# NTSE-AT

### **Mathematics**

1. If the algebraic expression  $(3x^2 + px + 3)$  be always positive, then (a) -6 (b) <math>p < -6 (c) p > 6 (d) no such p exists

2. The sum of the roots of  $ax^2 + bx + c = 0$  ( $a \neq 0$ ) is equal to the sum of the squares of the roots of the equation. Then (a) 2ab = ac + be (b)  $b^2 = ab + 2ae$  (c)  $2ac = ab + b^2$  (d)  $ab = 2ac + b^2$ 

- 3. The solution set for the equation  $3^{2x^2} 2.3^{x^2+x+2} + 3^{2(x+2)} = 0$  is (a)  $\{-1, 2\}$  (b)  $\{0, 2\}$  (c)  $\{0, -1\}$  (d)  $\{2, 4\}$
- 4. It is printed on a paper that "The length of a diagonal of a rectangle is 10 cm and its area is 62.5 sq. cm". Then which one of the following statements is true?
  - (a) The perimeter of the rectangle is 30 cm.
  - (b) The sum of the length and breadth is 20 cm.
  - (c) The difference of the length and breadth is 5 cm.
  - (d) No such rectangle can exist.

5. The ratio of the lengths of the corresponding sides of two similar triangles are in the ratio of 4 : 9. Then the ratio of their areas is
(a) 16 : 81
(b) 81 : 16
(c) 4 : 9
(d) 9 : 4

- 6. Father says to his son: "On the date of birth of yours, I was twice older than you are now." Then which one of the following statements is true?
  - (a) The present ages of the father and his son are 30 years and 10 years respectively.
  - (b) The present ages of the father and his son are 48 years and 12 years respectively.
  - (c) Nothing can be said about their ages.
  - (d) The ratio of the present ages of the father to the son is 3:1.
- Taking at least one from the numbers 1,2,3, how many different sets can be formed?
  (a) 8
  (b) 7
  (c) 3
  (d) 3<sup>3</sup>
- 8.  $(18)^{23}$  is divided by remainder 17 to give the remainder (a) 11 (b) 9 (c) 5 (d) 1
- 9. If  $m^2 4m + 1 = 0$ , then the value of  $\left(m^3 + \frac{1}{m^3}\right)$  is (a) 52 (b) 48 (c) 64 (d) 68
- 10. For  $3^{x+y} = 81$ ,  $81^{x-y} = 3$ , we get (a) no solution (b)  $x = \frac{21}{2}$ ,  $y = \frac{21}{2}$  (c) x = 2,  $y = \frac{2}{3}$  (d)  $x = \frac{17}{8}$ ,  $y = \frac{15}{8}$

11. 125 identical cubes are cut from a big cube and all the smaller cubes are arranged in a row to form a long cuboid. What is the percentage of increase in total surface area of the cuboid over the total surface area of the cube?

(a)  $234\frac{2}{3}\%$  (b)  $234\frac{1}{3}\%$  (c)  $134\frac{2}{3}\%$  (d) None of the above

12. A bag contains 4 Red and 3 Black balls and a second bag contains 2 Red and 4 Black balls. After choosing a bag at random, a ball is also drawn at random. The probability that the ball is Red is

(a) 
$$\frac{23}{42}$$
 (b)  $\frac{17}{42}$  (c)  $\frac{19}{42}$  (d)  $\frac{16}{39}$ 

- 13. If [n] denotes the greatest integer n and (n) denotes the smallest integer n ; n being a real number, then  $\left(1\frac{1}{5}\right) \times \left[1\frac{1}{5}\right] - \left(2 - \frac{1}{5}\right) \div \left[1\frac{1}{5}\right] + (1.5)$  is (a) 1.5 (b) 2 (c) 2.5 (d) 3.5
- 14. The value of  $\frac{3}{1^2 \cdot 2^2} + \frac{5}{2^2 \cdot 3^2} + \dots + \frac{19}{9^2 \cdot 10^2}$  is (a)  $\frac{99}{100}$  (b)  $\frac{1}{100}$  (c)  $\frac{101}{100}$  (d) 1
- 15. In a frequency distribution, Mean = 9.1 and  $\sum f_i x_i = 132 + 5k$ ,  $\sum f_i = 20$ , then k is (a) 4 (b) 6 (c) 10 (d) 9
- 16. ABC is a triangle in which  $ABC > 90^{\circ}$  and AD CB produced. Then



(a)	$AB^2 = AC^2 + BC^2 + BC \times BD$
(c)	$Ac^2 = AB^2 + BC^2 + 2BC \times BD$

(b)  $AB^2 = AC^2 + BC^2 + 2BC \times BD$ (d)  $AC^2 = AB^2 + BC^2 + BC \times BD$ 

- 17. Given:  $0^{\circ} < <90^{\circ}$ . then, if  $\sin + \cos = x$ , which one of the following is correct? (a) x < 1 (b) x > 1.5 (c)  $1 \le x \le \sqrt{2}$  (d)  $1 < x \le \sqrt{2}$
- 18. If  $\sin\theta + \cos\phi = 2$  and  $0^{\circ} \le \theta$ ,  $\phi \le 90^{\circ}$ , then  $2\theta + 2000 \cdot \phi =$ (a)  $180^{\circ}$  (b)  $90^{\circ}$  (c)  $2180^{\circ}$  (d) Can not be found out
- 19.  $\sec \theta + \tan \theta = a + \sqrt{\overline{b}} \ a, b \in Q \text{ and } \sqrt{\overline{b}} \in Q \text{ and } \sec \theta \text{ is rational, then}$ (a)  $\overline{b}^2 = 1 + a$  (b)  $a^2 = 1 + \overline{b}$  (c)  $\overline{b}^2 = 1 + a$  (d)  $a^2 = 1 - \overline{b}$
- 20. The ratio of in which 9x 3y 14 = 0 divides the join of (2, -4) and (3, 7) is (a) 2:1 (b) 1:2 (c) 2:3 (d) 3:2

#### **Physics**

21. The mass, linear momentum and kinetic energy of a body are m, p and E respectively, then

(a) 
$$p = \sqrt{2mE}$$
 (b)  $E = \sqrt{2mp}$  (c)  $p = \sqrt{2E}$  (d)  $E = \sqrt{2p}$ 

22. A stone is allowed to fall freely downwards initially at rest from the top of a tower. The time taken by the stone to reach the bottom of the tower is 4 seconds. What is the height of the tower? Take, acceleration due to gravity =  $32 \text{ ft/s}^2$ 

- (a) 64 ft. (b) 32 ft. (c) 48 ft. (d) 256 ft.
- 23. The coefficient of linear expansion of a solid is x and the coefficient of volume expansion of the solid is y, then (a)  $x = \frac{y}{3}$  (b)  $y = \frac{x}{3}$  (c)  $x = \frac{y}{2}$  (d)  $y = \frac{x}{2}$
- 24. In case of refraction of light from a medium to air the critical angle is found to be 45°. What is the refractive index of the medium with respect to air?
  - (a)  $\sqrt{2}$  (b)  $\sqrt{3}$  (c) 2 (d) 3
- 25. Which of the following pair have same unit?(a) Heat and Specific heat(b) Thermal capacity and Water equivalent
  - (c) Specific heat and Thermal capacity
  - (d) Heat and Work

26.Which of the following is an electromagnetic wave?<br/>(a)  $\alpha$ -ray(b)  $\beta$ -ray(c)  $\gamma$ -ray(d) cathode ray27.In case of a convex lens, what is the minimum distance between an object and its real image?<br/>(a) 2.5 times of focal length<br/>(c) 4 times of focal length(b) 2 times of focal length<br/>(d) equal to focal length

- 28. What will be the power consumed by a 50Ω wire if it is kept across a potential difference of 200V?
  (a) 0.8 kW
  (b) 80 kW
  (c) 400 W
  (d) 8 Kw
- 29. I cm ot main scale of a vernier callipers is divided into 10 divisions. The least count of the callipers is 0.005 cm, then what is the number of divisions in the vernier scale?
  (a) 10
  (b) 20
  (c) 25
  (d) 50
- 30. If an x-ray tube is operated at 20kV, what is the cut-off wave length? (Take, planks constant  $h=6.62\times10^{-34}$  J.S) (a) 0.89 Å (b) 0.75 Å (c) 0.62 Å (d) 0.31 Å

31. An ideal gas is found to obey the equation  $p^2V = constant$  along with the ideal gas equation (here, p = pressure and V= volume). If initial temperature and volume are T<sub>0</sub> and V<sub>0</sub> respectively and it expands to a volume  $3V_0$  then what is the final temperature?

(a) 
$$\sqrt{3}T_0$$
 (b)  $\sqrt{2}T_0$  (c)  $\frac{T_0}{\sqrt{3}}$  (d)  $\frac{T_0}{\sqrt{2}}$ 

32. Specific heat (S) of a metal at low temperature varies according to  $S = aT^3$ , where 'a' is a constant and T is a absolute temperature. The amount of heat energy needed to raise the temperature of unit mass of the metal from T = 1K to T = 2K is

(a) 3a (b)  $\frac{15a}{4}$  (c)  $\frac{2a}{3}$  (d)  $\frac{13a}{4}$ 

33. An object of weight W and density is submerged wholly in a liquid of density, its apparent weight will be

(a) 
$$(\rho - \sigma)$$
 (b)  $(\rho - \sigma) / W$  (c)  $W\left(1 - \frac{\sigma}{\rho}\right)$  (d)  $W\left(1 - \frac{\rho}{\sigma}\right)$ 

### Chemistry

34.	The ratio of and bonds in propyne is				
	(a) 1 : 3	(b) 3 : 1	(c) 2 : 3	(d) 3 : 2	
35.	The element having the lowest first ionization energy is				
	(a) He	(b) Cl	(c) F	(d) I	
36.	If the four tubes of a car are filled to the same pressure with $N_2,O_2,H_2$ and Ne gas separately then which fill the tube first?			nd Ne gas separately then which will	
	(a) N <sub>2</sub>	(b) O <sub>2</sub>	(c) H <sub>2</sub>	(d) Ne	
37. At a given temperature what will be the percentage increase in pressure for a 5% decrease in the gas		e for a 5% decrease in the volume of			
	(a) 5%	(b) 5.26	(c) 6.26%	(d) 10.26%	
38.	$\mathbf{O}_2^-$ is isoelectronic with				
	(a) H <sub>2</sub>	(b) N <sub>2</sub>	(c) F <sub>2</sub>	(d) $HF_2^-$	
39. Which of the following forms a homologous series?					
	(a) Ethane, Ethylene, A	cetylene (b) Eth	ane, Propane, Butanone		
(c) Methanol, Ethanol, Propanoic acid (d) Butane, 2-Methyl Butane, 2, 3, dimethyl Butane.			, 3, dimethyl Butane.		
40.	. The gas that gives a black precipitate with aqueous Pb(NO) <sub>3</sub> solutuion and a white precipitate wit ZnCl <sub>2</sub> solution is		and a white precipitate with aqueous		
	(a) CO <sub>2</sub>	(b) NO <sub>2</sub>	(c) NH <sub>3</sub>	(d) H <sub>2</sub> S	

41.	The organic product boiling the mixture v	that is obtained by at vith water is	osorbing Ethylene into co	oncentrated HSO <sub>4</sub> and subsequently
	(a) an aldehyde	(b) an amide	(c) a ketone	(d) an alcohol
42.	Equal volumes of tw	o solutions of pH = 4 a	nd pH = 10 are mixed. pl	H of the resultant solution will be
	(a) 6	(b) 7	(c) 8	(d) 9
43.	Find out the position (a) $H_2C=C-CH_2$ $  CH_3$	n isomers from the foll OH, H <sub>2</sub> C=C—OC   CH <sub>3</sub>	owing pairs of compound H <sub>3</sub> (b) H <sub>2</sub> C—CH—	ds -CH <sub>2</sub> COOH, H <sub>2</sub> C==CHCOOCH <sub>3</sub>
	(c) H <sub>3</sub> C—CH—C   CH <sub>3</sub>	о——СН <sub>3</sub> , Н <sub>3</sub> С—С	СH <sub>2</sub> -@H <sub>2</sub> —O—CH <sub>3 С</sub> H <sub>3</sub> C—CH <sub>2</sub> —С	О С-СН <sub>3</sub> , Н <sub>3</sub> С—НС—С—О—Н   СН <sub>3</sub>
44.	Egg albumin in wate	r is a		
	(a) True solution	(b) Colloid	(c) Suspension	(d) Supersaturated Solution
45.	Lithium is generally	used as an electode in	high energy density batt	eries. This is because
	(a) Lithium is the ligh	ntest of all metals	(b) Lithium has qui	te high negative reduction potential

- (b) Lithium has quite high negative reduction potential
- (c) Lithium is quite reactive
- (d) Lithium does not corrode easily

$$NH_{3}+O_{2} \xrightarrow{Pt-Rh} A + H_{2}O$$

$$A+O_{2} \longrightarrow B$$

$$B+O_{2}+H_{2}O \longrightarrow C$$

A, B and C respectively are

(a) $N_2O$ , $NO_2$ and $HNO_3$	(b) NO, NO $_2$ and HNO $_3$
(c) $NO_{2}$ , NO and $HNO_{3}$	(d) $N_2O$ , NO and $HNO_3$

	BIOLOGY			
47.	The main plant body of (a) Sporophyte	pteridophyte is (b) Prothallus	(c) Spore	(d) Gametophyte
48.	In human eye, at the bl (a) Only rod cells are pr (c) Both rod and cone c	ind spot esent. (b) Only ells are present. (d) Neit	y cone cells are present. ther rod nor cone cells a	re present.
49.	Percentage of O <sub>2</sub> prese (a) 21%	ent in inhaled air in huma (b) 77%	n beings is approximate (c) 0.04%	ly (d) 3%
50.	The disease which usua (a) Chicken pox	lly spreads through cuts (b) Malaria	and wounds is (c) Tuberculosis	(d) Tetanus
51.	Lysosome stores (a) ATP (c) Carbobydrate		(b) Hydrolytic enzymes	
52.	(c) carbonydrate Which muscle separate (a) Abdominal muscle	s thoracic and abdomina (b) Smooth muscle	ll cavity? (c) Diaphragm (d) Car	diac muscle
53.	Which one of the follov (a) Vasopressin	ving hormones helps in c (b) Oxytocin	contraction of uterine m (c) Prolactin	uscles during parturition? (d) Relaxin
54.	Glomerulus and Bowma (a) Malpighian tubule (c) Collecting tubule	an's capsule together for	m (b) Malpighian corpusc (d) Renal tubule	le
55.	Cardiac muscle is (a) striated and voluntary (c) striated and involuntary		(b) smooth and volunta (d) smooth and involun	iry tary
56.	In which of the followin (a) Leptotene	ng subphases of meiosis o (b) Pachytene	crossing over takes place (c) Zygotene	e? (d) Diplotene
57.	The part of human alim (a) Mouth	entary canal where no e (b) Oesophagus	nzyme secretion takes p (c) Stomach	lace is (d) lleum
58.	Marine fish when placed in tap water bursts because of (a) Endosmosis (b) Exomosis (c) Diffusion (d) Plasmolysis			(d) Plasmolysis
59.	"Penicillin" obtained fro (a) Antiseptic	om a fungus is an (b) Antiserum	(c) Antibody	(d) Antibiotic
60.	The immunoglobulin w (a) IgG	hich is transported to the (b) IgA	e foetus through placent (c) IgE	a from mother is (d) IgM

# SST

61.	France was named as (a) Rousseau	"n museum of econon (b) Adam Smith	nic errors" by (c) Montesquieu	(d) Quesnay
62.	Who was known as t	he "Tsar the Liberator"	??	
	(a) Tsar Nicholas I	(b) Tsar Nicholas II	(c) Tsar Alexander I	(d) Tsar Alexander II
63.	The day 24th Octobe (a) Terrorist Attack (c) The Great Econor	r, 1929 was marked as nic Depression	'Black Thursday' in U (b) Natural Calamity (d) Change of Politic	J.S.A. because al Background
64.	The father of British (a) Louis Blanc	Socialism (b) Karl Marx	(c) Robert Owen	(d) Saint Simon
65.	Jagannath Singh Dho (a) Kol Rebellion	l was the leader of (b) Santhal Rebellion	(c) Munda Rebellior	n (d) Chuar Rebellion Ans
66.	The editor of the 'San (a) Rammohan Roy (c) Bhabani Charan H	machar Chandrika' was 3andyopadhyay	s (b) Iswar Gupta (d) Gangakishore Bł	nattacharya
67.	Madari Pasi was the (a) Santhal Rebellior	leader of h (b) Munda Uprising	(c) Bhil Revolt	(d) Eka Movement
68.	'May Day' was celebr (a) Bombay	rated for the first time i (b) Calcutta	n India at (c) Madras	(d) Kanpur
69.	The M2ahad Satyagraha was organised by (a) Dayananda Saraswati (c) Sree Narayan Guru		(b) Swami Vivekana (d) Dr. B. R. Ambed	nda kar
70.	The incident of Chau (a) 1919 AD	ri Choura took place ir (b) 1920 AD	(c) 1922 AD	(d) 1925 AD
71.	The first language state was formed in Independent India:(a) Andhra Pradesh(b) West Bengal(c) Tamil Nadu(d) Gujarat			(d) Gujarat
72.	The writer of the book named "Chhere Asha Gram" was(a) Manikuntala Sen(b) Dakshina Ranjan Basu(c) Sankha Ghosh(d) Selina Hossain			Basu
73.	The time difference between Greenwich Mean Time and the Indian Standard Time is(a) 6 hours(b) 5 hours 30 minutes(c) 5 hours 15 minutes(d) 5 hours			an Standard Time is tes
74.	By nature, the Weste (a) Old fold mountain (c) Block mountain	rn Ghat is a/an 1	(b) Young fold mound (d) Igneous mountai	ntain n

75.	The process by which (a) Aggradation	n, the height of the eart (b) Degradation	h surface increases is (c) Weathering	(d) Denudation		
76.	Deep cracks on the su	urface of the mountain	glacier are called			
	(a)Nunatak	(b) Arete	(c) Crevasse	(d) Cirque		
77.	The climate which is (a) Equatorial climate (c) Mediterranean cl	found in the Cape Tov e imate	vn of South Africa is (b) Tropical Monsoon (d) Hot Desert climat	n climate e		
78.	New South wales cur (a) northern side	rent flows along the (b) southern side	of Australia. (c) eastern side	(d) western side		
-			(•) ••••••			
79.	Which of the following (a) Equator	ng, parallel of latitude,	passes through middle	e of India?		(c)
	Prime Meridian		(d) Tropic of Capitet (d) Tropic of Cancer	/11		(U)
			(.)			
80.	The lake located, in $b$	between the deltas of the	e Godavari river and t	he Krishna river is		
	(a) Kolleru	(b) Pulicat	(c) Chilka	(d) Vembnad		
81.	Salty sea breeze is ne	eded for				
	(a) Sugarcane cultiva	tion	(b) Tea cultivation			
	(c) Jute cultivation		(d) Coffee cultivation	1		
82.	Which of the following	ng industry is called Fo	oot loose Industry?			
	(a) Iron and Steel Ind	lustry	(b) Engineering Indu	stry		
	(c) Automobile Indus	stry	(d) Cotton textile Ind	ustry		
83.	Diamond Quadrilateral project is related to Air Transport (b) Rail Transport (c) Road Transport (d) Water Transport					
84	The colour used for d	lrawing of contour line	es in a topographical m	an is		
01.	(a) Black	(b) Brown	(c) Red	(d) Blue		
~ ~						
85.	A candidate for Bidh	an Sabha and Lok Sabl	ha Election must not be $(c)$ 27	e less than	years.	
	(a) 25	(0) 20	(c) 21	$(0) 2^{j}$		
86.	'MONEY BILL' is fi	irst introduced in the				
	(a) Lok Sabha	(b) Rajya Sabha	(c) Supreme Court	(d) High Court		
87	The number of judge	s of International Cour	t of Justice is			
07.	(a) 9	(b) 10	(c) 15	(d) 16		
			~ .			
88.	The age of retirement $(a)$ 65 years	t of the judges of the H $(h) 60$ years	ligh Court is	(d) 70 years		
	(a) 05 years	(0) 00 years	(c) 02 years	(u) to years		
89.	The headquarter of W	Vorld Health Organizat	tion is			
	London	(b) Manchester	(c) Geneva	(d) Paris		

90.	The minimum age for the citizen to exercise their right to vote has been reduced to 18 years from 21 years through the		
	(a) $42^{nd}$ Amendment Act	(b) 44 <sup>nd</sup> Amendment Act	
	(c) 61 <sup>nd</sup> Amendment Act	(d) 74 <sup>nd</sup> Amendment Act	
91.	The Panch-Sheel Agreement was signed between		
	a) India and China (b) India and Nepal	(c) ndia and Pakistan (d) Pakistan and China	
92.	The World Trade Organization was founde	d in	
	(a) 1990 (b) 1995	(c) 2000 (d) 2005	
93.	Which of the following is not a function of	Commercial Banks?	
	(c) Issuing Notes	(d) Working as an agent of Client.	
94.	Stagflation is a situation where		
	(a) production increases and price level inc	reases	
	(c) production decreases and price level have	creases.	
	(d) production increases and price level dec	creases.	
95.	Which of the following is a direct tax?		
	(a) Sales Tax (b) Income Tax	(c) Entertainment Tax (d) Service Tax	
96.	In which economy is the policy of Laissez	faire adopted?	
	(a) Capitalist Economy (c) Mixed Economy	(b) Socialist Economy (d) Any Economy	
. –			
97.	Exclusion principle is not applicable in the	case of(h) Consumer goods	
	(c) Public goods	(d) Private goods	
98	Railway in India are highlighted by which of the following market form?		
201	(a) Perfect competition	(b) Monopolistic competition	
	(c) Monopoly	(d) Oligopoly	
99.	Which of the following taxes follows the a	bility to pay principle?	
	(a) Wealth Tax (c) Goods and Services Tax	(b) Entertainment Tax (d) Excise Duty	
105			
100.	In underdeveloped countries most of the la	(b) Service sector	
	Agricultural sector	(d) Banking sector	
		(-,	