Model Question [nET-2023]

Choose the one lettered choice that is best in each case and then fill in the corresponding circle in the answer sheet provided.

Each question carries equal mark.

Time: 2hrs

F.M. 1x100=100

MATHEMATICS

1) If $A \cap B = \phi$

A) $\bar{A} \subset B$

B) $\overline{B} \subset A$

C) $\bar{A} \cap \bar{B} = \phi$

D) $A \subset \overline{B}$

2) The inequality $2 \le x \le 4$ is same as

A) $|x-2| \le 1$

B) $|x-3| \le 1$

C) $|x-3| \le 2$

D) $|x - 3| \le 4$

3) If A = (-1, 3] and B = [0, 4), then A - B is

A) [-1, 0)

B) (-1, 0]

C) [-1, 0]

D) (-1, 0)

4) If $f^{-1}(x) = 2x - 1$, then f(x) is

A 2x + 1

B) $\frac{1}{2x-1}$

C) $\frac{x+1}{2}$

D) $\frac{x-1}{2}$

5) The value of $\log_{16} 64$ is

A) $\frac{3}{2}$

B) 2

C) 2

D) 3

6) The parabola $y = ax^2$ is wider than $y = x^2$ if

A) a < 1

B) |a| < 1

C) a > 1

D) |a| > 1

7) If the three positive numbers a, b, c are in AP, then

A) $b^2 = ac$

B) $b^2 < ac$

C) b = a + c

D) $b^2 > ac$

8) If |x| < 1 and $y = x + x^2 + x^3 + \dots$ to ∞ , then x is equal to

A) 1

B) $\frac{1}{1+x}$

C) $\frac{y}{1+y}$

D) <u>1+</u>

9) If A is a square matrix, then $A + A^{T}$ is a

A) diagonal matrix

B) scalar matrix

C) skew-symmetric matrix

D) symmetric matrix

The inverse of the matrix
$$\begin{pmatrix} 3 & -2 \\ 5 & 5 \end{pmatrix}$$
 is

A)
$$\frac{1}{5} \begin{pmatrix} 5 & 2 \\ -5 & 3 \end{pmatrix}$$

$$\begin{array}{cc} B) & \frac{1}{10} \begin{pmatrix} 5 & -2 \\ -5 & 3 \end{pmatrix} \end{array}$$

$$\begin{array}{ccc}
C) & \frac{1}{25} \begin{pmatrix} 5 & 2 \\ -5 & 3 \end{pmatrix}$$

D)
$$\frac{1}{15} \begin{pmatrix} 3 & -2 \\ 5 & 5 \end{pmatrix}$$

If
$$\begin{vmatrix} -4 & x-4 \\ -2 & x+1 \end{vmatrix} = 0$$
, then the value of x is

12) If
$$z = \frac{-1 + \sqrt{3}i}{2}$$
, then z^3 is equal to

$$C) -i$$

13) The multiplicative inverse of
$$3 - 2i$$
 is

A)
$$\frac{3}{13} + \frac{2}{13}i$$

B)
$$\frac{2}{13} + \frac{3}{13}i$$

C)
$$\frac{3}{13} - \frac{2}{13}i$$

D)
$$\frac{2}{13} - \frac{3}{13}i$$

14) The amplitude of the complex number
$$-\sqrt{3} - i$$
 is

A)
$$\frac{\pi}{6}$$

B)
$$\frac{2\pi}{3}$$

C)
$$\frac{11\pi}{6}$$

D)
$$\frac{7\pi}{6}$$

15) The maximum value of
$$\sin x + \cos x$$
 is

C)
$$\sqrt{2}$$

D)
$$1/\sqrt{2}$$

16) The general solution of the equation
$$4 \cos^2 x = 1$$
 is

A)
$$n\pi \pm \frac{\pi}{6}$$

B)
$$n\pi + \frac{\pi}{6}$$

C)
$$n\pi + \frac{\pi}{3}$$

D)
$$n\pi \pm \frac{\pi}{3}$$

17) The smallest angle of the triangle having sides 7cm,
$$4\sqrt{3}$$
cm and $\sqrt{13}$ cm is

The distance between the lines
$$4x - 3y = 22$$
 and $4x - 3y = 12$ is

19)	The equation $3x^2 + xy - y^2 - 3x + 6y + k = 0$ r	epres	ents a pair of straight line, then k is
	A) 9	B)	-9
	C) 0	D)	1
20)	The line $y = mx + c$ is normal to the circle $x^2 + c$	$\mathbf{y}^2 =$	a^2 if
	A) $c = \pm a\sqrt{1+m^2}$		c = 0
	C) $m=0$	D)	c = m = 0
21)	The equation of the tangent to the circle $x^2 + y$	$r^2 = 13$	3 at the point (2, 3) is
	$A) 2x + 3y = \sqrt{13}$	B)	2x - 3y = 13
	$C) 2x - 3y = \sqrt{13}$	D)	2x + 3y = 13
22)	The equations $ax + by + c = 0$ and $\alpha x + \beta y + \gamma$	=0 r	represents the same line if and only if
	A) $\frac{a}{\alpha} = \frac{b}{\beta}$		$a = \alpha, b = \beta, c = \gamma$
		D)	$c = \gamma$
	C) $\frac{a}{\alpha} = \frac{b}{\beta} = \frac{c}{\gamma}$	D)	
23)	The value of b for which the equations $9x + 4y$	y = 9	and $7x + by = 5$ have no solution is
,	A) 4	B)	7
	C) <u>9</u>	D)	28
	$\frac{1}{28}$	D)	9
24)	$\lim_{f(x) \text{ for the function } f(x) = \int_{0}^{x} 2x - 1 fo$	<i>r x</i> <	0 ic
	$\lim_{x \to 0} f(x) \text{ for the function } f(x) = \begin{cases} 2x - 1 & \text{for } x = 1 \\ 2x + 1 & \text{for } x = 1 \end{cases}$		0 15
	A) 0 C) -1	B) D)	not exist
25)			
25)	The value of k for which the function $f(x) = \frac{1}{2}$	$\begin{vmatrix} x-k \\ 5-x \end{vmatrix}$	is continuous at $x = 1$ is
	A) 4	B)	5
	C) -3	D)	3
26)	The derivative of $\frac{1}{x} + x$ with respect to x is		
		D)	2
	A) $1 - \frac{1}{x^2}$	B)	$\ln x + \frac{x^2}{2}$
	C) ln x +1	D)	0
27)	If $y = ln (\sin x)$ then d^2y is equal to		
	If $y = \ln(\sin x)$, then $\frac{d^2y}{dx^2}$ is equal to	D)	$-\cos ec^2x$
	A) $\cot x$		
	C) sec^2x	D)	$-\cos ec \ x \cot x$
28)	The derivative of $tan x$ with respect to $sec x$ is		
	A) $sec^2 x$	B)	cos x
	C) $\sin x$	D)	cosec x

29)	The derivative of 5^x is		
	A) 5 ^x log 5	B)	5 ^x
	C) $x 5^{x-1}$	D)	5*
			$\log 5$
30)	The function $f(x) = \begin{cases} x , & x \neq 0 \\ 0, & x = 0 \end{cases}$ at the	point :	x = 0 is
	A) differentiable	B)	continuous but not differentiable
	C) not continuous	D)	none of these
31)	The interval in which the function $f(x)$ is increased	easing	is
	A) $(2, \infty)$	B)	$[-2,\infty)$
	C) $(-2, \infty)$	D)	$[2,\infty)$
32)	The tangent to the parabola $x^2 = 2y$ at $(1, 2)$ n	nakes	with x-axis an angle of
	A) 0°	B)	45°
	C) 30°	D)	60°
33)	The minimum value of $x^2 + 1/x^2$ is		A 1'
	A) 1	B)	2
	C) -2	D)	3
34)	If the radius of the circular plate on heating is increase of its circumference is	incre	asing at the rate of 1.2 cm/s, then the rate of
	A) $1.2\pi \text{ cm/s}$	B)	2π cm/s
	C) π cm/s	D)	2.4π cm/s
35)	$\int \frac{dx}{x \log x}$		
	A) $\log(\log x) + c$	B)	$x \log x - x + c$
	C) $x^x + c$	D)	$(\log x)/x + c$
36)	$\int \frac{x}{x+3} dx$ is equal to		
	A) $x + 3 \ln x + 3 + c$	B)	$x - 3 \ln x + 3 + c$
	C) $3 \ln x + 3 + c$	D)	x + ln x + 3 + c
37)	$\int_{1}^{e} \ln x dx$ is equal to		
	A) 0	B)	e
	C) -1	D)	1
38)	∫ xe ^{-x} dx is equal to		
	A) $x e^{-x} - e^{-x} + c$	B)	$-x e^{-x} + e^{-x} + c$
	C) $x e^{-x} + e^{-x} + c$	D)	$-x e^{-x} - e^{-x} + c$
39)	The area bounded by the curves $y^2 = 4x$ and x	=9 is	S
	A) 12	B)	18
	C) 24	D)	36

40)	The area	a bounded by $y^2 = x - 1$, y-ax	is between y	= 0 to y = 3 is		
	A) 6		B)	12		
	C) 9		D)	10		
			PHYSICS			
41)	What are	the dimensions of Van der w	all's Constant	a' in the formula	a:	(P +
	$\frac{a}{V^2}$) $(V -$	b) = RT, Here, 'P' and 'V' a	and pressure a	nd volume.		`
	• ,	$L^{-1} T^{-2}$	B)	$[M L T^{-2}]$		
	C) [M]	$L^5 T^2$]	D)	$[M L^5 T^{-2}]$		
42)	The maxi	mum height (H) attained by a	a projectile lau	unched with initia	l velocity 'u' and a	ngle ' θ' is:
	A N	2	D \			
	A)	$\frac{u \sin^2 \theta}{2g}$	B)		$\frac{u^2 \sin 2\theta}{2\pi}$	
	C)	J	D)		2g	
	C)	$\frac{u^2 \sin^2\!\theta}{2g}$	D)		$\frac{u^2 \sin^2 \theta}{g^2}$	
		29			g^{\perp}	
12)	A 1	funces 5 les is seted amon have		wler female ON on	d CNI What is the	line etien ef
43)	accelerati	f mass 5 kg is acted upon by on?	two perpendic	cular forces on an	id on. what is the C	irection of
	A)	$Tan^{-1}(3/4)$	B)		$sin^{-1}(3/4)$	
	C)	$Cot^{-1}(3/4)$	D)		$Tan^{-1}(4/3)$	
	σ,	COL (3/4)			1 un (4/3)	
44)	The mas	s of the Sun, if the mean radio	is of the Earth	n's orbit is 'R' and	d 'G' is gravitations	al constant is
,	THE HILLS	of the sun, if the mean run.	as of the Earth		a o is gravitation	ar Constant, is
	A)	$4\pi^2R^3$	B)		$4\pi R^2$	
		$\overline{GT^2}$			$\overline{3GT^2}$	
	C)	$4\pi R^3$	D)		$3\pi^2R^3$	
		$\overline{G^2T}$			$\overline{4GT^2}$	
45)	An electr	on revolves round a nucleus i	n an orbit of r	radius 0.5×10^{-1}	0m If its linear val	ocity in the
73)		$2 \times 10^6 m/s$, what will be its				ocity in the
	A)	10^{-35}	B)		10^{-34}	
	C)	10^{35}	D)		10^{-36}	
	,	10			10	
46)	If two ten	nperatures differ by 25 on Ce	lsius scale, wl	hat is the differen	ce on Fahrenheit sc	ale?
,	A) 25		B)	45		
	C) 52		D)	54		
47)	The effic	iency of a Carnot engine depe	ends upon :			
		ure and amount of working	B)	Temperature of	sink only	
		stance	~ `	_		
	C) Tem	nperature of source only	D)	Temperature of	source and sink	

	of a curve	ed mirror?	?			
	A) R =	f/2			B)	f = R/2
	C) $f = 2$	2R			D)	R = 2f
49)	The value	e of permi	ttivity of free s	space (in unit	Farac	l/meter) is:
ĺ		5×10^{12}	•	1	B)	8.85 x 10 ⁻¹²
	C) 9.1	x 10 ⁹			D)	9.1 x 10 ⁻⁹
50)	Velocity	of radio w	vave is 3.0×1	08 m/s A rad	io sta	tion broadcasts on a wavelength of 2.0 m. It's
20)	frequency			. o 111/5. 71 144	10 500	aron orougasts on a wavelength of 2.0 m. it s
	A) 1.5	x 10 ⁸			B)	1.5×10^2
	C) 1.5	$\times 10^6$			D)	1.5
51)	Truth Tal	ole:				• () ′
ĺ	A	В	С			
	0	0	1			
	1	0	1			
	0	1	1			
	1	1	0			
	A and B	are input	s and C is the	output of a log	gic ga	ite. The type of such gate is:
	A) NOI	R			B)	AND
	C) OR				D)	NAND
52)	A physica	al constan	t that appears i	n de – Brogli	e eau	ation is:
,		ick's cons		Č	B)	Faraday's constant
	C) Grav	vitational	constant		D)	Boltzmann's constant
53)	Magnetic	susceptib	oility of some n	naterials is lar	ge ar	nd positive. Those materials are called:
	A) Para	-			_	Ferromagnetic
	C) Anti	iferromag	netic		D)	Diamagnetic
54)	In which	of the foll	lowing materia	ls electrical c	rondu	activity increases with increase in temperature?
54)	A) Cob		iowing materia	is, ciccurcar c	B)	Germanium
		nrome			D)	Copper
55)			s radius 'a' an	d carries curr	ent 'i	'.Magnetic field at it's center is:
55)	A)	o iv tuili	$\mu_0 Ni$	a carries carr	B)	$\mu_0 Ni$
	,		$\frac{70}{2\pi a}$,	$\frac{10}{2a}$
	C)		$\mu_0 N i$		D)	$\mu_0 N i^2$
	ŕ		$\frac{70}{2\pi}$,	$\frac{\mu_0 \cdots}{2\pi a}$
56)	Which of	the follow	wing phenome	na is followed	only	by transverse waves?
		raction	-		B)	Polarization
	C) Inter	rference			D)	Refraction

Which of the following expresses the relationship between focal length (f) and radius of curvature (R)

48)

57)	The γ – ray emitted by a radioactive nucleus,	, actua	ılly is:
	A) Photon	B)	Electron
	C) Proton	D)	Neutron
58)	The atomic mass unit is used for unit of:		
	A) Mass only	B)	Energy only
	C) Both mass and energy	D)	Neither mass nor energy
59)	Mass of a proton (in Kg) is equal to:		
	A) 9.11×10^{-31}	B)	1.67×10^{-27}
	C) 1.68×10^{-27}	D)	1.60×10^{-19}
60)	In a simple harmonic motion, the K.E. of the	body i	is maximum at which position?
	A) Extreme	B)	Between extreme and mean
	C) Mean	D)	K.E. is constant
61)	The energy stored in a capacitor is given by:		
01)	A) $1q^2$	B)	1.
	$\frac{1}{2}\frac{q}{C}$,	$\frac{1}{2}q^2C$
	C) 1 _{c2}	D)	1 1
	C) $\frac{1}{2}qC^2$		$\overline{2}\overline{q^2C}$
62)	The prefix 'Pico' used in a unit represents:	4	
02)	A) 10 ¹⁵	B)	10 ⁻¹²
	C) 10 ⁻¹⁵	D)	10 ¹²
62)	Which of the parameters below does not chan		
63)	•	ige on B)	
		D)	Phase
			Frequency
64)	Which of the following is correct for X – ray:		
	A) Deflected by electric field	B)	Does not possess charge
	C) Deflected by magnetic field	D)	Possess charge
65)	In parallel combination of resistors with uneq	ual re	sistances, the equivalent resistance:
A	A) Is less than minimum of that in	B)	Is more than maximum of that in combination
	combination		
	C) Remains as that of minimum one of in	D)	Remains as that of maximum one in combination
	combination		
66)	A lens of power -4D is placed in contact with	a lens	s of power +2D.The power of lens combination will
	A) +6D	B)	+2D
	C) -2D	D)	-1D
67)	If the normal reaction is doubled, keeping lim	niting 1	friction same, the coefficient of friction is
	A) not changed	B)	halved
	C) doubled	D)	tripled

68)	The	amount of heat required to change the stat	e of 1	kg of substance at constant temperature is called
	A)	Kilocal	B)	Calorie
	C)	Specific heat	D)	Latent heat
69)	Mec	chanical waves can be		
	A)	longitudinal only	B)	transverse only
	C)	both longitudinal and transverse	D)	neither longitudinal nor transverse
70)	The	bending of light waves through the corner	s of th	ne obstacle is called
	A)	refraction	B)	diffraction
	C)	interference	D)	beats
71)	Dik	ENGI endra got his servant his house.	ISH	
	A)	paint	B)	to paint
	C)	painted	D)	painting
72)	Am	ong the following words,has /æ/	sound	
, =)	A)	mouth	B)	moon
	C)	sound	D)	add
73)		word 'Tabulate' has primary stress on	,	llables.
,	A)	1 st	B)	2 nd
	C)	3 rd	D)	4 th
74)	The	wordhas three syllables from the fo	ollowi	ng.
	A)	absent	B)	academy
	C)	department	D)	beauty
75)	The	man has been working here last M	Ionda	у.
,	A)		B) .	to
	C)	from	D)	since
76)	T.C	an haildha matan ita inta manann		
76)		ou boil the water, it into vapour.	D)	will shower
	A) \	changes	B)	will be change
A	C)	would change	D)	will be changed
77)		passive form of the sentence, 'Everybody	•	
	A)	English was spoken all over the world	B)	English is spoken all over the world
	C)	English is being spoken all over the world	D)	English has been spoken all over the world
78)	Que	estion tag of the sentence, 'Let's prepare th	e min	ute',?
	A)	shall we	B)	will you
	C)	do you	D)	don't we
79)	I ex	plained that I wasartist, but that I wa	s som	etimes plumber as well.
	A)	an, the	B)	a, a
	C)	an, a	D)	an, an

80)	The	indirect speech of He says "I will meet y	ou at	the station" is
	A)	he says that he would meet him at the station	B)	he said that he would meet him at the station
	C)	he said that he will meet him at the station	D)	he says that he will meet him at the station
	3.5	CHEM		
81)		nimum energy required for the molecules		
	A)	Potential energy	B)	Kinetic energy
	C)	Activation energy	D)	Nuclear energy
82)	Le -	-Chatelier's principle is not applicable to		
	A)	Homogenous reaction	B)	Not homogenous reaction
	C)	System that is in equilibrium	D)	System that is not in equilibrium
83)	Wh	y liquid ammonia is used in refrigerator?	Becau	use of its
	A)	High basicity	B)	High heat of vaporization
	C)	High dipole moment	D)	All the above
84)	Tic	k the necessary conditions for Geometrica	al isom	nerism
04)	A)	There should be carbon - carbon	B)	First carbon must contain two different groups
	/	double bond compound		attached
	C)	Second carbon must contain same group as the first carbon	D)	All the above
85)	Wh	ich test is useful to distinguish formaldeh	yde w	ith acetaldehyde?
	A)	Schiff's test	B)	Fehling's test
	C)	Test with Iodine in basic condition	D)	Tollen's test
86)	Bro is	emomethane can be converted into methan	ol in s	suitable chemical environment, the reaction involved
	A)	Nucleophilic substitution	B)	Electrophilic substitution
	C)	Elimination	D)	Addition
87)	Mai	rkovnikoff's rule is applicable to		
01)	A)	Free radical addition reaction	B)	Electrophilic addition reaction
	C)	Substitution reaction	D)	Elimination reaction
88)	In v	which type of reaction, the number of pi b	onds i	n the product increases?
	A)	Elimination reaction	B)	Addition reaction
	C)	Substitution reaction	D)	Electrophilic addition reaction
89)				ly contaminated with chloroform (CHCl ₃) supposed 20 ppm (by mass), express this in % by mass.
	A)	20x 10 ⁵ x 100	B)	20/10 ⁶ x100
	C)	20/10 ⁵ x100	D)	$20x10^6 x100$
90)	Wh	ich of the following is optically active con	mpour	nd?
	A)	Formic acid	B)	Acetic acid
	C)	Phenol	D)	Lactic acid

91)	Trai	nsition metal compounds are colorful became	use		
	A) C)	it has unpaired electrons in d orbitals it has filled p orbitals	B) D)	it has completely filled d orbitals All the above	
92)	Tick	the correct order according to the size of	ionic/	atomic radii	
,	A)	$Cu^{++} > Ca > Cl^{-} > Al^{+3}$	B)	$Ca > Cu^{++} > Cl^{-} > Al^{+3}$	
	C)	$Ca>Cl>Cu^{++}>Al^{+3}$	D)	$Ca>Cl>Al^{+3}>Cu^{++}$	
93)	Whi	ich of the following metals are used for ma	nufac	eturing batteries of mobile phone	
	A)	Cobalt and Zn	B)	Cobalt and Lithium	
	C)	Nickel and Lithium	D)	Cadmium and lithium	
94)	The	consequences of global warming is			
	A)	Precipitation pattern changes	B)	Rise of temperature	
	C)	Drought	D)	All the above	
95)	In th	ne galvanic cell			
ŕ	A)	Oxidation occurs at anode and reduction occurs at cathode	B)	Oxidation occurs at cathode and reduction occurs at anode	
	C)	Only oxidation occurs at cathode	D)	Only reduction occurs at anode	
96)	If yo	ou titrate 1M H2SO4 solution against 50m	l of 11	M NaOH solution, what volume of H2SO4, in	
	A)	25	B)	10	
	C)	75	D)	2	
97)	Whi	ich of the following pair of compounds car	ı be u	sed to illustrate the law of Multiple Proportions?	
	A)	NO &NO ₂	B)	ZnO ₂ &ZnCl ₂	
	C)	H ₂ O&HCl	D)	CH ₄ &CO ₂	
98)	4gra	ams of hydrogen are ignited with 4 grams of	of oxy	gen. How many grams of water can be formed	
	A)	0.5	B)	4.5	
	C)	2.5	D)	36	
99)	Whi	ich of the following atom normally forms i	nonoa	atomic molecule?	
	A)	Oxygen	B)	Hydrogen	
	C)	Nitrogen	D)	Helium	
100)	What is the approximate pH of a 0.005M solution of H2SO4?				
	A)	5	B)	1	
	C)	2	D)	13	