

Max. Marks: 300

Date: 22.10.2022

ABHIMANYU BATCH PHYSICS : PART TEST SET-A Topic: FLT

1.	A poir	The image will form										
	at											
	(a)	infinity			(b)	pole						
	(c)	focus			(d)	15 cm behind the n	nirror					
2.	The in	nage formed by a co	onvex m	irror of focal length 3	0 cm is	a quarter of the size	of the ol	oject. The distance of				
	the ob	ject from the mirror	is									
	(a)	30 cm	(b)	90 cm	(c)	120 cm	(d)	60 cm				
3.	Object	t is placed 15 cm fro	om a con	cave mirror of focal l	ength 10) cm, then the nature	of imag	e formed will be				
	(a)	magnified and inv	reted		(b)	magnified and erec	t					
	(c)	small in size and i	nverted		(d)	small in size and en	rect					
4.	Two t	hin lenses, one of	focal le	ngth +60 cm and the	e other o	of focal length - 20	cm are	put in contact. The				
	combi	ned focal length is										
	(a)	+ 15 cm	(b)	– 15 cm	(c)	+ 30 cm	(d)	– 30 cm				
5.	Two s	imilar plano-convex	k lenses	are combined togethe	er in thre	ee different ways as a	shown ir	the adjoining figure.				
	The ratio of the focal lengths in three cases will be											
	The ratio of the focal lengths in three cases will be $\left(\begin{array}{c} \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\$											
	(a)	2:2:1	(b)	1:1:1	(c)	1:2:2	(d)	2:1:1				



- 6. A is an essential condition for coherent sources. Here, A refers to
 - (a) constant phase difference (b) equal amplitude
 - (c) Both (a) and (b) are correct (d) Both (a) and (b) are incorrect
- 7. Two periodic waves of intensities l_1 and l_2 pass through a region at the same time in the same direction. The sum of the maximum and minimum intensities is

(a)
$$l_1 + l_2$$
 (b) $(\sqrt{l_1} + \sqrt{l_2})^2$ (c) $(\sqrt{l_1} - \sqrt{l_2})^2$ (d) $2(l_1 + l_2)$

- 8. Interference was observed in interference chamber when air was present, now the chamber is evacuated and if, the same light is used, a careful observer will see
 - (a) interference in which width of the fringe will be slightly increased
 - (b) interference with bright bond
 - (c) interference with dark bond
 - (d) All of the above
- 9. Two coherent waves are represent by $y_1 = a_1 \cos \omega t$ and $y_2 = a_2 \sin \omega t$, superimposed on each other. The resultant intensity is proportional to
 - (a) (a_1+a_2) (b) (a_1-a_2) (c) $(a_1^2+a_2^2)$ (d) $(a_1^2-a_2^2)$
- 10. In the setup shown in figure, the two slits, S_1 and S_2 are not equidistant from the slit S. The central fringe at O is, then



- (a) always bright
- (b) always dark
- (c) either dark or bright depending on the position of
- (d) neither dark nor bright



- 11. In double slit experiment, the angular width of the fringes is 0.20° for the sodium light ($\lambda = 5890$ Å). In order to increase the angular width of the fringes by 10%, the necessary change in wavelength is
 - (a) zero (b) increased by 6479 Å
 - (c) decreased by 589 Å (d) increased by 589 Å
- 12. In a double slit interference experiment, the fringe width obtained with a light of wavelength 5900 Å was 12 mm for parallel narrow slits placed 2 mm apart. In this arrangement, if the slit separation is increased by one-and-half times the previous value, then the fringe width is
 - (a) 0.9 mm (b) 0.8 mm (c) 1.8 mm (d) 1.6 mm

13. In Young's double slit experiment, the seventh maximum with wavelength λ_1 is at a distance d_1 and the same maximum with wavelength λ_2 is at a distance d_2 . Then, d_1/d_2 is equal to

- (a) $\frac{\lambda_1}{\lambda_2}$ (b) $\frac{\lambda_2}{\lambda_1}$ (c) $\frac{\lambda_1^2}{\lambda_2^2}$ (d) $\frac{\lambda_2^2}{\lambda_1^2}$
- 14. In Young's double slit experiment, the intensity on screen at a point where path difference is $\lambda / 4$?
 - (a) K4 (b) K/2 (c) K (d) Zero
- 15. In a Young's double slit experiment, the source is white light. One of the holes is covered by a red filter and another by a blue filter. In this case
 - (a) there should be no interference fringe
 - (b) there should be an interference pattern for red mixing with one for blue
 - (c) there should be alternate interference pattern for red mixing with one for blue
 - (d) None of the above
- 16. The angular width of the central maximum of the diffraction pattern in a single slit (of width a) experiment, with λ as the wavelength of light, is

(a)
$$\frac{3\lambda}{2a}$$
 (b) $\frac{\lambda}{2a}$ (c) $\frac{2\lambda}{a}$ (d) $\frac{\lambda}{a}$



- 17. A parallel monochromatic beam of light is incident normally on a narrow slit. A diffraction pattern is formed on a screen placed perpendicular to the direction pattern, the phase difference between the rays coming from the edges of the slit is
 - (a) 0 (b) $\frac{\pi}{2}$ (c) π (d) 2π
- 18. The source is at some distance from an obstacle. Distance between obstacle and the point of observation is b and wavelength of light is λ . Then the average distance of nth Fresnel zone will be at a distance ... from the point of observation
 - (a) $\frac{bn\lambda}{2}$ (b) $b \frac{n\lambda}{2}$ (c) $b + \frac{n\lambda}{2}$ (d) $b n\lambda$
- 19. When light is incident on a diffraction grating, then zero order principal maximum will be
 - (a) spectrum of the colours (b) white
 - (c) one of the component colours (d) absent
- 20. An object of uniform density is allowed to float in water kept in a beaker. The object has triangular cross-section as shown in the figure. If the water pressure measured at the three points A, B and C below the object are p_x , p_y and p_z respectively. Then



(a) $p_x > p_y > p_z$ (b) $p_x > p_z < p_z$ (c) $p_x = p_y = p_z$ (d) $p_x = p_y < p_z$ In the given figure the velocity y will be

21. In the given figure, the velocity v_1 will be



Space for Rough Work



- 22. An ideal fluid flows through two pipes of circular cross-section with diameters 2.5 cm and 3.75 cm connected one after another. The ratio of the velocities in the two pipes is
 - $\sqrt{2}:\sqrt{3}$ $\sqrt{3}:\sqrt{2}$ 3:4 (b) (c) (d) (a) 3:2

Water is in streamline flows along a horizontal pipe with non-uniform cross-section. At a point in the pipe where 23. the area of cross-section is 10 cm⁻¹, the velocity of water is 1 ms⁻¹ and the pressure is 2000 Pa. The pressure at another point where the cross-section area is 5 cm^2 is

4000 Pa 1000 Pa 500 Pa (a) (b) 2000 Pa (c) (d)

There are two holes O₁ and O₂ in a tank of height H. The water emerging from O₁ and O₂ strikes the ground at the 24. same points, as shown in figure. Then



- 25.
 - remains unchanged (a)
 - (b) decreases
 - (c) increases
 - increases or decreases depending on the external pressure (d)



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ABHIMANYU BATCH CHEMISTRY : PART TEST SET-A Topic: FLT

26. The number of organic products (oxime) is:

	$H_{3}C$ H $C = O + H_{2}N$ $pH = 3.5 - 4.5$ $H_{2}O$										
	(a)	1	(b)	2	(c)	3	(d)	4			
27.	Amon	g the following, the	essentia	l amino acid is:							
	(2)	Alanina	(b)	Valina	(c)	Aspartic acid	(d)	Sarina			
78	(a) During	Addition of benzer	(U)	value	(C)	Aspartic acid	(u)	Serme			
20.	(a)	an acid	(b)	a basa	(a)	cotolyst	(d)	raducing agont			
7 0	(a) Which	an actu			(C)	catalyst	(u)	reducing agent			
29.	(a)	A mulanastin				Storeh	(4)	Amulaca			
20	(a)	Amylopectin	(0)	Glycogen			(u)	Amylose			
30.	0.12 g	of an organic com	pouna g	gave 0.22 g of Mg ₂	P_2O_7 byus	ual analysis. The per	centage	of phosphorus in the			
	compo	oundis	<i>a</i> .		<i>.</i>						
	(a)	15.23	(b)	38.75	(c)	51.20	(d)	60.92			
31.	The IU	JPAC name of C_2H_5	5 – 0 – 0	$CH(CH_3)_2$							
	(a)	1-Ethoxy propane	¢		(b)	1, 1-dimethyl ether					
	(c)	2-Ethoxy isopropa	ane		(d)	2–Ethoxy propane					
32.	Identif	y the product D in t	the follo	wing series of react	ion						
	CH ₃ C	$OOH \xrightarrow{\text{LiAlH}_4} \rightarrow$	• A	$\xrightarrow{H^+} B \xrightarrow{Br_2} $	C — Nal	$\xrightarrow{\mathrm{NH}_2} \mathrm{D}$					
	(a)	Methane	(b)	Alcohol	(c)	Acetylene	(d)	Benzaldehyde			
33.	Amon	g the following sets	of react	ions which one prod	ducesaniso	ole ?					
	(a)	C ₆ H ₅ OH ; neutral	FeCl ₃		(b)	C ₆ H ₅ CH ₃ ; CH ₃ CO	CI / AIC	l ₃			
	(c)	CH ₃ CHO ; RMgX	K		(d)	C ₆ H ₅ OH ; NaOH ; O	CH ₃ Cl				
				Space for R	ough Woi	r <u>k</u>					



34. Select the molecule which has only one π -bond

(a)
$$CH \equiv CH$$

- (c) $CH_3CH = CH_2$
- 35. CH₃COCH, can be obtained by
 - (a) Heating acetaldehyde with methanol
 - (c) Oxidation of isopropyl alcohol
- 36. Molecular formula of amyl alcohol is

(a)
$$C_7H_{14}O$$
 (b) $C_6H_{13}O$

37. Write the products of the addition reaction

- (b) $CH_2 = CHCHO$
- (d) $CH_3CH = CHCOOH$
- (b) Oxidation of n-propyl alcohol
- (d) Reduction of propionic acid

(c) $C_5H_{12}O$ (d) $C_5H_{10}O$





42. Glycerol is extracted from spent soap lye by using										
	(a)	Simple distillation	l		(b)	Sublimation				
	(c)	Distillation under	reduced	pressure	(d)	Paper chromatograp	ohy			
43.	The he	ating of phenylmeth	yl ether	with HI produces						
	(a)	iodobenzene	(b)	phenol	(c)	benzene	(d)	ethyl chloride		
44.	The sy	nthesis of ethene fro	om elect	rolysis of an aqueous	solution	of potassium succina	te is kno	own as		
	(a)	Faraday's electroly	sis		(b)	Kolbe - Schmidt rea	action			
	(c)	Hoffmann's rearra	ngemen	t	(d)	Kolbe's electrolytic	synthesi	is		
45.	Coupli	ng reaction is given	by							
	(a)	Nitrobenzene			(b)	aniline				
	(c)	Benzenediazoniun	n chloric	le	(d)	Both 2 and 3				
46.	Acidic	nature of alcohols i	s in the	order :						
	(a)	$1^{\circ} > 2^{\circ} > 3^{\circ}$	(b)	$3^{\circ} > 2^{\circ} > 1^{\circ}$	(c)	$2^{\circ} > 3^{\circ} > 2^{\circ}$	(d)	$2^{\circ} > 1^{\circ} > 3^{\circ}$		
47.	One lit	re oxygen gas at ST	'P will w	veigh						
	(a)	1.43 g	(b)	2.24 g	(c)	11.2 g	(d)	22.4 g		
48.	CHCl ₃	on reaction with ac	etone gi	ves a compound used	as					
	(a)	Tear gas	(b)	Hypnotic	(c)	Pesticide	(d)	Anaesthetic		
49.	Aniline	e on treatment with	excess c	of bromine water give	S					
	(a)	Aniline bromide			(b)	o-bromoaniline				
	(c)	p-bromoaniline			(d)	2,4,6-tribromoanilii	ne			
50.	Which	one of the followin	g class o	of compounds is obtai	ned byp	olymerization of acet	ylene?			
	(a)	Poly-ene	(b)	Poly-amide	(c)	Poly-yne	(d)	Poly-ester		



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ABHIMANYU BATCH MATHEMATICS : PART TEST SET-A Topic: FLT

If $f(x) = \begin{vmatrix} 1 & x & x+1 \\ 2x & x(x-1) & (x+1)x \\ 3x(x-1) & x(x-1)(x-2) & x(x-1)(x+1) \end{vmatrix}$ then $f(0) + f(1) + f(2) + \dots + f(2021) = \dots$ 51. 2021 (b) 1 (c) 4041 (d) 0 (a) 52. The domain of the function $f(x) = \sqrt{\frac{1-|x|}{|x|-3}}$ is (a) (-3, 3) (b) $(-3, 3) - \{1\}$ (c) $(-3, 3) - \{0\}$ (d) $(-3, 3) - \{0, 1\}$ $\lim_{x \to \infty} \frac{(x+1)^{20} + (x+2)^{20} + (x+3)^{20} + \dots + (x+1000)^{20}}{(6x-5)^{30}} = \dots$ 53. 1000^{2} 1000 ! (b) 1000 (d) (a) (c) 9991 If β is the repeated root of the equation $ax^2 + bx + c = 0$, then 54. $\lim_{x\to\beta}\frac{\sin(ax^2+bx+c)}{(x-\beta)^2}=\dots$

(a) β (b) $\alpha - \beta$ (c) α (d) a + b + c



55. If
$$f(x) = \begin{cases} \frac{\log x - \log 2}{x - 2} + a & , x > 2 \\ 1 & , x = 2 \\ \frac{1 - \cos 3(x - 2)}{(x - 2)^2} + 2b & , x < 2 \end{cases}$$

is continuous at $x = 2$, then $a - 2b$ is
(a) 1 (b) 2 (c) 3 (d) 4
56. If $f(x) = \begin{cases} \frac{4^{x - \pi} + 4^{\pi - x} - 2}{(x - \pi)^2} & , \text{ for } x \neq \pi \\ k & , \text{ for } x = \pi \end{cases}$
is continuous at $x = \pi$, then $k =$
(a) $4 (\log 2)^2$ (b) $8 (\log 2)^2$ (c) $(\log 2)^2$ (d) $2 \log 2$
57. If $y = \frac{\cos x}{1 + \frac{\sin x}{1 + \frac{\cos x}{1 + 2y + \sin x - \cos x}}}$, then $\frac{dy}{dx} =$
(a) $\frac{y \cos x + y \sin x + \cos x}{1 + 2y + \sin x - \cos x}$ (b) $\frac{y \cos x - y \sin x - \sin x}{1 + 2y + \sin x - \cos x}$
(c) $\frac{y \cos x + y \sin x - \sin x}{1 + 2y + \sin x - \cos x}$ (d) $\frac{y \cos x - y \sin x + \sin x}{1 + 2y + \sin x - \cos x}$
58. Derivative of $\tan^{-1}\left[\frac{3x - x^3}{1 - 3x^2}\right]$ with respect to $\tan^{-1}\left(\frac{2x}{1 - x^2}\right)$; $x \in \left(-\frac{1}{\sqrt{3}}, \frac{1}{\sqrt{3}}\right)$ is
(a) $\frac{2}{3}$ (b) $\frac{3}{2}$ (c) 1 (d) -1
Space for Rough Work



59. If
$$f(x) = \frac{|x|}{x}$$
; for $x \neq 0$

$$= 1$$
; for x = 0

then the functions \dots

- (a) continuous and differentiable at x = 0
- (b) neither continuous nor differentiable at x = 0
- (c) continuous but not differentiable at x = 0
- (d) differentiable but not continuous at x = 0

60. If
$$y = \tan^{-1} \left[\frac{\log(e / x^2)}{\log(ex^2)} \right] + \tan^{-1} \left[\frac{3 + 2\log x}{1 - 6\log x} \right]$$
, then $\frac{d^2 y}{dx^2} = \dots$
(a) 1 (b) 0 (c) $\frac{2}{1 + x^2}$ (d) $\frac{1}{1 + x^2}$

- 61. A ladder 15 meter long is leaning against a vertical wall. If the bottom of the ladder is pulled out the ground away from the wall at the rate of 3 m/sec. Then the rate at which height on the wall decreases when the foot of ladder is 12 meter away from the wall is
 - (a) 12 m/sec (b) 24 m/sec (c) 36 m/sec (d) 48 m/sec

62. An open box is to be cutout of piece of square card board at side 24 cm by cutting of equal square from the corners and turning up the sides, then the maximum volume of the box is

(a) 512 cm^3 (b) 1024 cm^3 (c) 2048 cm^3 (d) 256 cm^3

63. If
$$\int \sec(x^{101}) \cdot x^{100} \, dx = \frac{1}{101} \log |f(x)| + c$$
, then $f(x) = \dots$
(a) $\cot\left(\frac{\pi}{4} + \frac{x^{101}}{2}\right)$ (b) $\sec\left(\frac{\pi}{4} + \frac{x^{101}}{2}\right)$ (c) $\tan\left(\frac{\pi}{4} + \frac{x^{101}}{2}\right)$ (d) $\frac{\pi}{4} + \frac{x^{101}}{2}$



64. If
$$\int \tan^{-1} \sqrt{x} \, dx = P(x) \tan^{-1} \sqrt{x} - Q(x) + c$$
, then $P(x) - [Q(x)]^2 = \dots$
(a) 0 (b) 1 (c) -1 (d) $2x + 1$
65. If $\int \frac{\cos x}{(1 + \sin x)(2 + \sin x)(3 + \sin x)} \, dx$
 $= p \log \left| \frac{(1 + \sin x)(2 + \sin x)(3 + \sin x)}{(2 + \sin x)^2} \right| + c$,
then $p = \dots$
(a) 3 (b) $-\frac{1}{2}$ (c) 2 (d) $\frac{1}{2}$
66. If $\int_{\pi/4}^{\pi/2} \cos 2x \cdot \log \sin x \, dx = A \log 2 - \frac{\pi}{8} + B$, then $A + B = \dots$
(a) 0 (b) $\frac{1}{2}$ (c) 2 (d) 1
67. $\int_{0}^{\pi/4} \sec x \log (\sec x + \tan x)dx = \dots$
(a) $[\log(\sqrt{2} - 1)]^2$ (b) $[\log(\sqrt{2} + 1)]^2$ (c) $\frac{[\log(1 + \sqrt{2})]^2}{2}$ (d) $\frac{[\log(\sqrt{2} - 1)]^2}{2}$
68. The area of the region common to the circle $x^2 + y^2 = 9$ and the parabola $y^2 = 8x$ is \dots sq. units.
(a) $\frac{\sqrt{2}}{3} + \frac{9}{2} \sin^{-1}(\frac{2}{3})$ (b) 8
(c) $\frac{\sqrt{2}}{3} + \frac{9}{2} \sin^{-1}(\frac{2\sqrt{2}}{3})$ (d) 4



69.	The common area between the circle $x^2 + y^2 = 16$ and $x + y \le 4$ is A(3 π + B), then the value of A + B is									
	(a)	6	(b)	2	(c)	-2	(d)	-6		
70.	If the	differential equation	n of the	equation $y = a + be$	$e^{5x} + ce^{5x}$	$^{-7x}$ is Ay''' + By'' +	- Cy´ =	0, then the value of		
	A + B	+ C is								
	(a)	32	(b)	-11	(c)	-32	(d)	2		
71.	The ge	neral solution of $\frac{dy}{dx}$	$\frac{y}{x} = x\sqrt{1}$	$\overline{00-x^2}$ is						
	(a)	$3y = c + (100 - x^2)$) ^{3/2}		(b)	$3y = c - (100 + x^2)^{3}$	/2			
	(c)	3y = c + (x - 100)	3/2		(d)	$3y = c - (100 + x^2)^{3}$	/2			
72.	The ge	neral solution of								
	xy co	$s\left(\frac{y}{x}\right) + y^2 \sin\left(\frac{y}{x}\right)$	$\left(\int dx \right) = \int dx + \int dx$	$\left[x^2\cos\left(\frac{y}{x}\right) - xy\sin\left(\frac{y}{x}\right)\right]$	$\left(\frac{y}{x}\right)$	dy = 0				
	is xy . :	p(x) = c, then $p(x) =$	=	<i>.</i>				<i>.</i>		
	(a)	$\cos\left(\frac{x}{y}\right)$	(b)	$\cos\left(\frac{y}{x}\right)$	(c)	$\sin\left(\frac{x}{y}\right)$	(d)	$\sin\left(\frac{y}{x}\right)$		
73.	Water	flows from the base	e of recta	angular tank of depth	16 mete	r. The rate of flowin	g the wa	ter is proportional to		
	the squ	are root of depth at	any tim	e t. If depth is 4 m w	hen $t = 2$	2 hours, then after 3.5	hours th	ne depth is		
	(a)	0 m	(b)	0.25 m	(c)	0.5 m	(d)	3 m		
74.	The eq of a po	uation of the curve int on the curve and	passing I the tan	through (2, 5) and ha gent at the point 5 sq.	ving the units is	area of triangle form	ed by the	e X-axis. the ordinate		
	(a)	xy = 10	(b)	$x^2 = 10y$	(c)	$y^2 = 10x$	(d)	$xy^{1/2} = 10$		
75.	Accord	ling to Newton's la	w of co	oling, the body at ter	nperatur	re 100° C cools in 10	minute	s to 88° C in a room		
	temper	ature 25° C. After 2	20 minu	tes, the temperature o	f a body	is approximately				
	(a)	78° C	(b)	87° C	(c)	77° C	(d)	52° C		





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1.	(d)	2.	(b)	3.	(a)	4.	(d)	5.	(b)
6.	(a)	7.	(d)	8.	(a)	9.	(c)	10.	(c)
11.	(d)	12.	(b)	13.	(a)	14.	(b)	15.	(a)
16.	(c)	17.	(d)	18.	(c)	19.	(b)	20.	(c)
21.	(c)	22.	(a)	23.	(d)	24.	(a)	25.	(b)

CHEMISTRY : PART TEST SET-A ANSWER KEY Topic: FLT

26.	(b)	27.	(b)	28.	(b)	29.	(d)	30.	(c)
31.	(d)	32.	(c)	33.	(d)	34.	(c)	35.	(c)
36.	(c)	37.	(a)	38.	(d)	39.	(c)	40.	(a)
41.	(d)	42.	(c)	43.	(b)	44.	(d)	45.	(d)
46.	(a)	47.	(a)	48.	(b)	49.	(d)	50.	(a)

MATHEMATICS : PART TEST SET-A ANSWER KEY Topic: FLT

51.	(d)	52.	(d)	53.	(b)	54.	(c)	55.	(d)
56.	(a)	57.	(b)	58.	(a)	59.	(b)	60.	(b)
61.	(c)	62.	(b)	63.	(c)	64.	(b)	65.	(d)
66.	(b)	67.	(c)	68.	(c)	69.	(a)	70.	(c)
71.	(b)	72.	(b)	73.	(b)	74.	(a)	75.	(a)