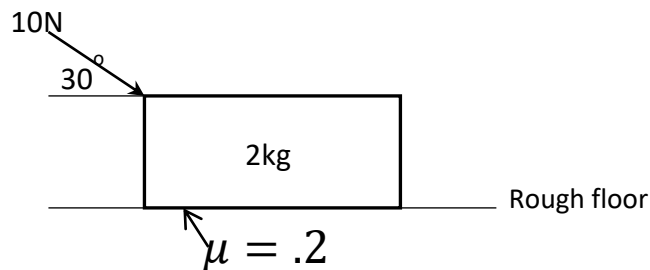
(a) Yes

(b) No

(c) Information insufficient

(d) Problem cannot be solved

13. In the figure shown a weight of 2kg resting on a rough floor which is acted upon by a force of 10N as shown. The coefficient of friction between the floor and the mass is 0.2. Assume $g=10m/s^2$.
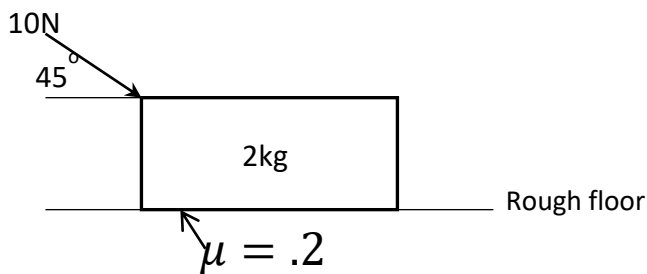
If the force applied is at an angle of 45^0 then what would be the acceleration of the mass?

(a) 1.657 m/s^2

(b) $.828 \text{ m/s}^2$

(c) 3.51 m/s^2

(d) None of the above

14. A uniform cube of side *a* and mass *m* rests on a rough horizontal plane surface. A horizontal force *F* is applied normal to one face at a point that is directly above the center of the face at a height of *a/4* above the center. The minimum value of F for which the cube begins to topple about an edge without slipping is:

(a) mg/4

(b) 2mg

(c) 2mg/3

(d) Mg/2

15. Three rods of mass *m* and length *l* are joined together to form an equilateral triangle. What would be the moment of inertia of the system about an axis passing through its center of mass and perpendicular to the plane of the triangle?

(a) $\frac{ml^2}{2}$

(b) $\frac{ml^2}{6}$

(c) $\frac{ml^2}{12}$

(d) $\frac{ml^2}{2}$

16. What is the moment of inertia of a solid sphere of mass M and radius R about an axis XX as shown in the Figure?

25
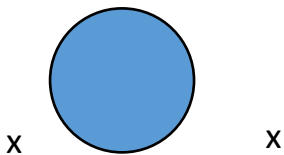
(a) $\frac{2}{5}MR^2$

(b) $\frac{9}{10}MR^2$

(c) $\frac{7}{5}MR^2$

(d) $\frac{8}{5}MR^2$

17. A uniform rod has mass m and length $2l$. Two particles of mass m each are placed at its two ends. What is the moment of inertia of the system about the center of mass of the system?

(a) $\frac{25ml^2}{12}$

(b) $\frac{4ml^2}{3}$

(c) $\frac{5ml^2}{3}$

(d) $\frac{7ml^2}{3}$

18. Two circular disks of the same weight and thickness are made from metals having different densities ρ1 and ρ2 such that ρ2 > ρ1. The moment of inertia of the disks about their central axis can be written as:

(a) $I_1 > I_2$

(b) $I_2 > I_1$

(c) $I_1 = I_2$

(d) It cannot be told

19. If I_1 is the moment of inertia of a thin rod about an axis perpendicular to its length and passing through the center of mass and I_2 the moment of inertia of the ring formed by the same rod about an axis passing through the center of the mass of the ring and perpendicular to the plane of the ring. Then the ratio I_1/I_2 is:

(a) $\pi^2/12$

(b) $\pi^2/6$

(c) $2\pi^2/3$

(d) $\pi^2/3$

20. A non-uniform rod AB has a mass M and length $2l$. The left end of the rod is designated as A and the right end as B. The mass per unit length of the rod is mx at a point of the rod distant x from A. The moment of inertia of this rod about an axis perpendicular to the rod through A would be:

(a) Ml^2

(b) $2Ml^2$

(c) $Ml^2/3$

(d) $Ml^2/12$

21. A non-uniform rod AB has a mass M and length $2l$. The left end of the rod is designated as A and the right end as B. The mass per unit length of the rod is mx at a point of the rod distant x from A. what would be the moment of inertia of the rod about the mid-point of AB?

(a) $2Ml^2/3$

(b) $4Ml^2/3$

(c) $Ml^2/3$

(d) $Ml^2/12$

22. A uniform circular disk has a moment of inertia of $1.2\ kg.m^2$ about its central axis which is perpendicular to the plane of the disk. If a segment of 60^0 is cut out from the disk then the moment of the inertia of the remaining disk about the same old axis is:
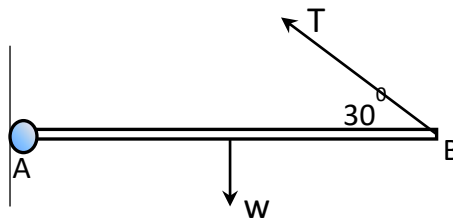

60
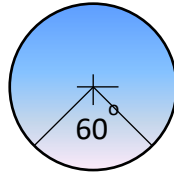
(a) 0.6 kg m²

(b) 1.2 kg m²

(c) 1.0 kg m²

(d) 0.5 kg m²

23. Three co-planner forces F1, F2 and F3 are in equilibrium. If F1=20N then how much is F2?

F2

F3

120^0

140^0

F1
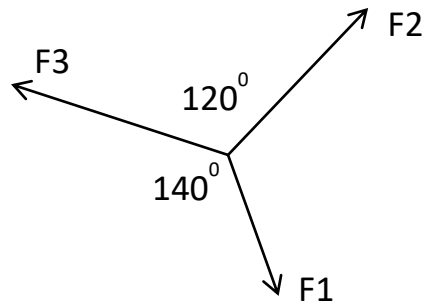
(a) 10.23N

(b) 26.94 N

(c) 18.14N

(d) 14.84N

24. A uniform rod AB of weight W is hinged to a fixed point at A. It is held in horizontal position by a string, one end of which is attached to B as shown. The tension in the string in terms of W is:

T

30^0

B

A

W

(a) T = W

(b) T =2W

(c) T=3W/2

(d) None of the above

25. A uniform rod AB of weight W is hinged at a fixed point A. It is held in horizontal position by a string, one end of which is attached to B as shown. Reaction at A can be R_x and R_y which can be written in terms of W. The expression for R_y in terms of W is:

T

30^0

B

A
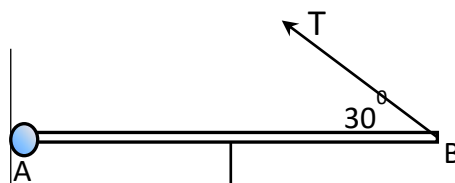
(a) $R_y = \sqrt{3}W/2$

(b) $R_y = W$

(c) $R_y = W/4$

(d) $R_y = W/2$

26. The Figure shows two concurrent forces acting at a point. The magnitude of the resultant force is?
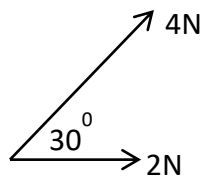
(a) 4.472N

(b) 5.818N

(c) 5.73N

(d) None of the above

27. Two blocks of mass 4kg and 2kg are placed side by side on a smooth floor. A horizontal force of 30N is acting on the 4kg block. The normal reaction between the two blocks is:
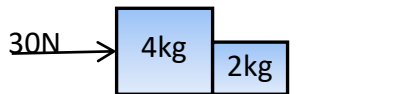
(a) 30N

(b) 20N

(c) 10N

(d) 12N

28. The center of mass of a uniform semi-circular disk of radius R lies on the axis of symmetry at a distance of h from the center. The expression for h is:

(a) $h = R/2$

(b) $h = 3R/\pi$

(c) $h = 3R/2\pi$

(d) $h = 4R/3\pi$

29. The center of mass of a solid hemisphere of radius R lies at a distance of h from its center on the axis of symmetry. The expression for h is:

(a) $h = 3R/8$

(b) $h = 2R/5$

(c) $h = 4R/13$

(d) $h = 3R/4$

30. Two particles of mass 1kg and 2kg are placed at *x=0* and *x=3m* on the *x*-axis. The center of mass of the two particles is located at:

(a) x=1m

(b) x=2m

(c) x=2.5m

(d) x=1.5m

31. The position of a particle executing SHM can be described by $x = 10 \sin\left(\pi t + \frac{\pi}{6}\right)$ in SI units.

The time period of the particle is:

(a) 4s

(b) 1s

(c) 2s

(d) 3.141s
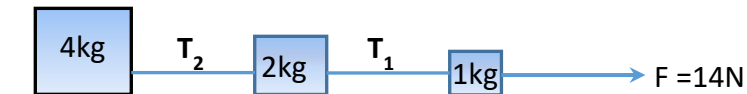
32. The position of a particle executing SHM can be described by $x = 10 \sin\left(\pi t + \frac{\pi}{6}\right)$ in SI units.

The maximum velocity of the particle is:

(a) $5\pi \ m/s$

(b) $4\pi \ m/s$

(c) $2\pi \ m/s$

(d) $10\pi \ m/s$

33. The figure shows three blocks connected by two light and inextensible strings placed on a smooth horizontal surface acted upon by a force of 14N. The tension T_2 in the string is:

(a) 6N

(b) 4N

(c) 8N

(d) 14N

34. The figure shows three blocks connected by two light and inextensible strings placed on a smooth horizontal surface acted upon by a force of 14N. The tension T_1 in the string is:
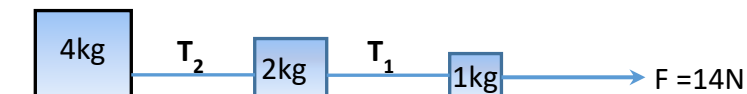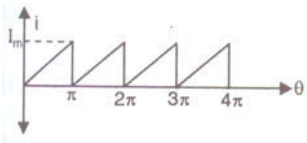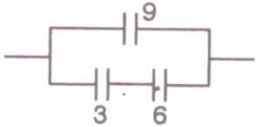
(a) 8N

(b) 12N

(c) 1N

(d) 2N

35. A stone is thrown at an angle of 45^0 to the horizontal with kinetic energy K. The kinetic energy at the highest point is:
    (a) $K/2$
    (b) $K/\sqrt{2}$
    (c) K
    (d) Zero

36. A ball is thrown vertically upward with a velocity of 10 m/s. It returns to the ground with a velocity of 9 m/s. If g =9.8m/s^2 , then the maximum height attained by the ball is nearly: (Assume air resistance to be uniform)
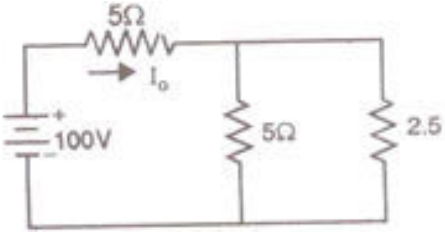   (a) 5.1m
    (b) 4.1m
    (c) 4.61m
    (d) 5.0m

37. A spring-mass system oscillates such that the mass moves on a rough surface having coefficient of friction μ. It is compressed by a distance a, from its normal length and, on being released, it moves to a distance b from its equilibrium position. The decrease in amplitude for one-half cycle (-a to b) is:
    (a) $\mu mg/K$
    (b) $2\mu mg/K$
    (c) $\mu g/K$
    (d) $\mu mg/2K$

38. A particle of mass 0.01kg travels along a space curve with velocity 4i+16k m/s. After some time its velocity becomes 8i+20j m/s due to the action of a conservative force. The work done on the particle during this interval of time is:
    (a) 0.32J
    (b) 6.9J
    (c) 9.6J
    (d) 0.96J

39. A body is attached to the lower end of a vertical spring and it is gradually lowered to its equilibrium position. This stretches the spring by a length d. If the same body attached to the same spring is allowed to fall suddenly, what would be the maximum stretching in this case?
    (a) d
    (b) 2d
    (c) 3d
    (d) d/2

40. What is the fractional decrease in kinetic energy of a particle of mass m_1 when it makes a head on elastic collision with a particle of mass m_2 kept at rest.
    (a) $4m_1m_2/(m_1 + m_2)^2$
    (b) $2m_1m_2/(m_1 + m_2)^2$
    (c) $(m_1 - m_2)^2/(m_1 + m_2)^2$
    (d) $m_1m_2/(m_1 + m_2)^2$
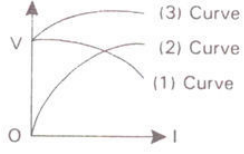
Basic Electrical Engineering

1.	An emf of 8V is induced in a coil of inductance 4H. The rate of change of current must be (a) 32 A/sec (b) 0.5 A/sec (c) 2 A/sec (d) 1 A/sec	( )
2.	Two coils have self inductance of 5H and 1H, the mutual inductance being zero. If the two coils are connected in series, ,the total inductance will be (a) 4H (b) 5H (c) 3H (d) 6H	( )
3.	Four resistors 5 Ohm, 10 Ohm ,20 Ohm and 40 Ohm are connected in parallel across 20V battery. The highest power will be dissipated in (a) 5 Ohm (b) 10 Ohm (c) 20 Ohm (d) 40 Ohm	( )
4.	Two inductors carrying current in opposite direction are connected in series. The total inductance is (a) $L_1 + L_2 + 2M$ (b) $L_1 + L_2 - 2M$ (c) $\dfrac{L_1 L_2 - M^2}{L_1 + L_2 + 2M}$ (d) $\dfrac{L_1 L_2 - M^2}{L_1 + L_2 - 2M}$	( )
5.	The current I_0 in the circuit given below will be (a) 4 A (b) 7.5 A	( )

			( )
		(c) 10 A	
		(d) 15 A	
6.	A constant current of 5mA charges a 10 µF capacitor for 1sec. The voltage across the capacitor is (a) 50V (b) 250V (c) 500V (d) 1000V		( )
7.	The direction of the induced emf is found by (a) Fleming's right hand rule (b) Lenz's law (c) Fleming's left hand rule (d) Biot-savart law		( )
8.	The angular velocity of a sine wave of 50 Hz is (a) 50π (b) 100π (c) $\pi/50$ (d) $\pi/150$		( )
9.	RMS value of current wave in the given figure is (a) $\frac{I_m}{\sqrt{2}}$ (b) $\frac{8\,I_m}{\pi}$ (c) $\frac{I_m}{\sqrt{3}}$ (d) $\frac{I_m}{2}$		( )
10.	An alternating current has a peak value of 2A. If its peak factor is $\sqrt{2}$ and its form factor is $\frac{\pi}{2\sqrt{2}}$, its average value is (a) $\frac{8}{\pi}A$ (b) $\frac{4}{\pi}A$ (c) $\frac{\pi}{4}A$		( )

	(d) $\frac{\pi}{2} A$	
11.	The power factor of a circuit comprising R and X in series is given by (a) $\frac{R}{\sqrt{R^2+X^2}}$ (b) $\frac{X}{R^2+X^2}$ (c) $\frac{R}{R^2+X^2}$ (d) $\frac{X}{\sqrt{R^2+X^2}}$	( )
12.	The equivalent capacitance(in µF) of the circuit shown in figure is 9 3 6 (a) 6 (b) 4.5 (c) 3 (d) 11	( )
13.	The X_L offered by an inductance of 1H to a current $I_m Sin10\pi t$ is (a) 100 Ω (b) 50 Ω (c) 31.4 Ω (d) 314 Ω	( )
14.	In a R-L-C circuits, v(t)=20 sin(314t+5π/6) and i(t)= 10 sin(314t+2π/3). The power factor of the circuit is (a) 0.5 lead (b) 0.866 lag (c) 0.866 lead (d) 0.5 lag	( )
15.	The device which recovers a part of heat from the flue gases is (a) Condenser (b) Evaporator (c) Draft tube (d) Economiser	( )
16.	Steam power plants work closely on (a) Binary vapour cycle (b) Bragtn cycle (c) Rankine cycle (d) Carnot cycle	( )
17.	Ash handling plant is located in between (a) Boiler & Ash storage	( )

	(b) Boiler & Chimney		
	(c) Boiler & Super heater		
	(d) Boiler & Coal storage		
18.	The electrical power developed by an hydro electric plant in kW is given by the expression (a) $N_s = N.\sqrt{P}/H^{0.75}$ (b) $N_s = \sqrt{N}.P/H^{3/2}$ (c) $N_s = N.\sqrt{P}/H^{1.25}$ (d) $N_s = N.\sqrt{P}/H^{2/3}$	( )	
19.	If H is the head in meters, w is the specific gravity in Kg/m^3, Q is discharge in m^3/sec and η is efficiency then power output of Hydro Electric Plant is (a) $\dfrac{wQH}{\eta}$ (b) $\dfrac{wQ}{H} \times \eta$ (c) $wQH \times \eta$ (d) $\dfrac{QH}{w} \times \eta$	( )	
20.	Control rods for nuclear reactor are made of (a) Graphite (b) Cadmium (c) Concrete (d) Lead	( )	
21.	Which of the following material is used a moderator (a) Graphite (b) Boron (c) N$_a$ k liquid (d) Plutonium	( )	
22.	The equivalent resistance of a transformer referred to secondary is given by (a) $r_1 + r_2 \left(\dfrac{N_1}{N_2}\right)^2$ (b) $r_2 + r_1 \left(\dfrac{N_1}{N_2}\right)^2$ (c) $r_2 + r_1 \left(\dfrac{N_2}{N_1}\right)^2$ (d) $r_1 + r_2 \left(\dfrac{N_2}{N_1}\right)^2$	( )	
23.	The purpose of laminating the transformer core is (a) To minimize the eddy current loss (b) To increase the cross-sectional area of the core (c) To increase the flux density in the core (d) To increase the weight of the transformer	( )	
24.	The following figure shows the external (V-I) characteristics of three types of	( )	

generator having the same rating . Curve 2 represents for _____ generator

(a) Shunt
(b) Series
(c) Compound
(d) None

---

25. If W_c is the constant loss and R_a is the armature resistance of a dc generator then load current I_L corresponding to maximum efficiency is ( )

(a) $I_L = \sqrt{\dfrac{R_a}{W_c}}$

(b) $I_L = \dfrac{W_c}{\sqrt{R_a}}$

(c) $I_L = \dfrac{R_a}{\sqrt{W_c}}$

(d) $I_L = \sqrt{\dfrac{W_c}{R_a}}$

---

26. A 6-pole lap wound generator has 300 conductors, the e.m.f induced per conductor being 5V. The generated voltage of the generator is _____ ( )

(a) 60 V
(b) 1500 V
(c) 360 V
(d) 250 V

---

27. In a DC series motor, if the armature current is reduced by 50%, the torque of the motor will be equal to ( )

(a) 100% of the previous value
(b) 50% of the previous value
(c) 25% of the previous value
(d) 12.5% of the previous value

---

28. If Bmax is the maximum flux density, then eddy current loss will vary as ( )

(a) B_{max}
(b) $(B_{max})^2$
(c) $(B_{max})^{1.6}$
(d) $(B_{max})^{3.2}$

---

29. A 3-point starter is used to start _____ motor ( )

(a) Shunt
(b) Series
(c) Compound
(d) Differential compound

30.	Three phase four wire energy meter is used to measure (a) Three phase balanced energy only (b) Three phase unbalanced energy only (c) Both (a) and (b) (d) Two phase energy	(	)
31.	To measure insulation resistance of insulators, the instrument required is (a) Ohm meter (b) Meggar (c) Ammeter (d) Voltmeter	(	)
32.	If n similar cells, each of e.m.f volts and internal resistance r ohms are connected in series, then the amount of current flow in an external resistance of R ohms will be equal to (a) $\frac{nE}{R}$ (b) $\frac{nE}{R+r}$ (c) $\frac{nE}{R+nr}$ (d) nE	(	)
33.	Devices used for large soldering are 1. Soldering iron 2. Blow lamp 3. Ladle 4. Pot (a) 1 (b) 2,3,4 (c) 1,2,3,4 (d) 2,3	(	)
34.	In concealed conduit wiring, the switches used are (a) Flush switches (b) Tumbler switches (c) Knife switches (d) Iron clad switches	(	)
35.	Lakin Hickey is used to (a) Cut the metal (b) Make holes in wood (c) Fixing conduit (d) Bending conduit	(	)
36.	The most economical wiring used in public buildings is (a) C.T.S wiring (b) Conduit wiring (c) Casing and capping wiring (d) None	(	)

37.	Fusing factor is given by	( )
	(a) Element rating / Minimum fusing current (b) Minimum fusing current / Element rating (c) Element rating (d) None	
38.	Energy produced by fission reaction is given by	( )
	(a) $\frac{1}{2} m^2 c$ (b) $\frac{1}{2} mc^2$ (c) $\frac{1}{2} cv^2$ (d) mc^2	
39.	The function of a dry cell is to convert :	( )
	(a) chemical energy to mechanical energy (b) chemical energy to electrical energy (c) electrical energy into mechanical energy (d) electrical energy into magnetic energy	
40.	Distilled water is used in electrolytes because it :	( )
	(a) prevents or slows down local action (b) speeds up electrochemical action (c) improves specific gravity (d) prevents polarization	

Engineering Mathematics

1. $\lim_{x\to 0} \frac{1-\cos 2x}{x}$ is

  (A) 0   (B) 1   (C) -1 (D) does not exist

2. The value of a for which $f(x) = \begin{cases} ax+1 & if \ x \le 3 \\ \frac{x}{3}+3 & if \ x > \ 3 \end{cases}$ which is continuous at $x = 3$ is

  (A) 3   (B) 4   (C) 2   (D) 1

3. $\frac{d}{dx} sin^{-1}\left(\frac{2x}{1+x^2}\right)$ is

  (A) $\frac{2}{1+x^2}$ (B) $\frac{2x}{1+x^2}$ (C) $\frac{2x}{(1+x^2)^2}$ (D) 1

4. Derivative of $cos^2 x$ w.r.t. $e^{\sin x}$ is

  (A) $\frac{-2\cos x}{e^{\sin x}}$ (B) $\frac{2\cos x}{e^{\sin x}}$ (C) $\frac{2\sin x}{e^{\sin x}}$ (D) $\frac{-2\sin x}{e^{\sin x}}$

5. Which of the following function is strictly decreasing on $\left(0,\frac{\pi}{2}\right)$

  (A) $2\cos x$ (B) $\cos 3x$ (C) $\tan x$ (D) none of these

6. The maximum value of $|\sin 4x + 2|$ is

  (A) 4   (B) 1   (C) 3   (D) does not exist

7. $\int \sec 2x$ is

  (A) $\frac{1}{2}ln|\cos 2x + \tan 2x| + C$ (B) $\frac{1}{2}ln|\sec 2x + \tan 2x| + C$

  (C) $\frac{1}{2}ln|\sec 2x - \tan 2x| + C$ (D) $\frac{1}{2}ln|\cos 2x - \tan 2x| + C$

8 . $\int_0^1 \frac{dx}{1+x^2}$ equals

  (A) $\frac{\pi}{3}$ (B) $\frac{2\pi}{3}$ (C) $\frac{\pi}{4}$ (D) 0

9. $\int_{-1}^{1} x^{15} \cos^4 x$ equals

  (A) 0   (B) $\frac{1}{15}$ (C) $-\frac{1}{15}$ (D) $\frac{1}{3}$

10. The number of points at which the function $f(x) = |x - 0.5| + |x - 1|$ does not have a

derivative in $(0,3)$ is

(A) 1   (B) 2   (C) 3   (D) 0

11. If $f(x) = \int_0^x \cos 2t \, e^t \, dt$, then $f'(0)$ is

(A) 0   (B) 1   (C) e (D) $\frac{1}{e}$

12. Which of the following is true

(A) Every continuous function is differentiable

(B) $f(x)$ is differentiable implies $f'(x)$ is continuous

(C) Every differentiable function is not continuous

(D) $f(x) = x|x|$ is differentiable at $x = 0$

13. The area bounded by the curve $y = \cos x$ between $x = 0$ and $x = \frac{\pi}{2}$ is

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

14. The order of the differential equation $\left(\frac{dy}{dx}\right)^4 + 6y \frac{d^2y}{dx^2} = 0$ is

(A) 4   (B) 2   (C) 1   (D) 3

15. A solution to the differential equation $\frac{dy}{dx} = \frac{1+y^2}{1+x^2}$ with $y(0) = \frac{\pi}{4}$

(A) $y - x = \frac{\pi}{4}$ (B) $tan^{-1}y = \frac{\pi}{4}$

(C) $tan^{-1}y - tan^{-1}x = \frac{\pi}{4}$ (D) $tan^{-1}y + tan^{-1}x = \frac{\pi}{4}$

16. The algebraic sum of the deviation from mean is

(A) maximum   (B) least

(C) zero   (D) none of these

17. Three identical dice are rolled. The probability that the same number will appear on each of

them is

(A) $\frac{1}{6}$ (B) $\frac{1}{18}$ (C) $\frac{1}{36}$ (D) none of these

18. Ram, his wife and 8 delegates are to be seated on a round dining table at random. The

probability that the host and his wife sit together is

(A) $\frac{1}{9}$ (B) $\frac{2}{9}$ (C) $\frac{1}{5}$ (D) $\frac{1}{10}$

19. The value of determinant $\begin{vmatrix} 1 & 1 & 1 \\ 1 & 1+x & 1 \\ 1 & 1 & 1+y \end{vmatrix}$ is

(A) 1   (B) 0   (C) x (D) xy

20. If $A = \begin{bmatrix} 1 & -2 & 1 \\ 2 & 1 & 3 \end{bmatrix}$ and $B = \begin{bmatrix} 2 & 1 \\ 3 & 2 \\ 1 & 1 \end{bmatrix}$ then, AB equals

(A) $\begin{bmatrix} -3 & -2 \\ 10 & 7 \end{bmatrix}$ (B) $\begin{bmatrix} -3 & 10 \\ -2 & 7 \end{bmatrix}$ (C) $\begin{bmatrix} -3 & 10 \\ 7 & -2 \end{bmatrix}$ (D) $\begin{bmatrix} 3 & 10 \\ 2 & 7 \end{bmatrix}$

21. If A is any square matrix, then $A + A^T$ is

(A) Identity matrix   (B) zero matrix

(C) skew-symmetric matrix   (D) symmetric matrix

22. If $|\vec{a} + \vec{b}| = |\vec{a} - \vec{b}|$ then angle between $\vec{a}$ and $\vec{b}$ is

(A) $\frac{\pi}{4}$ (B) $\frac{\pi}{2}$ (C) 0   (D) $\frac{\pi}{3}$

23. The projection of the vector $\vec{i} - 2\vec{j} + \vec{k}$ on the vector $4\vec{i} - 4\vec{j} + 7\vec{k}$ is

(A) $\frac{\sqrt{5}}{2}$ (B) $\frac{\sqrt{6}}{16}$ (C) $2\frac{1}{9}$ (D) $\frac{9}{19}$

24. Let $\vec{a}$ and $2\vec{b}$ denotes the diagonals of a parallelogram. Then the area of the

parallelogram is given by

(A) $\frac{1}{2}|\vec{a} \times \vec{b}|$ (B) $|\vec{a} \times \vec{b}|$ (C) $2|\vec{a} \times \vec{b}|$ (D) None of these

25. In a $\triangle ABC$, $\cot\frac{1}{2}A + \cot\frac{1}{2}B + \cot\frac{1}{2}C$ equals

(A) 1   (B) 0   (C) $\cot\frac{1}{2}A \cot\frac{1}{2}B \cot\frac{1}{2}C$ (D) None of these

26. If $\sin\left\{\frac{1}{2}\cos^{-1} x\right\} = 1$, then x equals

(A) -1 (B) 1   (C) 0   (D) $\frac{1}{5}$

27. The equation $\cos x + \sin x = 2$ has

(A) only one solution

(B) two solutions

(C) infinite number of solutions

(D) no solution

28. If the rth term in the expansion of $\left(\frac{x}{3} - \frac{2}{x^2}\right)^{10}$ contains x^4, then r is equal to

(A) 2 (B) 3 (C) 4 (D) 5

29. The product of r consecutive positive integers, divided by $r!$ is

(A) a proper fraction

(B) equal to r

(C) a positive integer

(D) none of these

30. If ω is a cube root of unity , then $(4 + \omega + 4\omega^2)^4$ equals

(A) 27 (B) 81ω (C) 27ω (D) 81

31. Which of the following is correct

(A) $3 + 4i > 2 + 3i$

(B) $6 + 2i > 3 + 3i$

(C) $5 + 9i > 5 + 8i$

(D) none of these

32. The area of the triangle with vertices $(-4, -1), (1,2)$ and $(4, -3)$ is

(A) 17 (B) 16 (C) 15 (D) 14

33. The equation of the line through $(2, -4)$ parallel to $x -$ axis is

(A) $y = -4$ (B) $y = 2$ (C) $x = 2$ (D) $x = -4$

34. P and Q are the points on the line joining $A(-2, 5)$ and $B(3, 1)$ such the

$AP = PQ = QB$. Then the mid-point of PQ is

(A) $\left(\frac{1}{2}, 4\right)$ (B) $(2,3)$ (C) $\left(\frac{1}{2}, 3\right)$ (D) $(-1,4)$

35. Two circles $x^2 + y^2 = 6$ and $x^2 + y^2 - 6x + 8 = 0$ are given. Then the equation of the circle through their points of intersection and the point $(1, 1)$ is

(A) $x^2 + y^2 - 6x + 4 = 0$

(B) $x^2 + y^2 - 3x + 8 = 0$

(C) $x^2 + y^2 - 4y + 2 = 0$

(D) none of these

36. Foot of perpendicular down from $(0, 5)$ to the line $3x - 4y - 5 = 0$ is

(A) $(1, -1)$ (B) $\left(2, \frac{1}{4}\right)$ (C) $\left(\frac{5}{3}, 0\right)$ (D) $(3,1)$

37. The angle between the two plane $4x + 8y + z - 8 = 0$ and $y + z - 4 = 0$ is

(A) $90°$ (B) $45°$ (C) $60°$ (D) $30°$

38. The distance between the two planes $2x + 3y + 4z = 4$ and $2x + 3y + 4z = 6$ is

(A) 2   (B) 4   (C) $\frac{2}{\sqrt{29}}$ (D) 8

39. A sphere is uniquely known if we know it, by knowing the following number of points

(A) one   (B) two   (C) three   (D) four

40. The image of the point $(6, 3, -4)$ with respect to $yz -$ plane is

(A) $(-6,3,-4)$ (B) $(6,-3,4)$ (C) $(-6,-3,-4)$ (D) $(6,0,-4)$

OJEE 2014 (MBA)

1. Name the author of the book 'Predictably Irrational'.
   (A) Thomas J. Sargent
   (B) Dan Ariely
   (C) Sigmund Freud
   (D) Ester Duflo

2. Which of the following countries will host 2018 Winter Olympics?
   (A) UK
   (B) China
   (C) South Korea
   (D) Japan

3. Who among the following has been elected recently as president of Indian Olympic Association (IOA)?
   (A) S. Srinivasan
   (B) N. Ramachandran
   (C) K Narayanan
   (D) Rajeeb Sukla

4. Name the planet in the solar system with maximum number of satellite.
   (A) Venus
   (B) Mercury
   (C) Jupiter
   (D) Saturn

5. When was the Planning Commission set up in India?
   (A) 1947
   (B) 1950
   (C) 1951
   (D) 1957

6. Which of the following human diseases is caused by virus?
   (A) Plague
   (B) Cholera
   (C) Rabies (Hydrophobia)
   (D) Pneumonia

7. 'Gerontology' is the study of
   (A) Certain Aspects of Ageing
   (B) Muscles
   (C) Kidneys
   (D) Cell

8. What does EEPROM stand for?

(A) Electronically Erasable Programmable Read Only Memory
(B) Electrically Erasable Programmable Read Only Memory
(C) Enabling Erasable Program on Read Only Memory
(D) Electronically Enabled Programmable Read Only Memory

9. When and where were the first Commonwealth Games held?
   (A) 1894, Greece
   (B) 1930, Canada
   (C) 1920, Australia
   (D) 1934, Holland

10. Where is headquarters of World Trade Organization located?
    (A) Geneva
    (B) New York
    (C) Washington DC
    (D) Vienna

11. Which company has the tagline 'The World's Online market Place'?
    (A) Amazon.com
    (B) Flipcart.com
    (C) Jungle.com
    (D) EBay

12. Web pages are written using
    (A) HTTP
    (B) HTML
    (C) URL
    (D) WAP

13. When was the first edition of the Bombay Plan published?
    (A) 1944
    (B) 1945
    (C) 1946
    (D) 1947

14. UNIVAC is an example of
    (A) First generation computer
    (B) Second generation computer
    (C) Third generation computer
    (D) Fourth generation computer

15. Who among the following received the Nobel Prize in Economics for the year 2013?
    (A) Elinor Ostrom
    (B) Christopher A. Sims
    (C) Lars Peter Hansen
    (D) Lloyd S. Shapley

16. Name the currency of Vietnam.
    (A) đồng
    (B) *Złoty*
    (C) Som
    (D) Riel

17. At the 58th Bocskai International Tournament which concluded in Hungary on 10 February 2014, Indian Boxers finished
    (A) Second
    (B) Third
    (C) Fourth
    (D) Fifth

18. Which country is called as the 'Land of four seasons'?

    (A) Turkey
    (B) Peru
    (C) Venezuela
    (D) Norway

19. Name India's first 'Super Computer'.
    (A) Bikram
    (B) Trisul
    (C) Param
    (D) Akash

20. Which of the following is an operating system?
    (A) Dos
    (B) Java
    (C) Unix
    (D) Window XP

Read the instructions provided before each set of questions and answer them (20-60)

Identify the odd word in each of the following questions.

21. Identify the odd word
    (A) Avertable
    (B) Evitable
    (C) Preventable
    (D) Loathing

22. Identify the odd word
    (A) Attire
    (B) Grab
    (C) Garb
    (D) Costume

23. Identify the odd word
    (A) Pother
    (B) Dither
    (C) Slither
    (D) Fizz

24. Identify the odd word
    (A) Affection
    (B) Ascribe
    (C) Impute
    (D) Attribute

Identify the odd word in each of the following questions.

25. Identify the odd word
    (A) Reed
    (B) Tree
    (C) Straw
    (D) Pipe

26. Identify the odd word
    (A) Cadence
    (B) Beat
    (C) Meter
    (D) Inch

27. Identify the odd word
    (A) Hibernation
    (B) Take up
    (C) Withdraw
    (D) Depression

In each of the following arrange the words in a meaningful sequence.

28. A. Afforestation   B. Growth   C. Saplings   D. Water   E. Protection
    (A) BDACE
    (B) CDEBA
    (C) CDABE
    (D) BADEC

29. A. Cure   B. disease C. Hospital D. Operation E. doctor
    (A) BEADC
    (B) AECBD
    (C) BECDA
    (D) CBDAE

30. A. Realization B. Contentment C. Suffering D. Desire E. Failure
    (A) DACEB
    (B) DECBA
    (C) BDCEA
    (D) DECAB

31. A. Crushing B. Rolling C. Pulp D. Paper E. Bamboo
    (A) EACBD
    (B) DEABC
    (C) EBCDA
    (D) DACBE

In each of the following questions four pairs of synonyms are supplied, out of which three pairs are alike/similar in certain ways and the fourth one is different (not a pair of synonyms). Choose the ODD pair out.

32. Identify the odd pair
    (A) Cook: Chef
    (B) Gourmet: Connoisseur
    (C) Foodie : Epicure
    (D) Bon vivant: Sensualist

33. Identify the odd pair
    (A) Tint: Pigment
    (B) Colour: Stare
    (C) Tingle: Itch
    (D) Stain: Tincture

34. Identify the odd pair
    (A) Dynasty: Bizarre
    (B) Phratry: Kinfolk
    (C) Sept: Lineage
    (D) Cajole: Stain

35. Identify the odd pair
    (A) Philander: Vamper
    (B) Frat: Stoic
    (C) Dally: Minx
    (D) Coquet: Flirt

The following questions consist of two words each that have a certain relationship with each other, followed by four pairs of words. Select the pair which has the SAME relationship (or the most similar relationship) as the original pair of words.

36. Water: Bottle
    (A) Mind: Brain
    (B) Dune: Sand
    (C) Man: Heart
    (D) Wine: Holy

37. Repellant: Mosquito
    (A) Magnet: Iron
    (B) Oil: Water
    (C) Muse: Inspiration
    (D) Pen: Drive

38. Plastic: Fabrication
    (A) Wood: Chair
    (B) Metal: Sculpting
    (C) Brick: building
    (D) Petrol: Container

The following questions consist of two words each that have a certain relationship with each other, followed by four pairs of words. Select the pair which has the SAME (or the most similar) relationship as the original pair of words.

39. Food: Energy
    (A) Power: Standby
    (B) Pen drive: Data
    (C) Petrol: Power
    (D) Battery: Backup

40. Window: Paint
    (A) Film: Coating
    (B) Bed: Cover
    (C) TV: Screen
    (D) Mobile: Box packet

In the following questions there is a certain relationship between two given words on both sides of (::). Only one word is given on the other side of (::). Choose the MOST APPROPRIATE word from the alternatives give below and supply the fourth word.

41. Cloud: Rain :: Smoke: ?
    (A) Flame
    (B) Tyre
    (C) Fumigate
    (D) Dope

42. Mary: Jesus:: Bitch: ?
    (A) Kitten
    (B) Goddess
    (C) Puppy
    (D) Dog

Choose the MOST APPROPRIATE definition for the following words.

43. Fester
    (A) To make merry
    (B) A festival like Easter
    (C) To move both slow and fast
    (D) Ripen and generate pus

44. Attractant
    (A) The source of attention
    (B) Difficult to attract
    (C) Anything that draws attention
    (D) A person with magical qualities

45. Circumspect
- (A) A circular metallic object
- (B) Heedful of potential sequences
- (C) To look around in a circle carefully
- (D) To be over-cautious

46. Degenerate
- (A) Unrestrained by convention or morality
- (B) To dissolve quickly
- (C) To generate by deactivating
- (D) A form of organism

In the questions below four words are provided at the beginning. If you add one of the four choices to one of the four words given at the beginning, you will get a new word. Find the correct choice.

47. Haste/ State/ Hate/ Goat
- (A) Stable
- (B) Tut
- (C) Rate
- (D) Able

48. Gore/ Store/ Lore/ Floor
- (A) House
- (B) Louse
- (C) Paste
- (D) Ten

49. Plan/ Tan /Gain/ San
- (A) Pet
- (B) Ate
- (C) Gate
- (D) Rate

50. Soon/ Tune/ Don / Scone
- (A) Bess
- (B) Seas
- (C) Less
- (D) Mess

In the following questions identity the word which has the OPPOSITE meaning to one of the three words presented at the beginning.

51. Drown / Anger / Courage
    (A) Jump
    (B) Rage
    (C) Despair
    (D) Awe

52. Crazy / Hasty / Musty
    (A) Slack
    (B) Stark
    (C) Hark
    (D) Bark

53. Pine / Shine / Dine
    (A) Lighted
    (B) Stalled
    (C) Perforated
    (D) Muted

54. Kind / Hind / Mind
    (A) Reed
    (B) Deed
    (C) Lead
    (D) Steed

55. Lice / Rise / Guys
    (A) Dominate
    (B) Plummet
    (C) State
    (D) Late

In the questions below a word is given with a number of synonyms or similar words in the option. Identify the option which is the least appropriate.

56. Begrudge
    (A) Resent
    (B) Envy
    (C) Redolent
    (D) Dislike

57. Discourse
- (A) Sermon
- (B) Divulge
- (C) Speech
- (D) Discuss

58. Edict
- (A) Fiat
- (B) Decree
- (C) Promise
- (D) Edict

The questions that follow are based on codes. Read the instructions carefully and answer. In a certain code, "She is a good girl," is written as XYZAB and "Catch that young sheep," is written as CDEF.

59. "Is that girl young," will be written as:
- (A) YDBE
- (B) YDEB
- (C) YEDB
- (D) YBED

60. "Good sheep catch young" will be written as
- (A) AFEC
- (B) AFCE
- (C) ACEF
- (D) AEFC

Read the poem below carefully and answer the questions that follow (questions 61-70). Choose the _most appropriate choice_ for each question.

More and more studies are showing how greatly the mind depends on the brain. For example, as the brain develops in childhood, so does the mind; if the brain is ever damaged, so is the mind. Subtle shifts in brain chemistry will alter mood, concentration, and memory (Meyer and Quenzer 2004). Using powerful magnets to suppress the emotion-processing limbic system changes how people make moral judgments (Knoch et al. 2006). Even some spiritual experiences correlate with neural activities (Vaitl et al. 2005).

Any aspect of the mind that is not transcendental must rely upon the physical processes of the brain. Mental activity, whether conscious or unconscious, maps to neural activity, much like a picture of a sunset on your computer screen maps to a pattern of magnetic charges on your hard drive. Apart from potential transcendental factors, the brain is the necessary and proximally sufficient condition for the mind; it's only proximally sufficient

because the brain is nested in a larger network of biological and cultural causes and conditions, and is affected itself by the mind.

Of course, no one yet knows exactly how the brain makes the mind, or how—as Dan Siegel puts it—the mind uses the brain to make the mind. It's sometimes said that the greatest remaining scientific questions are: What caused the Big Bang? What is the grand unified theory that integrates quantum mechanics and general relativity? And what is the relationship between the mind and the brain, especially regarding conscious experience?

The last question is up there with the other two because it is as difficult to answer, and as important.

To use an analogy, after Copernicus, most educated people accepted that the earth revolved around the sun. But no one knew how that actually happened. Roughly 150 years later, Isaac Newton developed the laws of gravity, which began to explain how the earth went about the sun. Then, after 200 more years, Einstein refined Newton's explanation through the theory of general relativity. It could be 350 years, and maybe longer, before we completely understand the relationship between the brain and the mind. But meanwhile, a reasonable working hypothesis is that the mind is what the brain does.

61. More and more studies are showing that:
    (A) The mind is manipulated by the brain
    (B) Magnets can change concentration
    (C) Chemical shifts in brain modifies memory
    (D) The mind modifies the stem cells

62. Identify the incorrect statement:
    (A) Brain damage alters the mind
    (B) Spirituality is dependent of the mind
    (C) Brain and mind develop from childhood
    (D) Brain changes alter mental states

63. "Limbic system" refers to:
    (A) A brain system that deals with emotions
    (B) A brain system that deals with perception
    (C) A brain system that deals with attention
    (D) A brain system that deals with decision making

64. "The brain is the necessary and proximally sufficient condition of the mind."
   What does this statement imply?
    (A) The brain is born out of the mind
    (B) The mind is born independent of the brain
    (C) Without mind the brain would not exist
    (D) Without the brain mind would not exist

65. Why is the analogy of the computer screen and magnetic charges used to describe an activity of the brain?
   (A) Because it shows how the mind and brain are correlated
   (B) Because it shows that networks are the essence of brain
   (C) Because it shows that networks are the essence of mind
   (D) Because the mind cannot exist without the brain

66. "The mind uses the brain to make the mind." Why is this remark made:
   (A) Because the brain can simply make up the mind
   (B) Because mind can simply not make up the brain
   (C) Because the brain, as a mechanical device, doesn't explain how mind is born
   (D) Because the brain-mind relation is an unsolvable mystery

67. What does "Big Bang" refer to:
   (A) A kind of explosion of the star
   (B) Inception of the black hole
   (C) Origin of the universe
   (D) The centre of the Milky Way

68. "Potential transcendental factors" suggest that the author wishes to tell us:
   (A) That the mind and brain can transcend and go beyond their limits
   (B) That the brain transcends mind
   (C) That mind transcends the brain
   (D) That the relation between mind and brain are inexplicable

69. Why does the author agree that "the mind is what the brain does?"
   (A) Because there is no way to get a grip of the transcendental factor
   (B) Because brain activities can now be exactly mapped to mind activities
   (C) Because one is the hardware and the other is the software
   (D) Because mind is virtual and the brain is actual

70. Chose the most appropriate title for the piece:
   (A) Brain vs. Mind
   (B) Brain and Mind
   (C) Mind-Brain Debate
   (D) Mind-Brain Problem

Read the text below carefully and answer the questions that follow (questions 71-80). Choose the most appropriate choice for each question.

Who are these? Why sit they here in twilight?
Wherefore rock they, purgatorial shadows,
Drooping tongues from jays that slob their relish,
Baring teeth that leer like skulls' teeth wicked?
Stroke on stroke of pain,- but what slow panic,
Gouged these chasms round their fretted sockets?
Ever from their hair and through their hands' palms
Misery swelters. Surely we have perished
Sleeping, and walk hell; but who these hellish?

-These are men whose minds the Dead have ravished.
Memory fingers in their hair of murders,
Multitudinous murders they once witnessed.
Wading sloughs of flesh these helpless wander,
Treading blood from lungs that had loved laughter.
Always they must see these things and hear them,
Batter of guns and shatter of flying muscles,
Carnage incomparable, and human squander
Rucked too thick for these men's extrication.

Therefore still their eyeballs shrink tormented
Back into their brains, because on their sense
Sunlight seems a blood-smear; night comes blood-black;
Dawn breaks open like a wound that bleeds afresh.
-Thus their heads wear this hilarious, hideous,
Awful falseness of set-smiling corpses.
-Thus their hands are plucking at each other;
Picking at the rope-knouts of their scourging;
Snatching after us who smote them, brother,
Pawing us who dealt them war and madness.

71. Who are the people being referred to?
   (A) Lunatics
   (B) POWs
   (C) Prisoners
   (D) Ex-soldiers

72. "Gouge" means to:
   (A) Scold
   (B) Scratch
   (C) Extract
   (D) Focus

73. The picture painted in the first stanza is that of
    (A) Sadness
    (B) Misery
    (C) Shock
    (D) Wonder

74. How can the dead ravish living men?
    (A) Through death
    (B) Memories
    (C) Violence
    (D) Anger

75. "Ravish" in the context of this poem means:
    (A) Violate
    (B) Destroy
    (C) Coagulate
    (D) Smash

76. How are the horrible dead described?
    (A) Multitudinous murder
    (B) Wading sloughs of flesh
    (C) Blood of lungs
    (D) Memory fingers

77. What are the other horrors these men have experienced than death and dying?
    (A) Batter of guns
    (B) Shatter of muscles
    (C) Carnage
    (D) Human squander

78. Why does the dawn torment them?
    (A) Because it looks like a blood smear
    (B) Because of its darkness
    (C) Because it breaks like a wound
    (D) Because it is hideous

79. What are the smiles of these men compared to?
    (A) Blood cuddling monsters
    (B) Awful falseness
    (C) Red sun
    (D) Set grimace on a dead face

80. Which is the most apt title for the piece?
    (A) Nightmare
    (B) Sad lunatics
    (C) Death
    (D) Barbarism

Read the questions that follow and identify the correct choice. (81-120)

81. A number when divided by 5 leaves a remainder of 4. When the twice of that number is divided by 5, what will be the reminder?
    (A) 1
    (B) 2
    (C) 3
    (D) 4

82. If the sum of a number and its reciprocal is thrice the difference of the number and its reciprocal, find the number.

    (A) $\pm\sqrt{\dfrac{1}{3}}$

    (B) $\pm\sqrt{2}$

    (C) $\pm\sqrt{\dfrac{2}{3}}$

    (D) $\pm\sqrt{\dfrac{1}{2}}$

83. The average age of Ramesh and Amar is 35 years. If Jagdish replaces Ramesh, the average age becomes 32 years and if Jagdish replaces Amar, the average age becomes 38 years. If the average age of Rahul and Sashikant is half the average age of Ramesh, Amar and Jagdish, find the average age of all the five persons.
    (A) 25
    (B) 26
    (C) 27
    (D) 28

84. The incomes of Rajan, Umesh and Harapriya are in the ratio of 12 : 9 : 7 and their spendings are in the ratio 15 : 9 : 8. If Rajan saves 25% of his income, find the ratio of the savings of Rajan, Umesh and Harapriya.
    (A) 15 : 12 : 6
    (B) 12 : 8 : 5
    (C) 15 : 18 : 11
    (D) 16 : 18 : 12

85. In a mixture of milk and water, milk is only 99 litres. If the same quantity of milk would be presented in another mixture of milk and water where total volume would be 198 litres less than the actual mixture, then the concentration of milk in the actual mixture would have been 13.33% point less than that of the new mixture. Find the concentration of milk in actual mixture.
    (A) 20%
    (B) 15.75%
    (C) 16.88%
    (D) 22.33%

86. A company sells a product to a wholesaler making a profit of 10%. The wholesaler, in turn, sells it to the retailer making a profit of 10%. A customer buys it at Rs 990 and the profit of the retailer is estimated to be $2\frac{3}{11}$%. Find the cost incurred by the company to produce the product.
    (A) Rs 750
    (B) Rs 780
    (C) Rs 800
    (D) Rs 820

87. A certain sum amounts to Rs 8988.8 in two years and to Rs 9528.128 in three years at compound interest per annum. Find the principal and the rate of interest.
    (A) Rs 8000, 6%
    (B) Rs 10000, 6%
    (C) Rs 8000, 8%
    (D) Rs 10000, 8%

88. Preeti, Madhu and Smita started a work together. After 5 days Smita left the work and Madhu left the work after working 8 days. In how many more days Preeti would have completed the remaining work if they take 20, 60 and 30 days individually to finish the work?
    (A) 5
    (B) 6
    (C) 7
    (D) 8

89. A train of length 100 metres takes 1/6 minute to pass over another train of 150 metres long coming from the opposite direction. If the speed of the first train is 60 km/h, what is the speed of the second train?
    (A) 30 km/h
    (B) 35 km/h
    (C) 40 km/h
    (D) 45 km/h

90. Three cubes of metal, whose edges are 3 cm, 4 cm and 5 cm respectively, are melted to form a new cube. Find the surface area of the new cube.
(A) 42 cm^2
(B) 124 cm^2
(C) 188 cm^2
(D) 216 cm^2

91. An acute angle made by a side of parallelogram with other pair of parallel sides is 60^0. If the distance between these parallel sides is $6\sqrt{3}$, find the other side.
(A) 10 cm
(B) 12 cm
(C) $\sqrt[3]{12}$
(D) $12\sqrt{5}$

92. What is the sum to n terms of the series
$1+(1+2)+(1+2+3)+(1+2+3+4)+.....$?
(A) $\dfrac{(n+1)(2n+1)}{2}$
(B) $\dfrac{(n+1)(2n+1)}{6}$
(C) $\dfrac{n(n+1)(n+2)}{6}$
(D) $\dfrac{n(n+1)(n+2)}{2}$

93. What is the sum of $\dfrac{1}{2}+\dfrac{3}{2^2}+\dfrac{5}{2^3}+....+\dfrac{2n-1}{2^n}$?
(A) $\left(3-\dfrac{2n+3}{2^n}\right)$
(B) $\left(3-\dfrac{2n}{2^n}\right)$
(C) $\left(3-\dfrac{2n-3}{2^n}\right)$
(D) $\left(2-\dfrac{2n-2}{2^n}\right)$

94. A committee of 7 persons is to be chosen from 13 persons of whom 6 are civil society members and 7 are politicians. In how many ways can the selection be made so as to retain a majority of politicians?
(A) 864
(B) 956
(C) 1032
(D) 1057

95. Four dice are thrown simultaneously. What is the probability that at least two of them show the same face?
(A) $\dfrac{26}{72}$
(B) $\dfrac{26}{56}$
(C) $\dfrac{47}{72}$
(D) $\dfrac{11}{56}$

96. In a school, 28 students joined NCC, 30 students joined NSS and 32 students joined Scout. 6 students joined NCC and NSS, 8 students joined NSS and Scout, and 10 students joined Scout and NCC. The number of students who joined only one scheme is 54. Also 20 students joined only NSS. Every student joined at least one scheme out of the three schemes. How many students joined the school?
(A) 50
(B) 60
(C) 64
(D) 70

97. In a marriage party, guests give pose for photographs. If they stand 4 persons per row, 2 persons are left out. If they stand 5 persons per row, 3 are left out. If they stand 6 persons per row, 4 are left out. If the total number of guests is greater than 100 and less than 150, find the number guests attending the marriage party?
(A) 112
(B) 116
(C) 118
(D) 124

98. A watch seller sells two watches for Rs. 1875 each. The first one is sold at 25% profit and the second one is sold at 25% loss. Find the percentage loss or gain to the shop owner?
(A) 5.75% loss
(B) 4.95% profit
(C) 6.25% loss
(D) 6.75% loss

99. Adish, Anubhav and Akanksha can finish a work independently in 10, 12 and 15 days. Akanksha started the work and after 1 day, Anubhav joined her. After 1 day of Anubhav, Adish also joined them but left 3 days before completion of the work, while Anubhav left two days before completion of the work. Find the total number of days taken to complete the work?
(A) 5 days
(B) 6 days
(C) 7 days
(D) 8 days

100.   Sides of a triangle are 3,4 and 5, find the area of triangle.

(Numbers are in proper unit)

(A) 6
(B) 8
(C) 12
(D) 24

101.   A triangle has sides of lengths 10, 8 and n, where n is a positive integer. Find the number of values of n for which this triangle is right angled.
(A) 12
(B) 15
(C) 8
(D) 6

102.   How many m digit numbers can be formed using n distinct digits?
(1) m = 3 and n = 5
(2) n = 2m

(A) Statement (1) ALONE is sufficient to answer the question but statement (2) alone is not sufficient;
(B) Statement (2) ALONE is sufficient to answer the question but statement (1) alone is not sufficient;
(C) The two statements TAKEN TOGETHER are sufficient to answer the question, but NEITHER statement ALONE is sufficient;
(D) EACH statement ALONE is sufficient to answer the question.

103.   Find the number of ways in which 5 identical green balls and 7 identical red balls are arranged in a row such that no two green balls are together.

(A) 48
(B) 56
(C) 62
(D) 66

104.   A dice is tossed 5 times. What is the probability that 5 shows up exactly thrice?

(A) $\dfrac{12}{388}$

(B) $\dfrac{25}{388}$

(C) $\dfrac{125}{3888}$

(D) $\dfrac{5}{38}$

105.   There are 5 green, 4 yellow, 3 red and 8 purple balls in a bag. If three balls are chosen at random without replacement, find the probability that they are of same color?

(A) $\dfrac{71}{1140}$

(B) $\dfrac{71}{140}$

(C) $\dfrac{7}{140}$

(D) $\dfrac{71}{114}$

106.   Find the sum of $1 + 2a + 3a^2 + 4a^3 + ...\infty$.

(A) $\dfrac{1}{(1+a)^2}$

(B) $\dfrac{1}{1+a}$

(C) $\dfrac{1}{(1-a)^2}$

(D) $\dfrac{1}{(1-a)}$

107.   Perimeter of a square is 64 meter. If we take a rectangle of same area as of this square and one side is 8 meter, find perimeter of this rectangle.

(A) 120
(B) 160
(C) 60
(D) 80

108.   A circle is inscribed in a triangle with sides measuring 4 cm, 6 cm and 8 cm. Find the area of the circle in sq centimeters.

(A) $\dfrac{3\pi}{3}$

(B) $\dfrac{5\pi}{3}$

(C) $\dfrac{7\pi}{3}$

(D) $\dfrac{9\pi}{3}$

109.   How is M related N?
    (1) N is the brother of M.
    (2) N is M's son.

(A) Statement (1) ALONE is sufficient to answer the question but statement (2) alone is not sufficient;
(B) Statement (2) ALONE is sufficient to answer the question but statement (1) alone is not sufficient;
(C) The two statements TAKEN TOGETHER are sufficient to answer the question, but NEITHER statement ALONE is sufficient;
(D) EACH statement ALONE is sufficient to answer the question.

110.   The capacity of a container is 20 gallons and the container is filled with spirit. Four gallons of spirit is drawn out and the container is again filled with water. If this process is repeated 5 times, how much spirit will be left out in the resulting mixture finally?
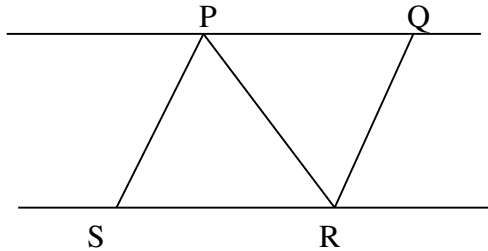   (A) 6 gallons
    (B) $6\dfrac{346}{625}$
    (C) $6\dfrac{346}{425}$

(D) $6\dfrac{346}{525}$

111.   What is the value of $\sqrt{6+\sqrt{6+\sqrt{6+.....}}}$?
   (A) 1.33
   (B) 2
   (C) 2.67
   (D) 3

112.   In the following figure, PQRS is a rhombus. $\angle SPQ = 120^0$. Find $\angle SRP$.

   (A) 45^0
   (B) 60^0
   (C) 70^0
   (D) 75^0

113.   What is the total inner surface area (in sq cm) of a closed hollow cylinder of outer radius 13 cm, outer height 15 cm and thickness 3 cm?
   (A) x sq cm
   (B) 370π sq cm
   (C) 380π sq cm
   (D) 400π sq cm

114.   What is the value of k, if the equation $2a^2 - 7a + k = 0$ has one root which is twice the reciprocal of the other root?
   (A) 2
   (B) 3
   (C) 4
   (D) 5

115.   If $\left(a+\dfrac{1}{a}\right)=4$, find the value of $\left(a^2+\dfrac{1}{a^2}\right)$.
   (A) 12
   (B) 14
   (C) 16
   (D) 18

116. Three groups of students drawn from three different schools comprising 120, 192 and 144 students are to be broken down into smaller teams such that each team comprises students from one group only and all the teams have equal number of students. Find the least number of total teams that can be formed.
(A) 13
(B) 14
(C) 19
(D) 22

117. Find the number of ways of distributing 5 identical balls into three boxes so that no box is empty and each box being large enough to accommodate all balls.
(A) 4
(B) 5
(C) 6
(D) 7

118. If there is threefold increase in all the sides of a cyclic quadrilateral, find the percentage increase in its area.
(A) 60%
(B) 180%
(C) 600%
(D) 800%

119. A boat running downstream covers a distance of 22 km in 4 hours, while for covering the same distance upstream, it takes 5 hours. Find the speed of the boat in still water.
(A) 4.55 km/h
(B) 4.95 km/h
(C) 4.30 km/h
(D) 4.20 km/h

120. At his usual rowing rate, Amit can travel 12 miles downstream in a river in 6 hours less than it takes him to travel the same distance upstream. If he doubles his usual rowing rate for his 24-mile round trip, the downstream 12 miles would then take one hour less than the upstream 12 miles. Find the speed of the current in miles per hour.
(A) $2\frac{1}{3}$ miles/h
(B) $2\frac{1}{4}$ miles/h
(C) $2\frac{2}{3}$ miles/h
(D) $2\frac{2}{5}$ miles/h

ANSWER KEY

Question	Key	Question	Key	Question	Key
1.	B	41.	A	81.	C
2.	C	42.	C	82.	B
3.	B	43.	D	83.	D
4.	D	44.	C	84.	C
5.	B	45.	B	85.	A
6.	C	46.	A	86.	C
7.	A	47.	D	87.	A
8.	B	48.	A	88.	B
9.	B	49.	B	89.	A
10.	A	50.	C	90.	D
11.	D	51.	D	91.	B
12.	B	52.	A	92.	C
13.	A	53.	D	93.	A
14.	A	54.	C	94.	D
15.	C	55.	B	95.	C
16.	A	56.	C	96.	D
17.	C	57.	B	97.	C
18.	A	58.	C	98.	C
19.	C	59.	A	99.	C
20.	B	60.	B	100.	A
21.	D	61	C	101.	D
22.	B	62.	B	102.	A
23.	C	63.	A	103.	B
24.	A	64.	D	104.	C
25.	B	65.	A	105.	A
26.	A	66.	C	106.	C
27.	B	67.	C	107.	D
28.	B	68.	C	108.	B
29.	C	69.	A	109.	C
30.	D	70.	D	110.	B

31.	A	71.	D	111.	D
32.	A	72.	C	112.	B
33.	C	73.	C	113.	C
34.	D	74.	B	114.	C
35.	B	75.	A	115.	D
36.	A	76.	B	116.	C
37.	B	77.	A	117.	C
38.	B	78.	C	118.	D
39.	C	79.	D	119.	B
40.	B	80.	A	120.	C

OJEE 2014 (PHYSICS)

1. Acceleration due to gravity g= 980 cm/sec^2. The value in km/min^2 is

    A) 9.8 B) 19.6 C)35.28 D) 49.46

2. The magnitudes of scalar and vector products of the two vectors are $48\sqrt{3}$ and 144. The angle between the vectors is

    A) 30° B) 45° C) 60° D) 90°

3. Two vectors $\bar{a}$ and $\bar{b}$ are at the angle of 60° with each other. Their resultant makes an angle of 45 with $\bar{a}$. If $|b| = 4$ then $|a|$ is

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

4. The velocity of a particle v changes with displacement x as $v = \sqrt{(25 - 6x)}$ m/sec. The acceleration of the particle is
    A) 5 m/s^2 B) 3 m/s^2 C) -3 m/s^2 D) -6 m/s^2

5. Two skaters have weight in the ratio 4:5 and are 9m apart, on a smooth friction less surface. They pull on a rope stretched between them. The ratio of distance covered by them when they meet each other will be

    A) 25 : 16 B) 16 : 25 C) 4 : 5 D) 5 : 4

6. The escape velocity of the body on the earth, from a height equal to radius of the earth R is

    A) $\sqrt{2gR}$ B) $\sqrt{gR}$ C) $\sqrt{4gR}$ D) $(\sqrt{2gR})/2$

7. A train of mass 3000 Ton is running with 72 km/h. The friction force acting between rails and wheels is 10 N/Ton. The power of the engine is

    A) 6 KW B) 600 KW C) 720 KW D) 3000 KW

8.   If a cyclist moving with a speed of 4.9 m/sec on a level road takes a sharp circular turn of the radius 4m. Then the coefficient of friction between the cycle tires and road is

    A) 0.41 B) 0.51 C) 0.61 D) 0.71

9. A satellite is orbiting a planet at a certain height in a circular orbit. If the mass of the planet is suddenly reduced to half, the satellite would

   A) continue to revolve around the planet at the same speed.
   B) falls freely on the planet
   C) orbit the planet at the lesser speed
   D) escape from the planet

10. When a gas is supplied 'ΔQ' heat, it performs a work 'ΔW' the increase its an internal energy 'dU' is

   A) $dU= (\Delta W - \Delta Q)$ B) $dU = (\Delta Q + \Delta W)$

   C) $dU= (\Delta Q - \Delta W)$ D) $dU= (\Delta Q - \Delta W)/2$

11. The temperature at which Centigrade thermometer and Fahrenheit thermometer gives the same reading

   A) $40^{o}C$ B) $-40^{o}C$ C) $160^{o}C$ D) $-160^{o}C$

12. A gas is filled in a container at some temperature and at pressure 76 cm of Hg. If at the same temperature the mass of the gas is increased by 50% then the resultant pressure will be

   A) 114 cm of Hg   B) 76 cm of Hg

   C) 152 cm of Hg   D) 38 cm of Hg

13. A Carnot engine takes heat from a reservoir at $527^{o}C$ and gives out to the sink at $127^{o}C$. the efficiency of the engine will be
   A) 10%   B) 30%   C) 50%   D) 70%

14. Two spheres A and B of same colour having radii 2 cm and 8 cm are maintained at a temperatures $327^{o}C$ and $27^{o}C$ respectively. The ratio of the rate of energy radiated by them is

   A) 0.25   B) 1   C) 0.5   D) 2

15. At what temperature a body does not emit heat energy?

   A) $373^{o}C$ B) $273^{o}C$ C) $0^{o}K$ D) $0^{o}C$

16. How much work can be done by $250^{o}C$ calories of heat?

   A) 1050 J   B)1045 erg   C)1045 Watt   D) Zero

17. If the value of $R = \frac{2}{5}C_v$ for a gas, then the gas will be

A) monatomic   B) diatomic   C) triatomic   D) polyatomic

18. A wire of length 1m and radius 4 mm is clamped at one end the other end is twisted by an angle of 30°. Then the angle of shear is

A) 0.12°   B) 12°   C)1.2°   D)120°

19. The longitudinal strain in a metal bar is 0.05. If the Poisson's ratio for the metal is 0.25, then the lateral strain is

A) 0.2   B) 0.3   C) 0.125   D) 0.0125

20. When a spring is stretched, the strain produced in the wire is

A) Longitudinal   B) Volume   C) Shearing   D) All

21. Two rain drops reach the earth with different terminal velocities having ratio 9:4. Then the ratios of their volume is

A) 3 : 2   B) 4 : 9   C) 27 : 8   D) 9 : 4

22. The coefficient of viscosity of a liquid does not depend on

A) The density of liquid   B) Pressure of liquid

C) Temperature of liquid   D) Nature of liquid

23. The spherical bubbles of radii r_1 and r_2 coalesce in vacuum under isothermal conditions. The radius of the resulting bubble R is

A) $R = (r_1 \times r_2)/(r_1 + r_2)$ B) $R = (r_1 + r_2)/2$

C) $R = \sqrt{(r_1^2 + r_2^2)}$ D) $R = \sqrt{(r_1^3 + r_2^3)}$

24. A 8 μF capacitor is connected in parallel to 4 μF capacitor. The combination is then connected in series with 12 μF capacitor. The system is charged to 20 volt. The charge on 8 μF capacitor will be

A) 2.5 μC   B) 40 μC   C) 80 μC   D) 250 μC

25. 3.2$\times 10^{-19}$ coulomb charge exists on a hollow conducting sphere of radius 10 cm. The potential at a point of distance 4 cm from the centre will be

A) 288 V   B) 1.6 $\times 10^{-19}$V   C) 2.88$\times 10^{-8}$ V   D) Zero

26. If the resistance of two bulbs of 200 watt and 100 watt working at the same voltage are R_1 and R_2 respectively, then

A) $R_2 = 2 R_1$ B) $R_2 = 4 R_1$ C) $R_1 = 4R_2$ D) $R_1 = 4R_2$

27. Two heater wires of equal lengths are first connected in parallel then in series. The ratio of heats produced in two cases will be

A) 1 : 2   B) 2 : 1   C) 4 : 1   D) 1 : 4

28. The charge in on a 3μF condenser is 6μC. The energy stored in the condenser will be

A) 0.5$\times 10^{-6}$J   B) 2$\times 10^{-6}$J   C) 4$\times 10^{-6}$J   D) 6$\times 10^{-6}$J

29. The value of magnetic susceptibility for the paramagnetic substance is

A) Infinity   B) Zero   C) Low positive   D) Low negative

30. The correct relation between magnetic susceptibility and relative permeability is

A) $\chi = \mu_r + 1$ B) $\chi = \mu_r - 1$ C) $\chi = \mu + 1$ D) $\chi = \mu - 1$

31. The ratio of magnetic inductions at the centre of a circular coil of radius 'r' and its axis at a distance equal to its radius, will be

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

32. The current in a coil changes from 1A to 3A in 0.05 seconds. If the average emf in the coil is 4 volt. Then the self inductance of the coil will be

A) 0.1 H   B) 0.2 H   C) 0.3 H   D) 0.4 H

33. The capacitive reactance of a condenser of capacity 125 μF for an A.C of frequency 4000 Hz will be

A) π Ω B) $\dfrac{1}{\pi}$ Ω C) 2π Ω D) $\dfrac{1}{2\pi}$ Ω

34. A transformer changes 220 volt to 22 volt. If the current in the primary and secondary coils are 10 A to 70 A respectively then, its efficiency will be

A) 35% B) 50% C) 70% D) 90%

35. The nature of electro Magnetic wave is

A) Longitudinal B) Longitudinal stationary

C) Transverse D) Transverse stationary

36. A transverse wave is represented by $y = 2\sin(60t - 2x)$ and measurements in meters. Then the velocity of propagation is

A) 15 m/s B) 30 m/s C) 45 m/s D) 6o m/s

37. The velocity of approach of an observers towards a stationary source that the apparent frequency is double to real frequency is (velocity of sound in air 340m/s)

A) 165 m/s B) 260 m/s C) 340 m/s D) 680 m/s

38. A tuning fork of frequency 340 Hz is vibrated just above a cylindrical tube of length of 1m. water is slowly pored in. what is the minimum height of water required for resonance. Velocity of sound in air is 340 m/s

A) O.25 m B) 0.35 m C) 0.45 m D) 0.15 m

39. The temperature at which the velocity of sound in air is double to that of at $0°C$ is

A) 546°C B) 546K C) 819°C D) 819K

40. The displacement of particle executing simple harmonic motion is given by $y = 2\sin(0.5\pi t)$ cm its time period is

A) 2 sec B) 0.5 sec C) 3 sec D) 4sec

41. An erect image, three times the size of the object, is obtained with a concave mirror of radius of curvature 30 cm. The position of the objet from the mirror is

A) 10 cm   B) 12 cm   C) 15 cm   D) 30 cm

42. Which of following phenomena is not explained by Huygens's construction of wave front?

A) Refraction   B) Reflection   C) Diffraction   D) Origin of spectra

43. Two mono chromatic light waves of amplitudes A and 2A interfering at a point, have a phase difference of 60°. The intensity at that point will be proportional to

A) A^2 B) $2A^2$ B) $5 A^2$ D) $7 A^2$

44. A meniscus lens has convex surface 20 cm and concave surface 30 cm. If the lans is constructed of glass ($\mu = 1.5$), the local length will be

A) -40 cm   B) $+40$ cm   C) -120 cm   D) $+120$ cm

45. The number of thermions emitted from a cathode does not depend on

A) Surface area of cathode   B) Cathode temperature

C) Work function of cathode   D) Specific heat of cathode

46. Triode valve can not be used as

A) Rectifier   B) Amplifier   C) A source of emf   D) An Oscillator

47. How many diodes are used in a bridge rectifier

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

48. The depletion layer in a silicon diode is 1μm wide and its knee potential is 0.5 volt. Then electric field in the depletion layer will be

A) $0.5\ V/m$ B) $5\times 10^{-7}V/m$ C) $5\times 10^5 V/m$ D)$2\times 10^5 V/m$

49. The order of magnitude of current in the reverse bias connection of a junction diode is

A) A   B) mA   C) μA   D) kA

50. A transition has $\alpha = 0.95$. The current amplification factor will be

A) 11 B) 19 C) 21 D) 35

51. The main cause of Zener break down is

    A) The base semi conductor being germanium.
    B) Production of electron-hole pair due to thermal excitation.
    C) Low doping   D) High doping

52. The rest mass of an electron is m_0. what would be its mass if it moves with velocity 0.6c (c= velocity of light)

    A) $\frac{1}{2}m_0$ B) $\frac{1}{6}m_0$ C) $\frac{4}{3}m_0$ D) $\frac{5}{4}m_0$

53. One of the postulates of special theory of relativity is

    A) Speed of light is relative
    B) Speed of the light is same in all inertial frames
    C) Time is relative
    D) Mass is relative

54. Einstein's mass energy relation ($E = mc^2$) show that

    A) Mass disappear to reappear as energy
    B) Energy disappear to re appear as mass
    C) Mass and energy are two different forms of the same entity
    D) All the statements are correct

55. The un decayed fraction of 1gram of radio active substance after 5 half lives will be

    A) $\frac{1}{8}$ gram   B) $\frac{1}{16}$ gram   C) $\frac{1}{32}$ gram   D) $\frac{1}{4}$ gram

56. From the following equation, find out the possible nuclear fusion reaction

    A) $_6C^{13} + {_1}H^1 \rightarrow {_6}C^{14} + {_{+1}}e^0 + 4.3$ Mev
    B) $_4Be^9 + {_2}He^4 \rightarrow {_6}C^{12} + {_0}n^1 + 5$ Mev
    C) $_7N^{14} + {_1}H^1 \rightarrow {_8}O^{15} + 7.3$ Mev
    D) $_{92}U^{235} + {_0}n^1 \rightarrow {_{54}}Xe^{140} + {_{38}}Sr^{94} + 2({_0}n^1) + 200$ Mev

57. The maximum binding energy for nucleon is for

    A) Hydrogen   B) Helium   C) Iron   D) Cobalt

58. Which of the following isotope is used for treatment of cancer

A) I^{131} B) Co^{60} C) K^{40} D) Sr^{90}

59. The radius of the nucleus varies with mass number A as

A) A^2 B) A^3 C) $A^{1/2}$ D) $A^{1/3}$

60. During a negative β-decay

A) An atomic electron is ejected
B) A neutron in the nucleus decay emitting an electron
C) An electron which is already present inside the nucleus is ejected
D) A part of binding energy of the nucleus is converting into an electron

1. The 6th term of an AP of n terms whose sum is $n^2 - 2n$ is

   (A) 9   (B) 10   (C) 12   (D) 18

2. If $y = 1 + x + x^2 + \cdots$ to ∞, with $|x| < 1$, then x is

   (A) $\dfrac{y}{y-1}$ (B) $\dfrac{y}{1-y}$ (C) $\dfrac{y-1}{y}$ (D) $\dfrac{1-y}{y}$

3. Which of the following statement is not TRUE

   (A) $2 \geq 3$ or 3 is not a positive integer

   (B) $2 < 3$ or 3 is a positive integer

   (C) $2 \geq 3$ or 3 is a positive integer

   (D) $2 < 3$ or 3 is not a positive integer

4. The contrapositive of the implication ``If it is snowing, then I get wet'' is

   (A) If it is not snowing, then I do not get wet.

   (B) If I do not get wet, then it is not snowing.

   (C) If it is snowing, then I do not get wet.

   (D) If it is not snowing, then I get wet.

5. Number of subset of $\{a, b, c, d\}$ having two elements is

   (A) 4   (B) 3   (C) 6   (D) 15

6. The relation R defined on the set $X = \{4,5,6\}$ by $R = \{(4, 5)\}$ is

   (A) reflexive   (B) symmetric   (C) identity   (D) transitive

7. If $A = \emptyset$ (empty set). Number of elements present in power set of A is

   (A) 0   (B) 1   (C) 2   (D) none of these

8. The domain of the function $f(x) = \dfrac{x^2+2x+1}{x^2-x-6}$ is

   (A) $\mathbb{R}$ (B) $\mathbb{R}\backslash\{3\}$ (C) $\mathbb{R}\backslash\{-2, 3\}$ (D) none of these

9. The value of π is

   (A) $\dfrac{22}{7}$ (B) 3.14   (C) 3.142   (D) none of these

10. If $z = 2 - \sqrt{3}\,i$, then value of $z\bar{z}$ is

   (A) 8   B) 7   (C) $2 + \sqrt{3}i$ (D) none of these

11. The nth roots of unity are in

   (A) AP   (B) GP   (C) HP   (D) none of these

12. The number of different 5 letter words, with or without meaning, which can be formed

out of the letters of the word ``APPLE'', where repetition of the letters is not allowed is

  (A) 60   (B) 30   (C)120   (D) none of these

13. The number of ways the 3 girls and 2 boys can be seated in a row so that no two boys

are together is

  (A) 36   (B 9   (C) 6   (D) 72

14. The term independent of x in $\left(\dfrac{x}{3}-\dfrac{2}{x^2}\right)^{10}$ is

  (A) 6   (B) 4   (C) 3   (D) none of these

15. In the expansion of $(1+x)^n$, the sum of coefficients of odd powers of x is

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

16. If the equations $ax^2 + bx + c = 0$ and $bx^2 + cx + a = 0$ have a common root with

$a \neq b \neq c$, then

 (A) $a + b + c = 0$ (B) $a + b + c = 1$ (C) $a + b + c = -1$ (D) none of these

17. The number of solution of the equation $\cos(e^x) = 4^x + 4^{-x}$ is

  (A) 1   (B) 2   (C) 0   (D) infinite

18. If α is the AM of the roots of the equation $x^2 - 2ax + b = 0$ and β is the GM of

the roots of the equation $x^2 - 2bx + a^2 = 0$, then

 (A) $\alpha > \beta$ (B) $\alpha = \beta$ (C) $\alpha < \beta$ (D) none of these

19. The vector $\vec{b} \times (\vec{a} \times \vec{b})$ is

  (A) perpendicular to $\vec{b}$ (B) perpendicular to $\vec{a}$

  (C) perpendicular to both $\vec{a}$ and $\vec{b}$ (D) null vector

20. The area of the parallelogram whose adjacent sides are given by vectors $\vec{a} = \hat{\imath} - \hat{\jmath} + 3\hat{k}$ and

$\vec{b} = 2\hat{\imath} - 7\hat{\jmath} + \hat{k}$ is

  (A) $10\sqrt{2}$ (B) $5\sqrt{2}$ (C) $15\sqrt{2}$ (D) none of these

21. The decimal equivalent of 110110 is

  (A) 54   (B) 52   (C) 56   (D) 58

22. If $a = 3\sqrt{3}$, $b = 9$ and $C = 90°$ in a ΔABC, then $\angle A$ is

  (A) $\dfrac{\pi}{4}$ (B) $\dfrac{\pi}{3}$ (C) $\dfrac{\pi}{2}$ (D) $\dfrac{\pi}{6}$

23. $\sin\left[tan^{-1}\left(\frac{1-x^2}{2x}\right) + cos^{-1}\left(\frac{1-x^2}{1+x^2}\right)\right]$ is equal to

   (A) 0   (B) 1   (C) $\frac{1}{\sqrt{2}}$ (D) $\sqrt{2}$

24. If $\sin 5x + \sin 3x + \sin x = 0$, then the value of x other than zero between $0 \leq x \leq \frac{\pi}{2}$ is

   (A) $\frac{\pi}{6}$ (B) $\frac{\pi}{12}$ (C) $\frac{\pi}{3}$ (D) $\frac{\pi}{9}$

25. Range of $\cot x$ is

   (A) $)(1, \infty)$ (B) $[-1,1]$ (C) $(-\infty, -1)$ (D $\mathbb{R}$

26. If A is any non-singular square matrix of order 3, then $A(adjA)$ is equal to

   (A) I (B) $\det A. I$ (C) $\det A^3 I$ (D) none of these

27. The system of linear equations :

   $x + y + z = 0, 2x + 2y + 2z = 0, 3x + 3y + 3z = 0$ has

   (A) No solution   (B) A unique solutions

   (C) An infinitely many solutions   (D) None of these

28. The cofactor of $'0'$ in the determinant $\begin{vmatrix} 1 & -3 & 4 \\ 0 & 2 & 5 \\ -2 & 6 & 3 \end{vmatrix}$ is

   (A) 33   (B) 24   (C) -33 (D) -24

29. The value of determinant $\begin{vmatrix} 1 & 2 & 3 \\ 2 & 4 & 6 \\ 5 & 7 & 8 \end{vmatrix}$ is

   (A) 1   (B) 32   (C) -32 (D) 0

30. If the mean deviation is 16, then the value of standard deviation is

   (A) 15   (B) 18   (C) 20   (D) none of these

31. The mean of the sum of first n natural number is

   (A) $\frac{n-1}{2}$ (B) $\frac{n+1}{2}$ (C) $\frac{n}{2}$ (D) none of these

32. Two identical dice are rolled. The probability that the same number will appear

   on each of them is

   (A) $\frac{1}{6}$ (B) $\frac{1}{18}$ (C) $\frac{1}{36}$ (D) None of these

33. A determinant is chosen at random from the set of all determinants of order 2 with

elements 0 or 1 only. The probability that the values of the determinant is chosen is positive is

   (A) $\frac{5}{16}$ (B) $\frac{7}{16}$ (C) $\frac{1}{4}$ (D) $\frac{3}{16}$

34. Equation of a straight line making equal intercepts on the axes and passing through the

point (1,2) is

(A) $4x - y - 2 = 0$ (B) $2x + y - 4 = 0$

(C) $x + y - 3 = 0$ (D) $x + 2y - 5 = 0$

35. If the equation $4x^2 - 8xy + \lambda y^2 = 0$ represents two perpendicular lines, then the

value of λ is

(A) 4   (B) -4 (C) 3   (D) -3

36. The equation of the circle which touches the line $5x + 12y = 1$ and which has its centre at

(3,4) is

(A) $(x - 3)^2 + (y - 4)^2 = \left(\frac{62}{11}\right)^2$ (B) $(x - 3)^2 + (y - 4)^2 = \left(\frac{62}{17}\right)^2$

(C) $(x - 3)^2 + (y - 4)^2 = \left(\frac{62}{13}\right)^2$ (D) none of these

37. The equation of the normal to the parabola $y^2 = 4x$ which is parallel to the line

$y - 2x + 6 = 0$ is

(A) $2x - y - 12 = 0$ (B) $2x + y - 12 = 0$

(C) $x + 2y - 12 = 0$ (D) $x - 2y + 12 = 0$

38. The equation of the ellipse whose foci are $(\pm 2,0)$ and eccentricity $\frac{1}{2}$ is

(A) $\frac{x^2}{12} + \frac{y^2}{16} = 1$ (B) $\frac{x^2}{16} + \frac{y^2}{12} = 1$ (C) $\frac{x^2}{16} + \frac{y^2}{8} = 1$ (D) None of these

39. The equation of the diameter which is conjugate to $y = 3x$ with respect to the hyperbola

$\frac{x^2}{4} - \frac{y^2}{9} = 1$ is

(A) $y = \frac{3}{4}x$ (B) $y = -\frac{3}{4}x$ (C) $y = \frac{4}{3}x$ (D) $y = -\frac{4}{3}x$

40. The direction cosines of any normal to the $xy -$ plane are

(A) 1,0,0   (B) 0,1,0   (C) 1,1,1   (D) 0,0,1

41. The lines $\frac{x-2}{1} = \frac{y-3}{1} = \frac{z-4}{-k}$ and $\frac{x-1}{k} = \frac{y-4}{2} = \frac{z-5}{1}$ are coplanar if

(A) $k = 0 \ or -1$ (B) $k = 1 \ or -1$ (C) $k = 3 \ or -3$ (D) $k = 0 \ or -3$

42. The perpendicular distance of the point (3,4,5) from the $y -$ axis, is

(A) $\sqrt{34}$ (B) $\sqrt{41}$ (C) 4   (D) 5

43. The radius of the sphere $x^2 + y^2 + z^2 - 6x + 8y - 10z + 1 = 0$ is

(A) 5   (B) 2   (C) 7   (D) 15

44. The solution of the given differential equation $\frac{dy}{dx} = ye^x$ with $y(0) = e$ is

(A) $y = e^x$ (B) $y = e^{-x}$ (C) $\ln y = e^x$ (D) None of these

45. The solution of $(x + 2y^3)dy = y\, dx$ is

(A) $x + y^3 = cy$ (B) $x = y^3 + cy$ (C) $y^2 - x = cy$ (D) None of these

46. The second order differential equation is

(A) $y'^2 + x = y^2$ (B) $y'y'' + y = \sin x$ (C) $y''' + y'' + y = \cos x$ (D) $y' = y$

47. The slope of the tangent to the curve $y = \frac{1}{4}x^3 - 4x$ at $x = 4$ is

(A) 16   (B) 64   (C) 32   (D) 8

48. If $\omega = f(y - z, z - x, x - y)$ then $\frac{\partial \omega}{\partial x} + \frac{\partial \omega}{\partial y} + \frac{\partial \omega}{\partial z}$ is

(A) 0   (B) 3   (C) -3 (D) None of these

49. $D^{(16)}\cos(x + 5)$ is equal to

(A) $5^{16}\cos(x + 5)$ (B) $5^{16}\sin(x + 5)$ (C) $\sin(x + 5)$ (D) $\cos(x + 5)$

50. $\lim_{x \to 0} \frac{\tan 3x}{\tan 4x}$ is equal to

(A) 0   (B) $\frac{3}{4}$ (C) $\frac{4}{3}$ (D) 1

51. The graph of the function $y = \ln x$ lies in

(A) 1st and 2nd quadrant   (B) 2nd and 3rd quadrant

(C) 3rd and 4th quadrant   (D) 1st and 4th quadrant

52. The function $f(x) = \begin{cases} x\sin\frac{1}{x} & , \; x \neq 0 \\ 0 & , \; x = 0 \end{cases}$ is

(A) differentiable at $x = 0$ (B) continuous at $x = 0$

(C) $f'(x)$ is continuous at $x = 0$ (D) none of these

53. If $y = \cot^{-1}\left[\tan\left(\frac{\pi}{2} - x\right)\right]$ then $\frac{dy}{dx}$ is

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

54. If $x = p$ is a local maximum point of the function $f(x) = x^5 - 5x^4 + 5x^3 - 10$, then p is

(A) 1   (B) -1 (C) 3   (D) -3

55. $\frac{d}{dx}(\sin x^\circ)$ is

(A) $\cos x°$ (B) $\frac{\pi}{180}\sin x°$ (C) $\frac{\pi}{180}\cos x°$ (D) $\sin x°$

56. The area bounded by the curve $y = x^2$ and the line $y = x$ is

(A) $\frac{1}{3}$ (B) $\frac{1}{6}$ (C) 1   (D) $\frac{1}{2}$

57. $\int_{-1}^{1}|x|dx$ is equal to

(A) 1   (B) 2   (C) 4   (D) $\frac{1}{2}$

58. $\int \frac{\cos\sqrt{x}}{\sqrt{x}}dx$ is equal to

(A) $2\cos\sqrt{x} + C$ (B) $\frac{1}{2}\cos\sqrt{x} + C$ (C) $\sin\sqrt{x} + C$ (D) $2\sin\sqrt{x} + C$

59. $\int e^x \cos x\, dx$ is equal to

(A) $\frac{1}{2}e^x(\cos x - \sin x) + C$ (B) $\frac{1}{2}e^x(\cos x + \sin x) + C$

(C) $\frac{1}{2}e^x(\sin x - \cos x) + C$ (D) none of these

60. $\int_0^{\frac{\pi}{2}}\left(sin^2\frac{x}{4} - cos^2\frac{x}{4}\right)dx$ is

(A) 0   (B) 1   (C) -1 (D) -2

OJEE 2014 (CHEMISTRY)

1. Aqueous solution of an organic compound "A" on electrolysis liberates acetylene and CO_2 at anode. "A" is:

   a) potassium citrate

   b) potassium acetate

   c) potassium succinate

   d) potassium maleate

2. Which of the following reagent used for the conversion of 3-hexyne into *trans*-3-hexene?

   a) $NaBH_4$

   b) H_2, PtO_2

   c) Na, liq. NH_3/ C_2H_5OH

   d) H_2, Pd-BaSO4, quinoline

3. Propene can be converted into 1 propanol by oxidation. Indicate which set of reagents amongst the following is most suitable for the above conversion.

   a) alkaline $KMnO_4$

   b) OsO_4, $NaHSO_4$

   c) B_2H_6 and alkaline H_2O_2

   d) dil. H_2SO_4 at $140\ ^0C$

4. Arrange the following carbocations in order of decreasing stability:
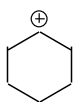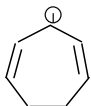
   (I)   (I)   (II)   (V)

   a) (II) > (IV) > (I) > (III)

   b) (II) > (I) > (III) > (IV)

   c) (I) > (II) > (III) > (IV)

   d) (II) > (III) > (IV) > (I)

5. Correct IUPAC name of the given compound

   $$\underset{CH_3\cdot CH - CH - CONH_2}{\overset{CN\ \ OC_2H_5}{}}$$
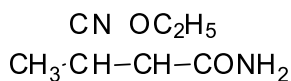
   a) 3-cyano-2-ethoxybutanamide

   b) 2 methyl 3 ethoxy 3 carbamoylpropanenitrile

c) ethoxy-1-carbamoyl-2-cyanopropane

d) 3-carbmoyl-3-ethoxy-3-methylpropanenitrile

6. Which of the following compound will give positive iodoform test?

$CH_3COCHCOOC_2H_5$ CH_3CH_2CHIOH ⬡—$NHCOCH_3$ ⬡—$COCHI_2$

         (I)   (II)   (III)   (IV)
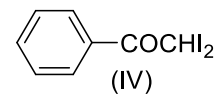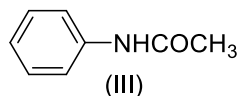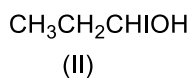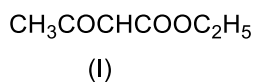
a) (I) and (II)   b) (III) and (IV)   c) (III) only   d) (IV) only

7. The bond that determine the secondary structure of a protein is
a) ionic bond   b) covalent bond
c) hydrogen bond   d) coordinate bond

8. Diazotisation of aniline with aqueous $NaNO_2$ and dil HCl, an excess of HCl is used primarily due to:
a) generate stoichiometric amount of HNO_2

b) neutralize the base liberated from the reaction

c) suppress the concentration of free aniline

d) activate the β-naphthol for coupling reaction

9. An organic molecule necessarily shows optical activity, if it

a) contain asymmetric carbon atoms   b) is superimposable on its mirror image

c) is non-superimposable on its mirror image   d) is non-planar

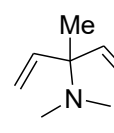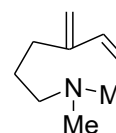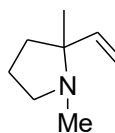10. Predict the major product of the following reaction:
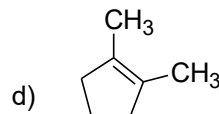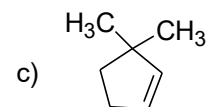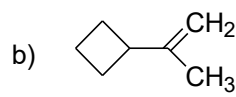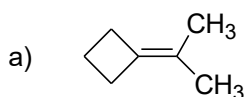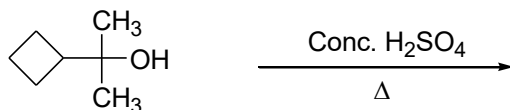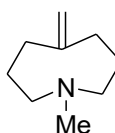
11. Formaldehyde react with ammonia to produce urotropine, which contain………..no. of nitrogen atom per molecule.

a) 3   b) 5   c) 4   d) 2

12. Identify the final product [Q] in this reaction sequence.
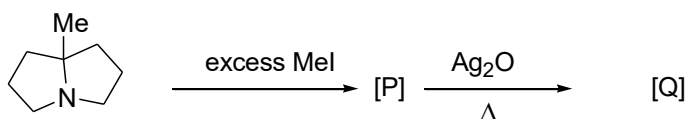
13. A condensation polymer among the following is

a) dacron   b) PVC   c) teflon   d) polystyrene
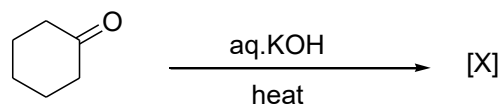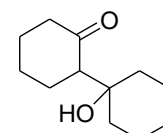
14. Which of the following molecule does not exhibit tautomerism
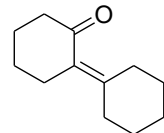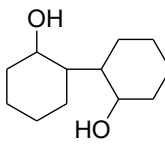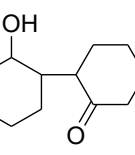

15. Reaction of acetylchloride with sodium propanoate will produce

a) acetic anhydride   b) propanoic anhydride

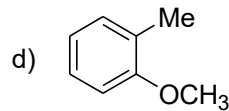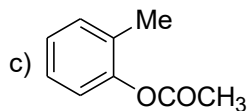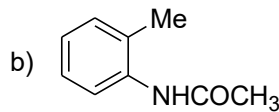c) ethylpropanoate   d) ethanoic propanoic anhydride
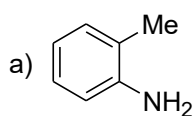
16. In the reaction:

[X] is

17. The reaction $H_3C-COOH \xrightarrow[I_2/\Delta]{AgNO_3} CH_3\overset{\overset{O}{\|}}{C}OCH_3$ is called as

a) Hunsdiecker reaction   b) Hell Volhard Zelinsky reaction

c) Simonini reaction   d) Finkelstein reaction

18. Which one of the following is most reactive towards electrophilic reagent?

a) [benzene ring with Me and NH_2 substituents]

b) [benzene ring with Me and $NHCOCH_3$ substituents]

c) [benzene ring with Me and $OCOCH_3$ substituents]

d) [benzene ring with Me and OCH_3 substituents]

19. An organic compound reacts with aqueous nitrous acid at low temperature to produce an oily product. The compound is

a) $(CH_3CH_2)_3N$ b) $(CH_3CH_2)_2NH$

c) $C_6H_5CH_2NH_2$ d) $C_6H_5CH_2CH_2NH_2$

20. p-Amino benzenesulphonic acid when treated with excess bromine water give-

a) 2,6-dibromo-4-amino benzenesulphonic acid

b) 2,4,6-tribromo aniline

c) 2,4-dibromo aniline

d) 2,6-dibromo aniline

21. The equivalent mass of an element is 4. Its chloride has a vapour density 59.25. The valency of the element will be.

a) 4   b) 3   c) 2   d) 1

22. Which pair of the following substances is said to be isomorphous?

a) Epsom salt and white vitriol   b) white vitriol and blue vitriol

c) Epsom salt and Glauber's salt   d) Glauber's salt and blue vitriol

23.   Magnetic quantum number is a number related to:

a) spin   b) shape   c) size   d) orientation

24.   Which one of the following is the man made radioactive disintegration series?

a) Uranium series   b) Thorium series

c) Neptunium series   d) Actinium series

25.   The maximum number of molecules is present in:

a) 01.0 gm of H_2 gas   b) 10 gm of O_2 gas

c) 15 L of H_2 gas at STP   d) 10 L of N_2 gas at STP

26.   A gas can be liquefied:

a) below its critical temperature   b) above its critical temperature

c) at its critical temperature   d) at any temperature

27.   If 4 gms of oxygen diffuse through a very narrow hole, how much hydrogen would have diffused under same condition?

a) 16 gm   b) 1 gm   c) 0.25 gm   d) 64 gm

28.   Solubility product of $BaSO_4$ is 1.5×10^{-9}. The precipitation in a 0.01 M solution of Ba^{2+} ions will start on adding H_2SO_4 of concentration:

a) 10^{-6} M   b) 10^{-8} M   c) 10^{-9} M   d) 10^{-7} M

29.   At high pressure van der Waals equation can be written as

a) $\left(P + \dfrac{a}{v} \right)\left(v - b \right) = RT$ b) $P\left(v - b \right) = RT$

c) $\left(P + \dfrac{a}{v} \right) v = RT$ d) $PV = RT$

30.   18 gm of glucose and 6 gm of urea are dissolved in 1 litre aqueous solution at 25 ^{0} C. The osmotic pressure of the solution will be:

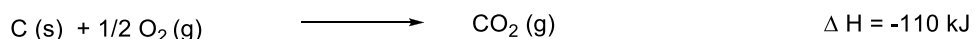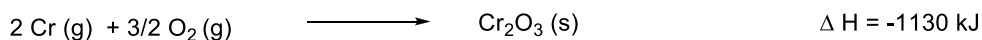a) 3.826 atm   b) 9.42 atm   c) 4.926 atm   d) 2.92 atm

31.   Critical micelle concentration (CMC) is:

a) concentration at which micelle formation starts

b) concentration of micelles at room temperature

c) concentration of electrolyte added to destroy the micelle

d) concentration at which micelles are destroyed

32.   2 Moles of an ideal gas at 27 ^{0}C is expanded reversibly from 2 litre to 20 litre. Find the entropy change (R = 2 cal/ mol K)

a) 0   b) 4   c) 9.2   d) 92.1

33.   Enthalpy changes for two reactions are given by equations.

$2 Cr_{(g)} + 3/2\ O_{2\,(g)} \longrightarrow Cr_2O_{3\,(s)}$ $\Delta H = -1130$ kJ

$C_{(s)} + 1/2\ O_{2\,(g)} \longrightarrow CO_{2\,(g)}$ $\Delta H = -110$ kJ

What is the enthalpy change in kJ for the following reaction?

$C_{(s)} + Cr_2O_{3\,(s)} \longrightarrow 2Cr_{(s)} + 3\ CO_{(g)}$
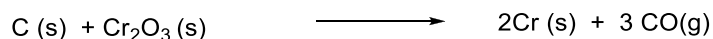
a) - 800 kJ   b) + 800 kJ   c) + 1020 kJ   d) + 1460 kJ

34.   Consider the exothermic reaction $X \longrightarrow Y$ with the activation energies E_b and E_f for backward and forward reactions respectively. Which statement is correct?

a) $E_b < E_f$ b) $E_b = E_f$

c) no definite relation between E_b and E_f d) $E_b > E_f$

35. $NaOH + Cl_2 \longrightarrow NaCl + NaClO_3 + H_2O$
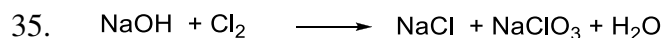
The equivalent mass of Cl_2 in the above reaction is

a) M/2   b) M/5   c) 2M/3   d) 3M/5

36. On heating a liquid, its viscosity

a) decreases

b) increases

c) remains same

d) first increases and then decreases

37. During the change of O_2 to O_2^- ion, the electron adds on which one of the following orbital?

a) π^* orbital

b) σ^* orbital

c) π orbital

d) σ orbital

38. If 0.8 mole of $BaCl_2$ is mixed with 0.4 mole of Na_3PO_4, the maximum number of mole of $Ba_3(PO_4)_2$ that can be formed.

a) 1.2   b) 0.45   c) 0.20   d) 0.40

39. The pair of compound having same shape.

a) SF_4 and XeF_4 b) CO_2 and XeF_2 c) BCl_3 and BrF_3 d) IF_5 and PCl_5

40. The dissociation equilibrium of a gas AB_2 can be represented as, $2AB_2 (g) \rightleftharpoons 2AB (g) + B_2 (g)$

The degree of dissociation is "x" and is small compared to 1. The expression relating the degree of dissociation x with equilibrium constant K_p and total pressure P is:

a) $2K_p/P$ b) K_p/P c) $(2K_p/P)^{1/2}$ d) $(2K_p/P)^{1/3}$

41. In the modern periodic table one of the following does not have appropriate position:

a) inert gases

b) inner-transition elements

c) transition elements

d) none of the above

42. The ratio of the difference between 2nd and 3rd Bohr's orbit energy to that between 3rd and 4th orbit energy is:

a) 0.35   b) 0.185   c) 5.4   d) 2.85

43. Basic strength of trihalides of nitrogen increases in the order:

a) $NCl_3 < NBr_3 < NI_3 < NF_3$

b) $NF_3 < NCl_3 < NBr_3 < NI_3$

c) $NF_3 < NBr_3 < NCl_3 < NI_3$

d) $NF_3 < NI_3 < NCl_3 < NBr_3$

44. H_2SO_4 has a very corrosive action on skin because

a) it acts as dehydrating agent   b) it reacts with proteins

c) it acts as oxidizing agent

d) it acts as dehydrating agent and absorption of water is highly exothermic

45. Calcium cyanamide on treatment with steam under pressure gives ammonia and

a) $CaCO_3$ b) $Ca(OH)_2$ c) CaO d) $CaHCO_3$

46. When excess of $SnCl_2$ is added to a solution of $HgCl_2$, a white precipitate turning black is obtained. The black colour is due of the formation of:

a) Hg_2Cl_2 b) $SnCl_4$ c) Sn d) Hg

47. Lead dissolves most readily in:

a) CH_3COOH b) HNO_3 c) H_2SO_4 d) HCl

48. Electrolytic reduction process is used for the extraction of:

a) noble metals   b) highly electronegative elements

c) highly electropositive elements   d) transition metals

49. Standard electrode potentials are:
$Fe^{2+} | Fe = -0.44$ V   and $Fe^{3+} | Fe^{2+} = +0.77$ V. Fe^{2+} and Fe^{3+} blocks are kept together , then

a) Fe^{3+} increases   b) Fe^{2+}/Fe^{3+} remains unchanged

c) Fe^{3+} decreases   d) Fe^{2+} decreases

50. When ZnS and PbS minerals are present together, NaCN is added of separate them in froth floatation process because

a) PbS forms soluble complex, $Na_2Pb(CN)_4$

b) ZnS forms soluble complex, $Na_2Zn(CN)_4$

c) $Pb(CN)_2$ is precipitated while there is no effect on ZnS

d) both (b) and (c)

51. Both HNO_3 and HF are strong acids. But when HNO_3 dissolve in HF, it behaves as:

a) an acid   b) a zwitter ion   c) amphiprotic solvent   d) a base

52. A commercial sample of H_2O_2 is labeled as "15 volume" its percentage strength is nearly:

a) 9 %   b) 4.5 %   c) 10 %   d) 45%

53. Which one of the following is used for reviving the exhaust permutit?

a) dil. HCl solution   b) 15 % $FeCl_3$ solution
c) 10 % $MgCl_2$ solution   d) 10 % NaCl solution

54. The bond present in borazole are:

a) 9α, 9π b) 6α, 6π c) 9α, 6π d) 12α, 3π

55. Which one of the following ions in aqueous solution is the best conductor of electricity?

a) Cs^+ b) Na^+ c) Mg^{2+} d) Li^+

56. A chemical reaction is carried out at 280 K and 300K. The rate constants were found of be k_1 and k_2 respectively. Then

a) $k_1 = 4k_2$ b) $k_2 = 2k_1$ c) $k_2 = 4k_1$ d) $k_2 = 0.5k_1$

57. Nucleophilic substitution in aryl halides is favoured by-
a) electron donating group   b) electron withdrawing group
c) both electron donating and withdrawing groups   d) none of these

58. The inhibitors:
a) retard the rate of a chemical reaction
b) do not allow the reaction of proceed
c) stop a chemical reaction immediately
d) are reducing agents

59. Red phosphorous is less reactive than yellow phosphorous because
a) its colour is red
b) it is hard
c) it is tetra atomic

d) it is highly polymerized

60.   Weight of iodine required to oxidize 500 mL of 2 N $Na_2S_2O_3$ solution is
        a) 6.35 gm   b) 63.5 gm   c) 31.75 gm   d) 127 gm