FIITJEE PET – VIII (CHAMPIONS_2ND YEAR)

MAINS

DATE: 18.08.2018

Time: 3 hours **Maximum Marks: 360**

INSTRUCTIONS:

Instructions to the Candidates

1. This Test Booklet consists of **90 questions**.

   Use **Blue/Black ball Point Pen only** for writing particulars and bubbling of OMR.

2. For each correct answer **4 Marks** will awarded and for each wrong answer **1 Mark** will be deducted.

3. Attempt all questions.

4. In case you have not darkened any bubble you will be awarded 0 mark for that question.

5. Use of calculator/logarithmic table is not permitted.

Don't write / mark your answers in this question booklet.
If you mark the answers in question booklet, you will not be allowed to continue the exam.

NAME: ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

ENROLLMENT NO.: ☐☐☐☐☐☐☐☐☐☐☐☐

1. Evaluate: $\int_0^{\pi} \frac{x\,dx}{1+\cos^2 x}$

(A) $\frac{\pi^2}{2\sqrt{2}}$ (B) $\frac{\pi^2}{2}$ (C) $\frac{\pi^2}{\sqrt{2}}$ (D) none of these

2. The value of $\int_{-1}^{3} \{|x-2|+[x]\}$.

(where [.] denotes greatest integer function)

(A) 5 (B) 7 (C) 3 (D) none of these

3. Evaluate: $\int_0^{\pi} \log(1+\cos x)\,dx$

(A) $\pi \log 1$ (B) $-\pi \log 2$ (C) $\pi - \log 2$ (D) none of these

4. $\int_{-1}^{1} \frac{\sqrt{1+x+x^2}-\sqrt{1-x+x^2}}{\sqrt{1+x+x^2}+\sqrt{1-x+x^2}}dx =$

(A) –1 (B) 0 (C) 1 (D) $\frac{1}{2}$

5. Evaluate: $\frac{\int_0^n [x]\,dx}{\int_0^n \{x\}\,dx}$

(where [.] denotes greatest integer function and {x} denotes fractional part of x)

(A) $\frac{1}{n-1}$ (B) $\frac{1}{n}$ (C) n (D) n – 1

6. $\int_0^1 \tan^{-1}\left[\frac{2x-1}{1+x-x^2}\right]dx =$

(A) 0 (B) $\frac{1}{2}$ (C) 1 (D) ∞

Space for rough work

7. $\int_0^{\pi/6} \sec^2 x \, d(x - [x])$ is equal to

(A) $\sqrt{3}$ (B) $\frac{1}{\sqrt{3}}$ (C) 1 (D) none of these

8. If $\int_e^x tf(t)\,dt = \sin x - x\cos x - \frac{x^2}{2}$ for all $x \in R - \{0\}$, then the value of $f\left(\frac{\pi}{6}\right)$ is

(A) 0 (B) 1 (C) $-\frac{1}{2}$ (D) $\frac{3}{2}$

9. $\int_{-\pi/2}^{\pi/2} \sin^{10} x\left(6x^9 - 25x^7 + 4x^3 - 2x\right)dx =$

(A) π (B) 0 (C) 25 (D) none of these

10. $\int_{-1/\sqrt{3}}^{1/\sqrt{3}} \frac{x^4}{1-x^4}\cos^{-1}\frac{2x}{1+x^2}\,dx =$

(A) $\frac{\pi}{2}\left[\frac{1}{2}\log\left(2+\sqrt{3}\right)+\frac{\pi}{6}-\frac{2}{\sqrt{3}}\right]$ (B) $\frac{\pi}{4}\left[\frac{1}{2}\log\left(2+\sqrt{3}\right)+\frac{\pi}{4}-\frac{2}{\sqrt{3}}\right]$

(C) $\frac{\pi}{2}\left[\frac{1}{2}\log\left(2-\sqrt{3}\right)-\frac{\pi}{6}+\frac{2}{\sqrt{3}}\right]$ (D) $\frac{\pi}{2}\left[\frac{1}{3}\log\left(3+\sqrt{3}\right)+\frac{\pi}{5}-\frac{1}{\sqrt{3}}\right]$

11. Let f(x) be a continuous function such that f(a – x) + f(x) = 0 for all $x \in [0, a]$. Then $\int_0^a \frac{dx}{1+e^{f(x)}} =$

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

12. The value of the integral $\int_{\pi/2}^{3\pi/2} [\sin x]\,dx$, (where [.] denotes greatest integer function) is

(A) $\frac{\pi}{2}$ (B) $\frac{-\pi}{2}$ (C) 0 (D) π

Space for rough work

13. If $I = \int_0^1 \frac{dx}{\sqrt{1+x^4}}$, then

(A) $I < 0.78$ (B) $I > 0.78$ (C) $I = 0.78$ (D) $I \le 0$

14. If $f(x) = \int_0^1 \frac{dt}{1+|x-t|}$, then $f'\left(\frac{1}{2}\right)$ is equal to

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

15. Let $g(x) = \int_0^x f(t)\,dt$ where $\frac{1}{2} \le f(t) \le 1$, $t \in [0, 1]$ and $0 \le f(t) \le \frac{1}{2}$ for $t \in (1, 2]$. Then

(A) $\frac{-3}{2} \le g(2) < \frac{1}{2}$ (B) $0 \le g(2) < 2$ (C) $\frac{3}{2} < g(2) \le \frac{5}{2}$ (D) $2 < g(2) < 4$

16. Evaluate: $\int_0^2 \left|\cos\frac{\pi x}{2}\right| dx$

(A) $\frac{1}{\pi}$ (B) $\frac{2}{\pi}$ (C) $\frac{3}{\pi}$ (D) $\frac{4}{\pi}$

17. $\int_0^{\pi} \sin^4\theta \frac{\sqrt{1-\cos\theta}}{(1+\cos\theta)^2}\,d\theta$ is equal to

(A) $\frac{8\sqrt{2}}{15}$ (B) $\frac{64\sqrt{2}}{15}$ (C) $\frac{32\sqrt{2}}{15}$ (D) none of these

18. If f(x) is function satisfying $f\left(\frac{1}{x}\right) + x^2 f(x) = 0$ for all x ($x \ne 0$), then the value of the integral $\int_{\tan\theta}^{\cot\theta} f(x)\,dx$ is

(A) $\tan^2\theta$ (B) $2\tan\theta$ (C) 0 (D) none of these

Space for rough work

19. If $u_{10} = \int_0^{\pi/2} x^{10} \sin x \, dx$, then the value of $u_{10} + 90u_8$ is

(A) $9\left(\frac{\pi}{2}\right)^8$ (B) $\left(\frac{\pi}{2}\right)^9$ (C) $10\left(\frac{\pi}{2}\right)^9$ (D) $9\left(\frac{\pi}{2}\right)^9$

20. The value of $\int_{-\pi}^{\pi} \frac{\cos^2 x}{1+a^x} dx$, $a > 0$ is

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

21. $\int_0^{\pi/2} \tan x \log \sin x \, dx$ is equal to

(A) $\frac{\pi^2}{24}$ (B) $\frac{-\pi^2}{24}$ (C) $\frac{\pi^2}{12}$ (D) $\frac{-\pi^2}{12}$

22. Let $I_1 = \int_{\sec^2 z}^{2-\tan^2 z} x \, f\left(x(3-x)\right) dx$ and $I_2 = \int_{\sec^2 z}^{2-\tan^2 z} f\left(x(3-x)\right) dx$, where f is a continuous function and z is any real number, then $\frac{I_1}{I_2} =$

(A) $\frac{3}{2}$ (B) $\frac{1}{2}$ (C) 1 (D) none of these

23. If $f(x) = |2^x - 1| + |x - 1|$, then $\int_{-2}^{2} f(x) \, dx$ is equal to

(A) $5 - \frac{9}{4}\log 2$ (B) $5 + \frac{9}{4}\log 2$ (C) $-\left(5 + \frac{9}{4}\log 2\right)$ (D) none of these

24. $\lim_{n\to\infty} \frac{(n!)^{1/n}}{n}$ is equal to

(A) e (B) $\frac{1}{e}$ (C) e^{-1} (D) none of these

Space for rough work

25. $\lim_{n\to\infty}\left[\frac{n+1}{n^2+1^2}+\frac{n+2}{n^2+2^2}+\frac{n+3}{n^2+3^2}+\cdots+\frac{1}{n}\right]$ is equal to

(A) $\frac{\pi}{4}+\frac{1}{2}\log 2$ (B) $\frac{\pi}{4}-\frac{1}{2}\log 2$ (C) $-\left(\frac{\pi}{4}+\frac{1}{2}\log 2\right)$ (D) none of these

26. If $\int_0^1 e^{x^2}(x-\alpha)\,dx = 0$, then

(A) $1 < \alpha < 2$ (B) $\alpha < 0$ (C) $0 < \alpha < 1$ (D) $\alpha = 0$

27. $\int_0^{1/\sqrt{2}} \frac{\sin^{-1}x}{(1+x^2)\sqrt{1-x^2}}\,dx$ is equal to

(A) $\frac{\pi}{4}-\frac{1}{2}\log 2$ (B) $\frac{\pi}{4}+\frac{1}{2}\log 2$ (C) $\frac{\pi}{4}+\log 2$ (D) $\frac{\pi}{4}-\log 2$

28. $\lim_{n\to\infty}\left[\frac{1}{n}+\frac{n^2}{(n+1)^3}+\frac{n^3}{(n+2)^3}+\cdots+\frac{1}{8n}\right]$ is equal to

(A) $\frac{3}{8}$ (B) $\frac{1}{4}$ (C) $\frac{1}{8}$ (D) none of these

29. If $f(x) = \int_2^x (x^3-6x^2+11x-6)\,dx$, $2 \le x \le 4$, then the range of f(x) is

(A) [0, 2] (B) $\left[\frac{-1}{4},2\right]$ (C) $\left[\frac{-1}{4},0\right]$ (D) none of these

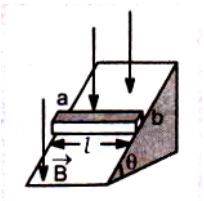
30. $\int_0^{2\pi} \frac{dx}{1+e^{\sin x}}$ is equal to

(A) π (B) 2π (C) $\frac{\pi}{2}$ (D) none of these

Space for rough work

For Questions 31–34

A conducting rod of length, ℓ mass m and resistance R slides on frictionless U–shaped metal rails that are inclined at an angle θ above the horizontal. The rails have negligible resistance. The rod is released from rest



31. What is the terminal speed of the bar ?

(A) $V_T = \frac{mgR\sin\theta}{B^2\ell^2\cos^2\theta}$ (B) $V_T = \frac{mgR\cos\theta}{B^2\ell^2\sin^2\theta}$

(C) $V_T = \frac{mgR}{B^2\ell^2\cos\theta}$ (D) None of these

32. What is the induced current in the bar when the terminal speed has been reached ?

(A) $I = \frac{mg}{B\ell}\cot\theta$ (B) $I = \frac{mg}{B\ell}\tan\theta$

(C) $I = \frac{mg}{B\ell}\sin\theta$ (D) $I = \frac{mg}{B\ell}\cos\theta$

33. After the terminal speed has been reached, at what rate is electric energy being converted to thermal energy in the resistance of the rod ?

(A) $P = \frac{B^2\ell^2v^2\sin^2\theta}{R}$ (B) $P = \frac{B^2\ell^2v^2\sin^2\theta}{2R}$

(C) $P = \frac{B^2\ell^2v^2\cos^2\theta}{R}$ (D) $P = \frac{B^2\ell^2v^2\cos^2\theta}{2R}$

34. After the terminal speed has been reached, at what rate is work being done on the rod by gravity ?

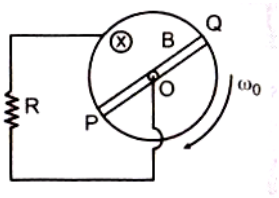
(A) $P = \frac{B^2\ell^2v^2\sin^2\theta}{R}$ (B) $P = \frac{B^2\ell^2v^2\sin^2\theta}{2R}$

(C) $P = \frac{B^2\ell^2v^2\cos^2\theta}{R}$ (D) $P = \frac{B^2\ell^2v^2\cos^2\theta}{2R}$

Space for rough work

For Questions (35–37)

A conducting rod PQ of mass M rotates without friction on a horizontal plane about O as circular rails of diameter 'ℓ'. The centre O and the periphery are connected by resistance R. The system is located in a uniform magnetic field perpendicular to the plane of the loop. At t=0, PQ starts rotating clockwise with angular velocity ω_0 see fig (a) Neglecting the resistance of the rails and rod, as well as self – inductance, find



35. Magnitude of current as a function of time

(A) $\alpha = \frac{3B^2\ell^2}{8RM}$ (B) $\alpha = \frac{B^2\ell^2}{RM}$ (C) $\alpha = \frac{7B^2\ell^2}{8RM}$ (D) None of these

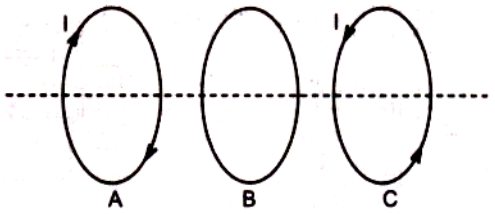
36. total charge flown through the resistance

(A) $Q = \frac{\omega_0 M}{3B}$ (B) $Q = \frac{\omega_0 M}{B}$ (C) $Q = \frac{\omega_0 M}{7B}$ (D) None of these

37. the heat generated in the circuit by t= ∞

(A) $H = \frac{m\ell^2\omega_0^2}{24}$ (B) $H = \frac{m\ell^2\omega_0^2}{12}$ (C) $H = \frac{m\ell^2\omega_0^2}{3}$ (D) $H = \frac{m\ell^2\omega_0^2}{6}$

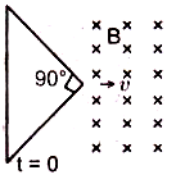
38. Three identical coils A, B and C carrying currents are placed coaxially with their planes parallel to one another. A and C carry currents as shown. B is kept fixed, while A and C both are moved towards B with the same speed. Initially, B is equally separated from A and C. The direction of the induced current in the coil B is

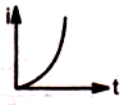


(A) same as that in coil A
(B) same as that in coil B
(C) zero
(D) non of these

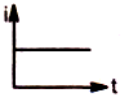
Space for rough work

39. The figure shows an isosceles triangle wire frame with apex angle equal to $\pi/2$. The frame starts entering into the region of uniform magnetic field B with constant velocity v at t=0. The longest side of the frame is perpendicular to the direction of velocity. If i is the instantaneous current through the frame then choose the alternative showing the correct variation of i with time

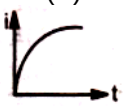




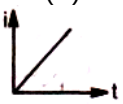
(A)



(B)



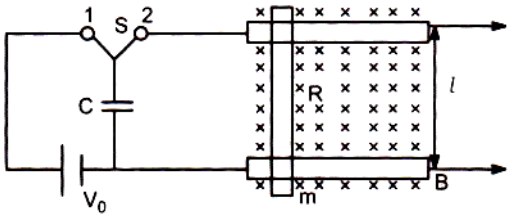
(C)



(D)

For Questions (40–41)

One end of a horizontal fixed track of gauge ℓ and negligible resistance is connected to a capacitor of capacitance C charged to voltage V_0. The inductance of the assembly is negligible. The system is placed in a homogenous, vertical magnetic field of induction B as shown in the fig.
A frictionless conducting rod of mass m and negligible resistance is placed perpendicularly on to the track. The polarity of the capacitor is such that the rod is repelled from the capacitor. Now the switches is turned from 1 to 2.



40. What is the maximum velocity of the rod ?

(A) $\frac{B\ell CV_0}{m+B^2\ell^2C}$

(B) $\frac{2B\ell CV_0}{m+B^2\ell^2C}$

(C) $\frac{B\ell CV_0}{2\left(m+B^2\ell^2C\right)}$

(D) None of these

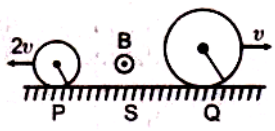
Space for rough work

41. Find the minimum charge on the capacitor

(A) $\frac{B^2\ell^2CV_0}{2m+B^2\ell^2C}$ (B) $\frac{B^2\ell^2C^2V_0}{m+B^2\ell^2C}$

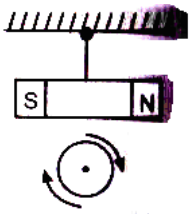
(C) $\frac{2B^2\ell^2C^2V_0}{m+B^2\ell^2C}$ (D) None of these

42. Two conducting rings P and Q of radii r and 2r rotate uniformly in opposite directions with centre of mass velocities 2 v and v respectively on a conducting surface S. There is a uniform magnetic field of magnitude B perpendicular to the plane of the rings. The potential difference between the highest points of the two rings is



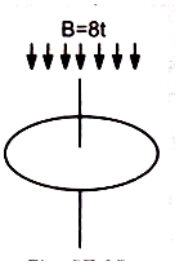
(A) zero (B) 4 Bvr
(C) 8 Bvr (D) 16 Bvr

43. A negative charge is given to a non –conducting loop and the loop is rotated in the plane of paper about its centre as shown in figure. The magnetic field produced by the ring affects a small magnet placed above the ring in the same plane.



(A) the magnet does not rotate
(B) the magnet rotates clockwise as seen from below
(C) the magnet rotates anticlockwise as seen from below
(D) no effect on magnet is there

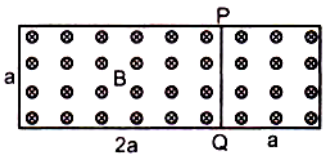
44. A thin ring of mass 0.1 kg and diameter 0.5 m carrying charge 'q' is free to rotate about an axis as shown in the fig. At t=0, time dependent magnetic field of 8t Tesla is applied vertically down on the ring. If the ring is a at rest before applying magnetic field and induced magnetic effects due to rotation of the ring are neglected, the power developed by the force acting of the ring after 10 sec is found to be 6.4 mw. Find the charge 'q' that the ring is carrying ?



(A) 2×10^{-3}C (B) 4×10^{-3}C (C) 6×10^{-3}C (D) 8×10^{-3}C

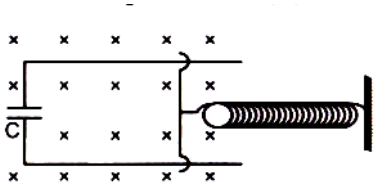
Space for rough work

45. Find the current through section PQ of length a in fig. The circuit is located in a time varying magnetic filed B = B_0t. Assume the resistance per length of the wire is λ.



(A) $\frac{aB_0}{23\lambda}$ (B) $\frac{9aB_0}{23\lambda}$ (C) $\frac{8aB_0}{23\lambda}$ (D) None of these

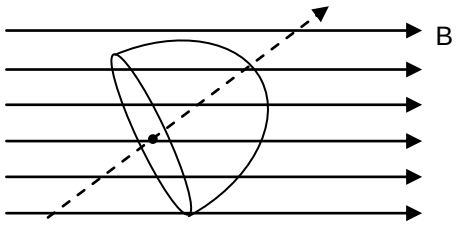
46. One end of a spring of force constant k is connected to the mid– point of a conducting rod of mass m and ℓ, which can slide freely on a pair of parallel, smooth, horizontal conducting rails. The other end of the spring is connected to a rigid wall. The spring is non – conducting. There exists a uniform magnetic field $\vec{B}$ normal to the plane of paper and into it. Electrical resistance of rails and rod is negligible . The rails are connected to a capacitor of capacitance C. if the wire is pushed towards left and released, the subsequent motion is oscillatory . Find its time period.



(A) $T = \pi\left(\sqrt{\frac{m+CB^2\ell^2}{k}} + \sqrt{\frac{m-CB^2\ell^2}{k}}\right)$ (B) $T = \pi\left(\sqrt{\frac{m+CB^2\ell^2}{k}}\right)$

(C) $T = \pi\left(\sqrt{\frac{m-CB^2\ell^2}{k}}\right)$ (D) $T = 2\pi\left(\sqrt{\frac{m-CB^2\ell^2}{k}}\right)$

47. A hemisphere is present in a uniform magnetic field as shown. $\varnothing$ through hemisphere is given by (angle between the dotted line and B is 30°)

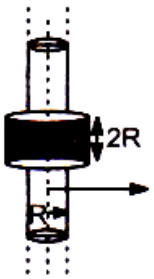


(A) $\frac{\sqrt{3}\pi R^2B}{2}$ (B) $2\sqrt{3}\pi R^2B$

(C) $\sqrt{3}\pi R^2B$ (D) none

Space for rough work

48. A current I flowing a cylindrical wire of radius R is uniformly distributed over its cross – section. The energy stored in a co–axial cylindrical volume near its centre as shown in fig.



(A) $\frac{\mu_0 I^2}{8\pi}[1+\ell n2]$ (B) $\frac{\mu_0 I^2}{8\pi}$

(C) $\frac{\mu_0 I^2}{16\pi}[1+4\ell n2]$ (D) $\frac{\mu_0 I^2}{16\pi}$

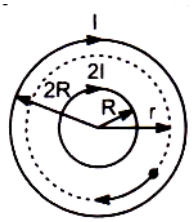
49. An aeroplane is moving towards north horizontally with a speed of 200 m s^{-1} at a place where the vertical component of earth's magnetic field is 0.5×10^{-4} tesla. Then the induced e.m.f. set up between the tips of the wings of the plane if they are 10 m apart is

(A) 0.1 volt (B) 0.01 volt (C) 10 volt (D) 1 volt

50. Flux ϕ (in weber) in a closed circuit of resistance 10 ohm varies with time t (in sec) according to the equation $\phi = 6t^2 - 5t + 1$. What is the magnitude of the induced current at t = 0.25 sec?

(A) 1.2 A (B) 0.8 A (C) 0.6 A (D) 0.2 A

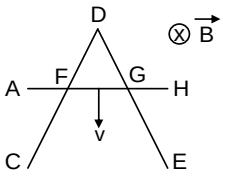
51. A long solenoid contains another coaxial solenoid (whose radius R is half of its own). Their coils have the same number of turns per unit length and initially both carry no current. At the same instant currents start increasing linearly with time in both solenoids. At any moment the current flowing in the inner coil is twice as large as that in the outer one and their directions are the same . As a result of the increasing currents a charged particle, initially at rest between the solenoids, starts moving along a circular trajectory . What is the radius r of the circle ?



(A) r= R (B) $r = \sqrt{2}R$ (C) $r = \frac{R}{2}$ (D) 2 R

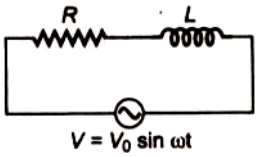
Space for rough work

52. A long conducting wire AH is moved over a conducting triangular wire CDE with a constant velocity v in a uniform magnetic field $\vec{B}$ directed into the paper. Resistance per unit length of each wire is ρ. Then



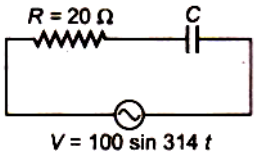
(A) a constant clockwise induced current will flow in dosed loop
(B) an increasing anticlockwise induced current will flow in the closed loop
(C) a decreasing anticlockwise induced current will flow in the closed loop
(D) a constant anticlockwise induced current will flow in the closed loop

53. If the current in the series R–L circuit is given as $i = i_0 \sin\omega t$, the applied voltage can be given as



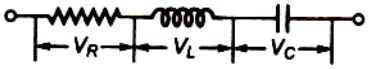
(A) $V = V_0 \sin\left(\omega t - \frac{\pi}{2}\right)$
(B) $V = V_0 \sin(\omega t + \phi); \phi < 90^0$
(C) $V = V_0 \sin(\omega t - \phi); \phi < 90^0$
(D) $V = V_0 \sin(\phi - \omega t); \phi < 90^0$

54. In the given R–C circuit, if the voltage across the resistor is 80 volt, the capacitance is :



(A) 0.53 μF (B) 5.3 μF
(C) 53 μF (D) None of these

55. At resonance in seris R–L– C circuit



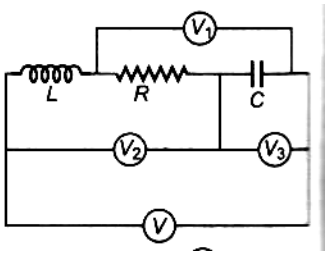
(A) $V_R + V_L + V_C = 0$ (B) $V_R + V_L = 0$
(C) $V_L + V_C = 0$ (D) $V_R + V_C = 0$

56. A coil of inductance 20 mH and resistance 2Ω is connected to a source of voltage 2 V. The current reaches half of its steady state value in

(A) 0.15 s (B) 0.05 s (C) 0.3 s (D) 0.1 s

Space for rough work

57. The voltmeter readings between R–C, R–L, C and R–L–C are V_1, V_2, V_3 and V respectively. Then $V^2 =$



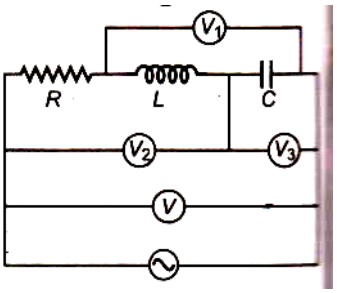
(A) $\sqrt{V_1^2 + V_2^2 - V_3^2}$

(B) $V_2 + V_3$

(C) $\sqrt{(V_2 - V_1)^2 (V_3 - V_1)^2}$

(D) None of these

58. At resonance of the given series R–L–C circuit



(A) $V^3 = |V_1 - V_2|^2 + V_3^2$ (B) $V_3 = 0$

(C) $V_1 = 0$ (D) $V_2 = 0$

59. If $i_1 = i_{0_1} \sin(\omega t + \phi_1), i_2 = i_{0_2} \sin(\omega t + \phi_2)$, then $i_3 =$

(A) $\sqrt{i_{0_1}^2 + i_{0_2}^2} \sin\{(\phi_1 - \phi_2) + \omega t\}$

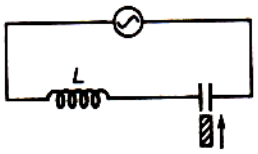
(B) $(i_{0_1} + i_{02}) \sin\left(\frac{\phi_1 + \phi_2}{2} + \omega t\right)$

(C) $\sqrt{i_{0_1}^2 + i_{0_2}^2 + 2 i_{0_1} i_{0_2} \cos(\phi_1 - \phi_2)} \sin\{(\phi_1 - \phi_2) + \omega t\}$

(D) None of the above

Space for rough work

60. The resonant frequency of the L–C circuit is f_0 before insertion of the dielectric of $\varepsilon_r = 4$. After inserting the dielectric, The resonant frequency will be



(A) $\frac{f_0}{2}$ (B) $2f_0$

(C) $\frac{f_0}{4}$ (D) None of these

61. When –vely charged colloid like As_2S_3 solution is added to +vely charged $Fe(OH)_3$ solution in suitable amounts
(A) Both the sol are precipitated simultaneously
(B) This process is called gold number
(C) They becomes +vely charged colloid
(D) They becomes –vely charged colloid

62. Which of the following statement(s) is/are correct?
(A) Higher the gold number, more protective power of colloid
(B) Lower the gold number, less the protective power
(C) Higher the coagulation value, more the coagulation power
(D) Lower the coagulation value, higher the coagulation power

63. Coagulation of colloidal solution takes place
(A) By the action of atmospheric oxygen (B) By the use of electrolyte
(C) By allowing it to stand for some time (D) by filtration

64. Gelatin is often used as an ingredient in the manufacture of ice cream. The reason is
(A) To prevent the formation of a colloid
(B) To stabilize the colloid and prevent crystal growth
(C) To cause the mixture solidifies
(D) To improve flavour

65. Lyophilic sols are more stable than lyophobic sols because
(A) The colloidal particles have positive charge
(B) The colloidal aprticles have no charge
(C) The colloidal particles are solvated
(D) There are strong electrostatic repulsions between the negatively charged colloidal particles

Space for rough work

66. Which of the following has maximum flocculation value for $Fe(OH)_3$ sol ?

(A) PO_4^{3-} P (B) SO_4^{2-} (C) $\left[Fe(CN)_6\right]^{4-}$ (D) Cl^-

67. Freundlich gave the following data for the adsorption of acetic acid on blood charcoal

C	0.0181	0.0616	0.2677	0.8817	2.785
x/m	0.457	0.801	1.55	2.84	3.76

The value of 'n' for the adsorption is

(A) 2.66 (B) 2.35 (C) 2.89 (D) 1.46

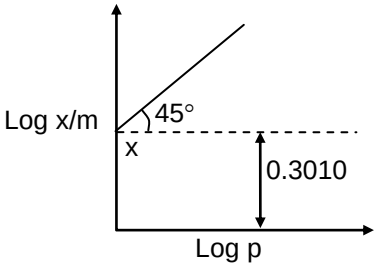
68. The gold numbers of A, B, C and D are 0.04, 0.002, 10, and 25 respectively. The protective power of A, B, C, and D are

(A) B > A > C > D (B) A > B > C > D (C) D > B > A > C (D) B > A > D > C

69. Which of the following is correct ?

(A) Adsorption is an endothermic process
(B) Adsorption is an exothermic process
(C) Adsorption takes place with increase in free energy
(D) Physical adsorption decreases with increase in pressure.

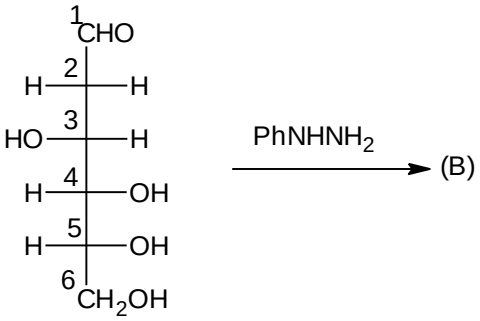
70. A graph of log(x/m) Vs logP is plotted as shown below. What will be the vaue of x/m when pressure is 0.4 atm ?



(A) 0.2 (B) 0.4 (C) 0.6 (D) 0.8

Space for rough work

71. Compound (B) is :



D-2-Deoxy glucose

(A)

(A) Phenylhydrazone of (A) (B) Osazone (A)
(C) Both (D) None

72. The colloidal particles can pass
(A) through filter paper as well as animal membrane
(B) through animal membrane but not through filter paper
(C) through filter paper but not through animal membrane
(D) neither through filter paper nor through animal membrane.

73. The minimum concentration of an electrolyte which is able to cause coagulation of a sol is termed as its
(A) emulsification value (B) saponification value (C) flocculation value (D) gold number.

74. Which of the following is a hydrophilic colloidal sol ?
(A) Barium sulphate solution (B) Arsenius sulphide solution
(C) Starch sol (D) Silver iodide sol.

75. Which is the characterstic of a catalyst ?
(A) it changes the equilibrium point (B) it initiates the reaction
(C) it alters the rate of reaction (D) it increases average K.E. of molecules

76. The colloidal sols are purified by
(A) peptization (B) coagulation (C) dialysis (D) flocculation

Space for rough work

77. If the disperse phase and the dispersion medium both are liquid, the colloidal solution is classified as
(A) emulsion (B) foam (C) gel (D) supercooled liquid

78. Which of the following carbohydrates cannot be directly utilized by the human body as a source of energy :
(A) Glucose (B) Sucrose (C) Glycogen (D) Cellulose

79. Lactose is made up of
(A) Galactose unit and glucose unit (B) Glucose and fructose
(C) Both Glucose units (D) Glucose and mannose units

80. Which of the following statements is incorrect ?
(A) α–D–Glucose and β–D–Glucose are enantiomers
(B) D–Glyceraldehyde and L–Glyceraldehyde are epimers
(C) The reserve carbohydrate of animals is glycogen
(D) Few aldohexoses which react with phenyl hydrazine to give identical osazones and epimers

81. Which of the following is least related to the other three ?
(A) Galactose (B) Glucose (C) Mannose (D) Arabinose

82. α–D–glucose and β–D–glucose differ from each other due to the difference in one of the carbons with respect to its :
(A) configuration (B) number of –OH groups
(C) conformation (D) size of hemiacetal ring

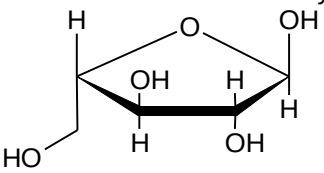
83. Complete hydrolysis of cellulose gives :
(A) D–fructose (B) D–ribose (C) D–glucose (D) L–glucose

84. The term anomers of glucose refers to :
(A) isomers of glucose that differs in configuration at carbons one and four (C–1 and C–(4)
(B) a mixture of (D–) glucose and (L–) glucose
(C) enantiomers of glucose
(D) isomers of glucose that differ in configuration at carbon one (C–(1)

Space for rough work

85. Which of the following hexoses will form the same osazone when treated with excess of phenyl hydrazine ?
(A) D–glucose, D–fructose and D–galactose (B) D–glucose, D–fructose and D–mannose
(C) D–glucose, D–mannose and D–galactose (D) D–fructose, D–mannose and D–galactose

86. Which set of terms correctly identifies the carbohydrate shown ?



1. Pentose 2. Hexose 3. Aldose 4. Ketose
5. Pyranose 6. Furanose
(A) 1, 3 and 6 (B) 1, 3 and 5 (C) 2, 3 and 5 (D) 2, 3 and 6

87. Which of the following is a reducing sugar?
(A) Glucose (B) Fructose (C) Maltose (D) All

88. When an aqueous solution of D-glucose is treated with a base, it is converted into D-fructose and D-mannose, this conversion (isomerisation) involves
(A) enolization (B) tautomerization (C) both (a) and (b) (D) none of the two

89. Glucose does not react with :
(A) NH_2OH (B) HCN (C) $NaHSO_3$ (D) Br_2/H_2O

90. $\underset{\substack{(A)\\(\text{Carbohydrate})}}{C_6H_{12}O_6} \xrightarrow{Br_2/H_2O} \underset{(B)}{C_6H_{12}O_7} \xrightarrow{LiAlH_4} (C)$. C in the above series is
(A) Acid (B) Alcohol (C) Alkane (D) Aldehyde

Space for rough work

FIITJEE PET – VIII (CHAMPIONS_2ND YEAR)

MAINS_ANSWERS

DATE: 18.08.2018

MATHEMATICS

1.	**A**	2.	**B**	3.	**B**	4.	**B**
5.	**D**	6.	**A**	7.	**B**	8.	**C**
9.	**B**	10.	**A**	11.	**B**	12.	**B**
13.	**B**	14.	**B**	15.	**Bonus**	16.	**D**
17.	**B**	18.	**C**	19.	**C**	20.	**B**
21.	**B**	22.	**A**	23.	**D**	24.	**B**
25.	**A**	26.	**C**	27.	**Bonus**	28.	**A**
29.	**B**	30.	**A**				

PHYSICS

31.	**A**	32.	**B**	33.	**C**	34.	**C**
35.	**D**	36.	**D**	37.	**A**	38.	**C**
39.	**D**	40.	**A**	41.	**B**	42.	**C**
43.	**B**	44.	**D**	45.	**A**	46.	**Bonus**
47.	**A or D**	48.	**Bonus**	49.	**A**	50.	**D**
51.	**B**	52.	**D**	53.	**B**	54.	**D**
55.	**C**	56.	**Bonus**	57.	**D**	58.	**C**
59.	**D**	60.	**A**				

CHEMISTRY

61.	**A**	62.	**D**	63.	**B**	64.	**B**
65.	**C**	66.	**D**	67.	**B**	68.	**A**
69.	**B**	70.	**D**	71.	**A**	72.	**C**
73.	**C**	74.	**C**	75.	**C**	76.	**C**
77.	**A**	78.	**D**	79.	**A**	80.	**A**
81.	**D**	82.	**A**	83.	**C**	84.	**D**
85.	**B**	86.	**A**	87.	**D**	88.	**C**
89.	**C**	90.	**B**				