

# ABHIMANYU BATCH PHYSICS : DCT Topic: Electro Magnetic Induction

Date: 20.08.2022

1.	A circu	ılar disc of radius 0	0.2 m is j	placed in a uniform m	nagnetic	field of induction $\left(\frac{1}{7}\right)$	$\left(\frac{l}{\tau}\right)$ Wb m	n <sup>-2</sup> in such a way that
	its axis	makes an angle of	60° with	$\vec{B}$ . The magnetic fl	ux linke	d with the disc is		
	(a)	0.02 Wb	(b)	0.06 Wb	(c)	0.08 Wb	(d)	0.01 Wb
2.	Farada	y's laws are conseq	uence of	f the conservation of				
	(a)	charge	(b)	energy	(c)	magnetic field	(d)	Both (b) and (c)
3.	Two ic	lentical coaxial coi	ls P and	Q carrying equal an	nount of	current in the same	direction	n are brought nearer.
	The cu	rrent in						
	(a)	P increases while	on Q de	creases	(b)	Q increases while in	n P decre	eases
	(c)	both P and Q incre	eases		(d)	both P and Q decrea	ases	
4.	As a re	esult of change in th	ne magn	etic flux linked to the	closed	loop shown in figure	, an emf	, V volt is induced in
	the loo	p. The work done (	(in joule)	) in taking a charge q	coulom	o once along the loop	is	
	(a)	qV	(b)	zero	(c)	2qV	(d)	$\frac{\mathrm{qV}}{\mathrm{2}}$



- A coil of area 0.4 m<sup>2</sup> has 100 turns. A magnetic field of 0.04 Wb m<sup>-2</sup> is acting normal to the coil surface. If this magnetic field is reduced to zero in 0.01 s, then the induced emf in the coil is
  (a) 160 V
  (b) 250 V
  (c) 270 V
  (d) 320 V
- A coil of mean area 500 cm<sup>2</sup> and having 1000 turns is held perpendicular to a uniform field of 0.4 gauss. The coil is turned through 180° in 1/10 second. The average induced emf is
  (a) 0.02 V
  (b) 0.04 V
  (c) 1.4 V
  (d) 0.08 V
- 7. A long solenoid with 10 turns per cm has a small loop of area 3 cm<sup>2</sup> placed inside, normal to the axis of the solenoid. If the current carried by the solenoid changes steadily from 2A to 4A in 0.2 s, what is the induced voltage in the loop, while the current is changing?
  - (a)  $4.2 \times 10^{-8}$  V (b)  $2.8 \times 10^{-8}$  V (c)  $7.3 \times 10^{-6}$  V (d)  $3.8 \times 10^{-6}$  V
- 8. An air cored solenoid with length 20 cm, area of cross section 20 cm<sup>2</sup> and number of turns 400 carries a current 2 A. The current is suddenly switched off within 10<sup>-3</sup> s. The average back emf induced across the ends of the open switch in the circuit is (ignore the variation in magnetic field near the ends of the solenoid)
  (a) 2 V
  (b) 4 V
  (c) 3 V
  (d) 5 V
- 9. The magnetic flux through a coil perpendicular to its plane and directed into paper is varying according to the relation  $\phi = (2t^2 + 4t + 6)$  m Wb. the emf induced in the loop at t = 4s is
  - (a) 0.12 V (b) 2.4 V (c) 0.02 V (d) 1.2 V



10. A long solenoid S has n turns per metre, with diameter a. At the centre of this coil, we place a smaller coil of N turns and diameter b (b < a). If the current in the solenoid increases linearly with time, then the emf will be induced in the smaller coil. Which of the following is the correct graph showing  $|\varepsilon|$  verses t if current varies as a function of  $mt^2 + C$ ?



- 11. A conducting circular loop is placed in a uniform magnetic field, B = 0.025 T with its plane perpendicular to the loop. The radius of the loop is made to shrink at a constant rate of 1 mm s<sup>-1</sup>. The induced emf when the radius is 2 cm, is
  - (a)  $2\pi \mu V$  (b)  $\pi \mu V$  (c)  $\frac{\pi}{2} \mu V$  (d)  $2\mu V$





- 12. A circular coil of radius 8 cm, 400 turns and resistance 2  $\Omega$  is placed with its plane perpendicular to the horizontal component of the earth's magnetic field. It is rotated about its vertical diameter through 180° in 0.30 s. Horizontal component of earth magnetic field at the place is  $3 \times 10^{-5}$  T. The magnitude of current induced in the coil is approximately.
  - (a)  $4 \times 10^{-2} \, A$  (b)  $8 \times 10^{-4} \, A$  (c)  $8 \times 10^{-2} \, A$  (d)  $1.92 \times 10^{-3} \, A$
- 13. A square loop of side 12 cm and resistance 0.60 Ω is placed vertically in the east-west plane. A uniform magnetic field of 0.10 T is set up across the plane in north-east direction. The magnetic field is decreased to zero in 0.6 s at a steady rate. The magnitude of current during this time interval is
  (a) 1.42 × 10<sup>-3</sup> A
  (b) 2.67 × 10<sup>-3</sup> A
  (c) 3.41 × 10<sup>-3</sup> A
  (d) 4.21 × 10<sup>-3</sup> A
- 14. A rectangular coil of 100 turns and size  $0.1 \text{ m} \times 0.05 \text{ m}$  is placed perpendicular to a magnetic field of 0.1 T. If the field drops to 0.05 T in 0.05 second, the magnitude of the e.m.f. induced in the coil is (a) 2 (b) 3 (c) 0.5 (d) 6
- 15. A uniform magnetic field B points vertically up and is slowly changed in magnitude, but not in direction. The rate of change of the magnetic field is  $\alpha$ . A conducting ring of radius r and resistance R is held perpendicular to the magnetic field, and is totally inside it. The induced current in the ring is
  - (a) zero (b)  $\frac{2\pi rB}{R}$  (c)  $\frac{r\alpha}{R}$  (d)  $\frac{\pi r^2 \alpha}{R}$



# ABHIMANYU BATCH CHEMISTRY : DCT Topic: Alkyl halide

Date: 20.08.2022

16.	The ca	atalyst used in the p	oreparatio	on of an alkyl ch	loride by the a	action of dry HCl	on an alcoh	ol is	
	(a)	anhy. AlCl <sub>3</sub>	(b)	FeCl <sub>3</sub>	(c)	anhy. ZnCl <sub>2</sub>	(d)	Cu	
17.	Numb	per of monochloro d	lerivative	es obtained when	neo-pentane	is chlorinated.			
	(a)	One	(b)	Two	(c)	Three	(d)	Four	
18.	Which	n one of the followi	ng forms	s propane nitrile	as the major p	product?			
	(a)	Ethyl bromide +	Alc. KC	N	(b)	Propyl bromide	e + Alc. KC	N	
(c) Propyl bromide + Alc. AgCN						Ethyl bromide + Alc. AgCN			
19.	In the	following reaction	, RX + A	$\rightarrow$ RNC. The re	eactant 'A' is				
	(a)	AgCN	(b)	KCN	(c)	NaCN	(d)	HCN	
20.	In alk	aline hydrolysis of	a tertiai	ry alkyl halide b	y aqueous all	cali, if concentrat	tion of alka	li is doubled, then the	
	reaction	on rate at constant t	emperat	ure					
	(a)	will be doubled			(b)	will be halved			
	(c)	will become four	times gi	reater	(d)	will remain cor	istant		
21.	CH <sub>3</sub> C	$CH_2CH_2Br_{alcohol}$	→CH <sub>3</sub> CH	$I = CH_2$					
	The al	bove reaction is an	example	of	reaction.				
	(a)	substitution	(b)	elimination	(c)	addition	(d)	rearrangement	
22.	An eth	heral solution of alk	xyl halide	e is heated with s	odium metal.	The reaction is k	nown as		
	(a)	Frankland's reac	tion		(b)	Sandmeyer's re	eaction		
	(c)	Wurtz-Fitting rea	action		(d)	Wurtz reaction			
				Space fo	r Rough Woi	rk			

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23.	Which	Which of the following can give a Grignard reagent when reacted with magnesium in dry ether?										
	(a)	$C_2H_6$	(b)	$C_2H_5Cl$	(c)	C <sub>2</sub> H <sub>5</sub> OH	(d)	C <sub>2</sub> H <sub>5</sub> CN				
24.	The hyd	drolysis of optically	active 2	-bromobutane with a	queous l	NaOH result in the fo	rmation	of				
	(a)	(+) butan -2-ol	(b)	(-) butan -2-ol	(c)	$(\pm)$ butan -1-ol	(d)	(±) butan -2-ol				
25.	R – X -	+ NaI $\xrightarrow{\text{Acetone}, \Delta}$ R	– I + Naž	X								
	The for	ward reaction is fac	ilitated b	ру								
	(a)	precipitation of Na	Cl or Na	aBr	(b)	Le-Chatelier's pricip	ole					
	(c)	Bragg's law			(d)	Both (a) and (b)						
26.	Which	of the following rea	ction is	incorrect?								
	(a)	$Me_{3}CCl \xrightarrow{NH_{3}} N$	$Ie_3C - N$	H <sub>2</sub>	(b)	$Me_3CCl \longrightarrow Me_3$	$e_2 C = CH$	2				
	(c)	CH <sub>2</sub> CI -		CH2-NH2	(d)							
27.	In the r	eaction $C_2H_5OH + 2$	HX — Zn2	$\xrightarrow{X_2} C_2 H_5 X$ , the order	or of the	reactivity of HX is						
	(a)	HBr > HI < HCl	(b)	HI > HCl > HBr	(c)	HI > HBr > HCl	(d)	HCl > HBr > HI				
28.	The alk	yl halide that under	goes S <sub>N</sub>	l reaction more readi	ly is							
	(a)	ethyl bromide	(b)	iso-propyl bromide	(c)	vinyl bromide	(d)	tert-butyl bromide				
29.	Which	halide does not get	hydrolys	sed by sodium hydrox	kide?							
	(a)	Vinyl chloride	(b)	Methyl chloride	(c)	Ethyl chloride	(d)	Isopropyl chloride				
30.	When e	thyl iodide is heate	d with di	ry silver oxide, it forr	ns							
	(a)	ethyl alcohol	(b)	diethyl ether	(c)	silver chloride	(d)	ethyl methyl ether				





### ABHIMANYU BATCH MATHEMATICS : DCT Topics: Roll's Theorem and Lagrange's Mean Value Theorem (LMVT)

Date: 20.08.2022

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31.	The val	ue of c in Rolle's th	neorem f	for the function $f(x) =$	$x^2 - 4x$	+ 10 defined on [0, 4]	] is	
	(a)	10	(b)	3	(c)	2	(d)	1
32.	The val	ue of c in Rolle's th	neorem f	for the function $f(x) =$	$x^3 - 3x$	in $[0, \sqrt{3}]$ is		
	(a)	$\sqrt{3}$	(b)	$\frac{1}{\sqrt{3}}$	(c)	1	(d)	-1
33.	The val	ue of c in Rolle's th	neorem f	for $f(x) = 2x^3 - 5x^2 - 4$	4x + 3, in	n the interval $\left[\frac{1}{3},3\right]$	is	
	(a)	$\frac{2}{3}$	(b)	$-\frac{1}{3}$	(c)	-2	(d)	2
34.	If $f(x) =$	$= e^{-x} \sin x$ in $[0, \pi]$	, then c	is Rolle's theorem is .				
	(a)	$\frac{\pi}{4}$	(b)	$\frac{\pi}{3}$	(c)	$\frac{\pi}{6}$	(d)	$\frac{\pi}{2}$
35.	Given a	an internal [a, b] th	at satisf	ies hypothesis of Rol	le's theo	prem for the function	f(x) = x	$x^2 - 4x + 3$ . If $a = 1$ ,
	then b i	S						
	(a)	1	(b)	2	(c)	3	(d)	4
36.	If the fu	unction $f(x) = x(x - x)$	$(2)^2; 0 \leq$	$\leq x \leq 2$ , satisfies the o	condition	n of Rolle's theorem t	hen c =	
	(a)	$\frac{2}{3}$	(b)	2	(c)	1	(d)	$\frac{1}{3}$



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37.	If funct	ion $f(x) = e^x (\sin x)$	$x - \cos x$	) on $\left[-\frac{7\pi}{4},\frac{13\pi}{4}\right]$ s	atisfies t	he condition of Rolle	e's theor	rem, then sum of all
	possible	e c is						
	(a)	2π	(b)	3π	(c)	4 π	(d)	5 π
38.	If the fu	unction $f(x) = \sin 2x$	x – sin x	on [0, $\pi$ ] statistics th	e condit	ion of Rolle's theorem	n then tł	ne value of c is
	(a)	$\frac{\pi}{3}$	(b)	$\frac{2\pi}{3}$	(c)	0	(d)	$\frac{\pi}{4}$
39.	If the fu	unction $f(x) = x(x +$	3) $e^{-x/2}$ sa	atisfies all the conditi	ons of R	oll's theorem on [–3,	0] then	the value of c is
	(a)	-1	(b)	-2	(c)	0	(d)	-3
40.	If the fu	unction $f(x) = \log x$	on [1, e	] satisfies the condition	on of La	grange's mean value	theorem	n, then the value of c
	is							
	(a)	e – 1	(b)	$\frac{e+1}{2}$	(c)	$\frac{e-1}{2}$	(d)	$\frac{e}{2}$
41.	For the	function $f(x) = x +$	$\frac{1}{x}, x \in$	[1, 3], the value of c	for the L	agrange's mean valu	e theore	m is
	(a)	$\sqrt{3}$	(b)	$-\sqrt{3}$	(c)	2	(d)	$\sqrt{2}$
42.	If the fu	function $f(x) = \frac{x-1}{x-3}$	$\frac{1}{3}$ on [4, 1]	5] satisfies the Lagra	nge's me	ean value theorem, the	en the va	alue of c is
	(a)	$\sqrt{3} + 2$	(b)	$3 + \sqrt{2}$	(c)	$\sqrt{3} + \sqrt{2}$	(d)	$3 - \sqrt{2}$



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- 43. If the function  $f(x) = 2x x^2$ ,  $x \in [0, 1]$  satisfies the condition of Lagrange's mean value theorem, then the value of c is ....
  - (a)  $\frac{1}{2}$  (b)  $\frac{1}{3}$  (c)  $\frac{1}{4}$  (d)  $\frac{1}{8}$
- 44. The value of  $c^2$  in Lagrange's mean value theorem for the function  $f(x) = tan^{-1} x$  on [0, 1] is ...

(a) 
$$\frac{4}{\pi}$$
 (b)  $\frac{4}{\pi} - 1$  (c)  $\frac{4}{\pi} + \frac{1}{2}$  (d)  $\frac{\pi}{4}$ 

- 45. The value of c in Lagrange's mean value theorem, if all condition satisfied, for the function  $f(x) = x^{2/3}$  on [-2, 2] is ....
  - (a) 0 (b) 1 (c)  $\frac{3}{2}$  (d) does not exist



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# ABHMANYU BATCH PHYSICS : DCT ANSWER KEY Topic: Electro Magnetic Induction

1.	(a)	2.	(b)	3.	(d)	4.	(a)	5.	(a)
6.	(b)	7.	(d)	8.	(b)	9.	(c)	10.	(c)
11.	(b)	12.	(b)	13.	(b)	14.	(c)	15.	(d)

Max. Marks: 60

Date: 20.08.2022

# ABHIMANYU BATCH CHEMISTRY : DCT ANSWER KEY Topic: Alkyl halide

16.	(c)	17.	(a)	18.	(a)	19.	(a)	20.	(d)
21.	(b)	22.	(d)	23.	(b)	24.	(d)	25.	(d)
26.	(b)	27.	(c)	28.	(d)	29.	(a)	30.	(b)

Max. Marks : 60

Date: 20.08.2022

### ABHIMANYU BATCH MATHEMATICS : DCT ANSWER KEY Topics: Roll's Theorem and Lagrange's Mean Value Theorem (LMVT)

1.	(c)	2.	(b)	3.	(d)	4.	(a)	5.	(c)
6.	(a)	7.	(d)	8.	(c)	9.	(b)	10.	(a)
11.	(a)	12.	(b)	13.	(a)	14.	(b)	15.	(d)