			U.	11
Register Number				

## 2012 CHEMICAL TECHNOLOGY

Time Allowed : 3 Hours ]

[ Maximum Marks: 300

TO DO SO

**QUESTION BOOKLET UNTIL YOU** 

THE

DO NOT TEAR THIS COVER OF

Read the following instructions carefully before you begin to answer the questions.

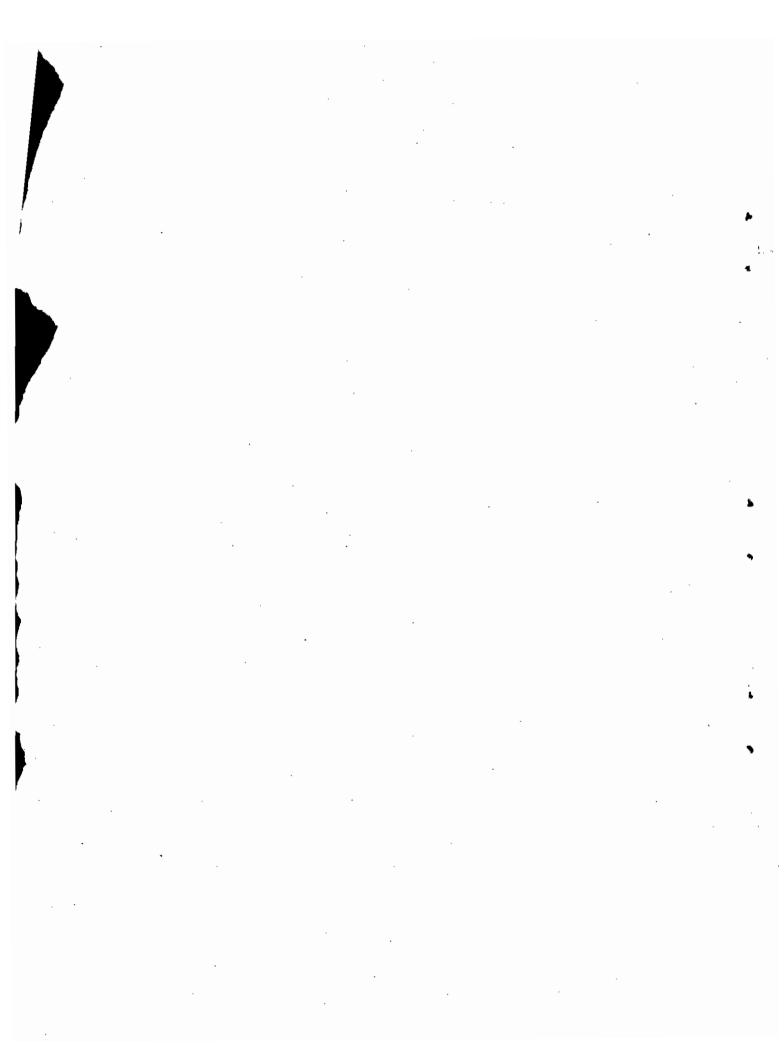
#### IMPORTANT INSTRUCTIONS

- 1. This Booklet has a cover (this page) which should not be opened till the invigilator gives signal to open it at the commencement of the examination. As soon as the signal is received you should tear the right side of the booklet cover carefully to open the booklet. Then proceed to answer the questions.
- 2. This Question Booklet contains 200 questions.
- 3. Answer all questions.
- 4. All questions carry equal marks.
- 5. You must write your Register Number in the space provided on the top right side of this page. Do not write anything else on the Question Booklet.
- 6. An Answer Sheet will be supplied to you separately by the Invigilator to mark the answers. You must write your Name, Register No., Question Booklet Sl. No. and other particulars on side 1 of the Answer Sheet provided, failing which your Answer Sheet will not be evaluated.
- 7. You will also encode your Register Number, Subject Code, Question Booklet Sl. No. etc., with Blue or Black ink Ball point pen in the space provided on the side 2 of the Answer Sheet. If you do not encode properly or fail to encode the above information, your Answer Sheet will not be evaluated.
- 8. Each question comprises four responses (A), (B), (C) and (D). You are to select ONLY ONE correct response and mark in your Answer Sheet. In case you feel that there are more than one correct response, mark the response which you consider the best. In any case, choose ONLY ONE response for each question. Your total marks will depend on the number of correct responses marked by you in the Answer Sheet.
- 9. In the Answer Sheet there are **four** brackets [A] [B] [C] and [D] against each question. To answer the questions you are to mark with Ball point pen ONLY ONE bracket of your choice for each question. Select one response for each question in the Question Booklet and mark in the Answer Sheet. If you mark more than one answer for one question, the answer will be treated as wrong. e.g. If for any item, (B) is the correct answer, you have to mark as follows:

## [A] [C] [D]

- 10. You should not remove or tear off any sheet from this Question Booklet. You are not allowed to take this Question Booklet and the Answer Sheet out of the Examination Hall during the examination. After the examination is concluded, you must hand over your Answer Sheet to the Invigilator. You are allowed to take the Question Booklet with you only after the Examination is over.
- 11. Failure to comply with any of the above instructions will render you liable to such action or penalty as the Commission may decide at their discretion.
- 12. Do not tick-mark or mark the answers in the Question Booklet.
- 13. The last sheet of the Question Booklet can be used for Rough Work.

Tear here X



1.		number of moles in 8 516 g of am 031 amu )	monia	a is (molecular mass of ammonia is			
	A)	0.5	B)	1.0			
	C)	1.5	D)	2.0.			
2.	In fo	ormation of ammonia process, incre	ase in	pressure favours			
	AY	forward reaction	B)	backward reaction			
	C)	no change	D)	none of these.			
3.	N <sub>2</sub>	$(g) + 3H_2(g) \Longrightarrow 2NH_3(g)$ . This	equat	ion is an example of			
	A)	irreversible reaction	B)	homogeneous equilibrium			
	1C)	heterogeneous equilibrium	D)	none of these.			
4.	For	the reaction $CaCO_3(s) = CaO(s)$	s)+	$\mathrm{CO}_2\left(g ight),\;\;k_p^{}\;\mathrm{is}\;\mathrm{equal}\;\mathrm{to}$			
	M	$p_{\mathrm{CO}_2}$	B)	$[CO_2(g)]$			
	C)	1	D)	- p <sub>CO2</sub> .			
5.	In n	nanufacture of ammonia by Haber's	proces	ss, high pressure			
	A	favours the formation of ammonia					
	B)	suppresses the formation of ammo	nia .				
	C)	has no effect					
	<b>D)</b> .	decreases and increases.					
6.	In a	chemical equilibrium, the free energ	gy will	be			
	A)	maximum	B)	negative			
	C)	positive	DY	minimum.			
7.	For	a reaction $2SO_2 + O_2 = 2SO_3$ ,	∆ n is	:			
	A)	zero	B)	10			
	C)	infinite	DI	negative.			

ο.		ime of all gases contain the same nu		- ,	, cquai
	A)	Gay-Lussac's law	BY	Avogadro's hypothesis	•
	C)	Boyle's law	D)	Graham's law of diffusion.	
9.	The	number of water molecules present	in 0·0	18 gm of water is 6.023 ×	
	A)	10 <sup>23</sup>	BÍ	10 <sup>20</sup> 10 <sup>19</sup> .	•
	C)	10 <sup>26</sup>	D)	10 <sup>19</sup> .	
10.	Add	lition of hydrogen cyanide to a keton	e in p	resence of sodium hydroxide	yields
	AT	cyanohydrin	B)	aldol	•
	C)	acid	D)	amide.	
11.		ich of the following products is fo		when two moles of ethyl	alcohol
	A)	Ethane	B)	Butane	
	R	Ethyl chloride	D)	Butyl chloride.	
12.		ich of the following products is for yl alcohol in presence of phosphorus			ts with
	A)	Ethylene	B)	Propene	•
•	es	Ethane	D)	Propane.	
13.	Wit	h an increase in temperature, the m	olarity	of the solution	
	A	decreases	B)	increases	
	C)	increases & decreases	D)	no change.	
14.	Nor	mality of a solution is the number o	f		
	A)	parts by mass of the solute per hu	ndred	parts by mass of solution	
	<b>B</b> ) /	parts by volume of solute per hund	dred p	arts by volume of solution	
	SX	gram equivalents of the solute diss	olved	per litre of the solution	
	D)	gram equivalents of the solute diss	solved	in 100 ml of the solution.	·

15. General electronic configuration of d-block elements is

$$(n-1)d^{1-10}$$
 ns  $^{1,2}$ 

- B)  $(n-2)d^{1-10} ns^{1,2}$
- C)  $(n-2)f^{1/14}(n-1)d^{0-1}ns^2$
- D)  $nd^{1-10}ns^{1,2}$ .
- 16. The number of elements in d-block is
  - A) 14

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C) 18

- D) 32.
- 17. The IUPAC name of Rutherfordium (Rf) is
  - A) unnilpentium

B) unnilhexium

2 unnilquadium

D) unnilenium.

- 18. Air is approximately
  - A)  $\frac{1}{2}$  oxygen and  $\frac{4}{5}$  nitrogen by volume
  - $\mathbb{A}$   $\frac{1}{5}$  oxygen and  $\frac{4}{5}$  nitrogen by volume
  - · C)  $\frac{4}{5}$  oxygen and  $\frac{1}{2}$  nitrogen by volume
    - D)  $\frac{1}{2}$  oxygen and  $\frac{1}{2}$  nitrogen by volume.
- 19. If a container of volume V contains  $n_1$  moles of gas 1,  $n_2$  moles of gas 2 and so on, then the partial pressure of gas 1 is given by
  - A)  $\frac{RT}{Vn_1}$

B)  $\frac{R}{TVn_1}$ 

 $\frac{n_1RT}{V}$ 

D)  $\frac{T}{RVn_1}$ .

- 20. Absolute zero is
  - A) 273·15 K

B) 373·15 K

C) 25° C

DY - 273·15° C.

21.	. – 27	3.15° C corresponds to a limiting va	lue of	
	A)	zero volume	<b>B</b> )	22.5 litres
	_C)	1000 ml	D)	1000 gm.
22.	5-10	0-5 fertilizers mean that they contain	1	
	A)	only 5% to 10% active fertilizer con	stitue	nt
	B)	5% to 10% filler, carrier of soil cond	dition	er ,
	æſ	5%,10%, 5% respectively of N <sub>2</sub> , P <sub>2</sub> C	) <sub>5</sub> and	K <sub>2</sub> O
	D)	none of these.		
23.	The	main use of HCl is in the		
	AY	drilling of petroleum wells and pick	ding o	f steel sheets
	B) -	manufacture of cationic detergent		
	C)	treatment of spent fuel of nuclear r	eacto	•
	D)	none of these.		•
24.	Eco	nomy of Solvay process depends upo	on the	efficiency of
	A)	carbonating tower	B	ammonia recovery
	C)	ammoniation of salt solution	D)·	none of these.
25.	Con	tact process for the manufacture of	sulph	uric acid
	AT	yields acid of higher concentration	than	chamber process
	B)	yields acid of lower concentration t	han c	hamber process
	C)	is obsolete		•
	D)	eliminates absorber.		
26.	Solv	vay process is used for the preparat	ion of	
	A)	soda ash	B)	Na <sub>2</sub> CO <sub>3</sub>
	P	both (A) and (B)	D)	caustic soda.
27.	In §	glass manufacture, the longer the		period, the better the quality of
	the	glass.	,	
	A)	shaping	BÍ	annealing
٠	C)	melting	D)	sintering.

28.	Which is not a constituent of lacquers?				
	A)	Diluents	B)	Cellulose derivatives	
	er	Pigments	D)	Resins.	
29.	In p	aints, drying oil is used as			
	,A)	film forming constituent	B)	viscosity reducer	
	C)	gelling preventer	D)	durability increaser.	
30.	Amo	ong the following pigments, which is	not a	white pigment?	
	A)	Titanium dioxide	B)	Zinc oxide	
	C)	Lithopone	DÍ	Cadmium sulphide.	
31.	In o	optical glass manufacture, which o	f the	following ingredients does not find	
	spe	cific application ?			
	A)	Barium compounds	B)	Potassium carbonate	
	C)	Red lead oxide	PY	Boric acid.	
32.	Whi	ch of the following parameters is no	t used	to characterise cement?	
	A)	Setting time	<b>B</b> )	Le Chatelier expansion	
	C)	Compressive strength	pr	Hardness.	
33.	Cha	ılking, flaking, peeling refers to failu	re of		
	<b>A</b> )	dyes	BY	paint	
	C)	pigments	D)	varnishes.	
34.	Ма	gnesia content in cement should			
	AY	not exceed 5%	B)	not exceed 8%	
	C)	exceed 4.5%	D)	none of these.	
35,	In n	nanufacture of phosphate fertilizers	, whicl	h of the following problems does not	
	occi	ur?			
	A)	Hydrofluoric acid handling		•	
	B)	Dust pollution			
	C)	Formation of hygroscopic calcium	nitrate	e ,	
	<b>-</b> 10)	Formation of biuret.			

36. Th	e content o	f nitrogen	is ammonium	sulphate is a	about
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AY 20% - 21%

B) 40% - 45%

C) 30% - 33%

D) 7% - 10%.

### 37. Production of nitric acid from ammonia consists of two steps

A) oxidation and stripping

By oxidation and absorption

C) reduction and absorption

D) reduction and evaporation.

## 38. Which one of the following does not belong to the class of diaphragm cells used for caustic soda production?

A) Dow cells

B) Hooker cells

- C) Diamond alkali cells
- De Nora cells.

# 39. In the manufacture of caustic soda by lime-soda process, the reaction is given by $Na_2CO_3 + Ca (OH)_2 \implies 2NaOH + CaCO_3$

By application of law of Mass Action, high conversion is obtained when the soda ash solution is

A) concentrated

BY dilute

C) supersaturated

D) saturated.

### 40. Nylon 6-6 is manufactured from

- A) hexamethylene diamine and adipic acid
- B) aminocaproic acid
- C) amino-undecanoic acid
- D) adipic acid and maleic anhydride.

### 41. Permanent hardness is due to the presence of

A) chlorides and sulphides of calcium & magnesium

- B) calcium bicarbonates
- · C) magnesium bicarbonates
- D) carbonate of iron.

42.	Hig	h pressure process uses oxygen as c	atalys	t in the manufacture of
	AT	LDPE	B)	HDPE
	C)	LLDPE	D)	XLPE.
43.	An	additional step in the manufacture	of p	aper from bagasse as compared to
•	that	t from bamboo is		•
	AY	depithing	B)	digestion
	C)	bleaching	D)	none of these.
44.	Coo	king conditions in kraft pulp proces	s are	
	A	time: 2-5 hrs, temperature: 170°C	C - 176	5°C and pressure: 660 - 925 kPa
	B)	time: 6-12 hrs, temperature: 125°	°C - 10	50°C and pressure : 620 - 755 kPa
	C)	time: 36 - 48 minutes,	tempe	rature : 160°C - 180°C and
		pressure : 660 - 1100 kPa		
	D)	time: 1-2 hrs, temperature: 150°C	C-160°	°C and pressure: 600 - 660 kPa.
<b>45</b> .	The	catalyst used in the manufacture of	(HDP	E by Ziegler process is
	<b>A</b> )	chromic oxide		·.
	B	aluminium triethyl combined with	titani	um tetrachloride
	C)	aluminium triethyl combined with	titani	um dioxide
	D)	molybdenum on alumina.		
46.	Oil	is .		•
	A)	a mixture of glycerides		,
	B	a mixture of glycerides of fatty acid	ls	
	C)	solid at normal temperature		
	D)	esters of alcohols other than glycer	in.	
47.	Whi	ich of the following is not a use of cit	ric ac	id?
	A)	Cleaning and polishing of iron and	steel	
	B)	In preparation of alkyd resins, pair	ıts an	d lacquers
•	C)	In printing and textile industries		
	pr	In manufacture of mayonnaise.		

48.	The	correct order of the tendency of fue	const	ituents to knock is:
	A)	aromatics > straight chain paraffic	ns > o	lefins > branched chain paraffins >
	BY	straight chain paraffins > br cycloparaffins > aromatics	anche	d chain paraffins > olefins >
	C)	aromatics > olefins > branched contain paraffins	hain p	araffins > cycloparaffins > straight
	D)	branched chain paraffins > cyclog chain paraffins.	paraffi	ns > olefins > aromatics > straight
49.	Whi	ch of the following processes yields	coke?	
	A)	Pyrolysis	<b>B</b> )	Visbreaking
	C)	Hydrocracking	. الطر	Delayed coking.
50.	Flex	tible foam ( for mattresses ) is usual	ly mad	le of
	A)	polypropylene	BI	polyurethane
	C)	polyvinyl chloride	D)	polyamide.
51.	Bea	ting the fibres using a Hollander be	ater m	akes the paper
	AT	stronger and uniform	В)	more porous
	C)	less denser	D)	less opaque.
52.	The	characteristic of pulp by sulphate	process	s is
	A)	dull white colour		
	B)	easy to bleach		
	es	strong fibres		
	D)	less resistant to mechanical refini	ng.	
53.	Nyl	on-6, 6 as compared to Nylon 6 is		
	À)	harder	B)	high melting point
	C)	less abrasive resistant	DY	all of these.
		607	,	

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54.	A de	etergent is		
	A)	a catalyst promoter		
	Æ)	a surface tension lowering organic	chem	ical
	C)	a water softening agent		
	, <b>D</b> )	a corrosion inhibitor.		
55.	Whi	ich of the following is a thermosettin	g poly	mer?
	A	Epoxy resin	B)	Polyethylene
	C)	PVC	D)	Polystyrene.
56.	The	rmoplastics are formed by		
	A	addition polymerization	B)	condensation polymerization
	C)	copolymerization	D)	all of these.
57.	The	polymer used in heart valves, blood	l filter	s, artificial heart etc. is
	A	Polyurethane	B)	Polyethylene
	C)	Polyvinyl chloride	D)	Polyalkyl sulphone.
58.	Hov	w much rust will be formed (Fe <sub>2</sub>	O <sub>3</sub> , 3	BH <sub>2</sub> O) when 100 kg of iron have
	com	pletely rusted away?		
	M	191 kg	B)	19·1 kg
	C)	190 kg	D)	195 kg.
59.	Cry	stallinity of high dense polyethylene	is	
	AY	80%	B)	55%
	C)	100%	D)	20%.
60.	Exa	mple for a detergent is		,
	M	sodium lauryl sulphate	B)	sodium stearate
	C)	sodium oleate	D)	potassium linoleate.
61.	Poly	mer commonly used for making fibr	e/clot	th is
	<b>A</b> )	rubber	B)	PVC
	(5)	nylon	D)	bakelite.

62.	62. The device which converts mechanical energy into electrical energy is			into electrical energy is
-	A)	electric motor	BY	generator
	(C)	transformer	D)	electric fan.
63.	The	purest form of semiconductors is c	alled	
	A	intrinsic semiconductors	B)	normal semiconductors
	C)	extrinsic semiconductors	· D)	none of these.
64.	In a	an electrical network, the law stat	ing th	at "The algebraic sum of current
	mee	eting at any junction at any instant	is zero	" is
	AS	Kirchhoff's current law	B)	Lenz's law
	C)	Kirchhoff's voltage law	D)	Faraday's first law.
65.	Con	nductance is the reciprocal of		•
	A)	conductivity	BY	resistance
	C)	specific conductance	D)	specific resistance.
66.	DC	generator works on the principle of		
	A)	Fleming's left hand rule	BY	Electromagnetic induction
	C)	Electromagnetic radiation	D)	Electrolysis.
67.	Wh	ich is not a terminal of a transistor	?	•
	A)	Common base	BI	Common projector
	C)	Common emitter	D)	Common collector.
68.	Wh	ich of the following statements is fa	lse ?	,
	A)	Impurity added to intrinsic semice	onduct	ors gives extrinsic semiconductors
	B)	Charge carriers of P-type semicon	ductor	s are holes
	C)	Charge carriers of N-type semicon	ductor	rs are electrons
	DY	Charge carriers of N-type semicon	ductor	rs are holes.
69.	The	e rising V/I characteristic of a series	gener	ator makes it suitable for use as a
	A)	regulator	B)	converter
	es	booster	D)	amplifier.

70.	In a	DC generator, the main function of	comp	ensating winding is to
	A)	assist in commutation		
	B)	reduce demagnetising effect of arm	ature	reaction
	2	reduce distorting effect of armature	e react	ion
	D)	eliminate reactance voltage.	-	
71.	The	emf generated within the armature	of a D	C generator is given by
	A)	$E_b = N \phi$	B)	$E_b = V - I_a R_a$
	P	$E_g = \frac{\phi Z N P}{60 A}$	D)	$\begin{split} E_b &= V - I_a R_a \\ E_g &= V + I_a R_a . \end{split}$
72.	The	experimental law for the hysteresis	loss of	f a magnetic material was found by
	A)	Newton	B)	Faraday
	C)	Lenz	D)	Steinmetz.
73.	The of it	steel make alloy sheet is most suit	ed for	making transformer cores because
	A)	low hysteresis loss and low permea	bility	
	B)	high hysteresis loss		
	K	high permeability and low hysteres	is loss	3
	D)	high permeability.		,
74.	Peri	meance of a magnetic circuit is given	by th	e reciprocal of its
	A	reluctance	B)	permeability
	C)	flux density	D)	air density.
<b>7</b> 5.	The	emf induced in a coil depends on		
	A)	the number of its turns	B)	the change of flux linked in it
	C)	the time taken to change the flux	W	all of these.
76.	The	electrostatic potential inside a posit	ively c	charged sphere is
	A)	maximum	B)	minimum
	C)	zero	DY	constant.

				•
77.	Kilo	-watt hour is the unit of		•
	M	energy	B)	power
	C)	force	D)	stress.
78.	The	cost of running 2 kW heater for 10	hours	at 50 paise/kWh is
	A)	Rs. 5	BÍ	Rs. 10
	C)	Re. 1	D)	Rs. 2.
79.	Acc	ording to the commonly used sign c	onvent	tion for voltages
	A)	a fall in voltage is considered posit	ive	· · · · · · · · · · · · · · · · · · ·
	BÍ	a rise in voltage is considered posi	tive	•
	C)	IR drop is taken as negative		, ,
	D)	battery EMFs are taken as positive	e.	
80.	A si	mple potentiometer is correctly calle	ed•a	
	A)	current divider	B)	voltage stabilizer
	C)	variable resistor	D	voltage divider.
81.		ich of the following materials has stance?	s neai	rly zero temperature coefficient of
	A)	Copper	B)	Carbon ·
	)es	Manganin	D)	Mica.
82.	The	Law of Demand is the outcome of t	he	
	AY	Law of Diminishing Marginal Utilit	ty	
	В)	Law of Equimarginal Utility		
	C)	Law of Consumption		
	D)	Law of Maximum Satisfaction.		
83.	In .	buyers and sellers belo	ong to	a small local area.
	A)	Family Market	B)	National Market
	C)	World Market	PI	Local Market.

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84.	Social Welfare is the guiding factor of the economic activity in				
,	<b>A</b> )	Market economy	BY	Socialist economy	
	C)	Traditional economy	D)	Mixed economy.	
85.	Proc	luction in simple terms means			
	A)	innovative activity	B)	destruction of utility	
	C)	absorption of utility	P	creation of utility.	
86.	The	Supply curve shifts in its entire len	gth to	the right because of	
	AY	increased production		· · · · · · · · · · · · · · · · · · ·	
	B)	increase in its price		•	
	C)	increase in subsidies for the produ	ct	,	
	D)	the exit of few firms.			
87.	Whe	en Demand curve is vertical, it prese	nts		
	A	perfectly elastic demand	B)	perfectly inelastic demand	
	C)	elastic demand	D)	inelastic demand.	
88.	The	quantum of utility derived depends	on the	<b>e</b> .	
	A)	need of the individual	B)	mental make up of the consumer	
	C)	social desirability	PI	intensity of desire.	
89.	The	Supply curve shifts to its left becau	se of		
	<b>A</b> }	increase in subsidies for the produ	ct		
	B)	number of producers in the indust	ry		
	C)	factors outside the economic spher	e	· . ·	
	<i>I</i> D)	fall in supply without a change in	price.		
90.	War	nts change with			
	A)	two or more commodities	B)	person to person	
	Æ)	time, place and person	D)	the destruction of utility.	
91.	To s	sell what could be produced is		•	
	A)	consumer orientation	B	marketing orientation	
	C)	product orientation	D)	management orientation.	

92.	Con	sumption is the		
	A)	creation of utility	BI	destruction of utility
	C)	result of production	D)	stimulant for production.
93.	The	father of Economics is		
	A	Adam Smith .	B)	Lionel Robbins
	C)	Paul A. Samuelson	D)	Alfred Marshall.
94.	The	major gas causing greenhouse effect	t is	
	M	$CO_2$	B)	H <sub>2</sub> S
	C)	SO <sub>3</sub>	D)	none of these.
95.	200	0 kg of wet solid containing 70%	solid	is dried to get a final product of
	99%	solids. The amount of water remov	ed fro	m wet solid is
	A)	1414·14 kg	B	585 80 kg
	C)	600 kg	D)	none of these.
96.		ne depletion in the upper atmosp		•
	rece	ent years by the release of CFCs. CF	C dene	otes .
	A)	Concentrated Fluorine Chemicals	B)	Concentrated Fine Chemicals
	<b>/</b> C)	Chloroflurocarbons	D)	Chlorinated Fixed Carbon.
97.	The	gas which has reddish-brown colou	ır with	pungent suffocating odour is
	A)	NO	BI	NO <sub>2</sub>
٠	C)	SO <sub>2</sub>	D)	co.
98.	Pac	king comes under		·
	A)	administrative expenses	P	plant overhead cost
	C)	distribution & marketing expenses	D)	none of these.
99.	Bui	lding, process and auxiliary comes t	under	
	A)	Indirect Cost	BY	Direct Cost
	C)	Working Capital	D)	Fixed Capital Investment.

100.	). Manufacturing cost is						
	AY	A) direct production costs + fixed charges + plant overhead costs					
	B)	direct production costs + administrative expenses					
	C)	direct production costs + distributi	ion an	d marketing expenses			
	D)	direct production costs + general e	xpens	es.			
101.	oper	•		a given direction and the valve is to			
	A)	Gate valve	B)	Globe valve			
	E)	Check valve	D)	Ball valve.			
102.	In p	otential flow, wall drag is					
	A)	infinite	BI	zero			
	C)	finite and non-zero	D)	none of these.			
103.	Und	er otherwise uniform conditions, far	nning	friction factor for a rough pipe is			
	<b>A</b> )	smaller than that for a smooth pip	е.	·			
	B	greater than that of a smooth pipe		•			
	C)	equal to that for a smooth pipe					
	D)	not a function of Reynolds number	·.				
104.		laminar flow of Newtonian fluids	in pip	es, the ratio of average velocity to			
	AY	0.5	B)	1.0			
	C)	1.5	D)	2.0.			
105.	The	equation of continuity applies to					
	A)	incompressible fluids					
	B)	compressible fluids		•			
	(C)	highly viscous fluids					
	DY	both incompressible and compress	sible fl	uids.			

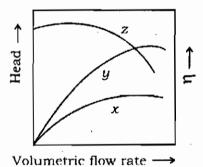
100.	VISC	osity of gas		•
	A)	decreases with an increase in temp	eratui	re .
	B) ·	increases with an increase in temp	eratur	re
•	C)	remains unaffected with change in	tempe	erature
	D)	increases with an increase in press	ure.	
107.	A flu	aid is called Newtonian when the sh	ear str	ess versus shear strain plot is
•	A	linear and passes through origin		:
	<b>B</b> )	linear but has an intercept		
	C)	exponential and passes through th	e origi	n
	D)	a rectangular hyperbola.		•
108.	A flu	id is a substance that		
, ,	A)	permanently resists distortion		
	<b>B</b> )	does not permanently resist distort	ion	
	C)	has a definite density which is con-	stant 1	under all circumstances
	D)	has a density which cannot be according	urately	y determined.
109.	The	equivalent length of pipe is express	ed as a	number of pipe diameter and
	M	number of velocity head	B)	number of pressure head
	C)	number of potential head	D)	all of these.
110.	The	roughness factor of pipe is the ratio	of the	e length of the surface roughness to
	A)	outside pipe diameter	B	inside pipe diameter
	C)	volume of pipe	<b>D)</b> .	surface area of pipe.
111.	One	poise is equal to	<b>^</b>	
	A)	$0.01 \text{ N.S/m}^2$	<b>J</b> B)	$0.1 \text{ N.S/m}^2$
	C)	$1 \text{ N.S/m}^2$	D)	none of these.
112.	A ce	entrifugal pump is designed to delive	er	
	AY	low discharge at high heads	•	
	B)	large discharge at low heads		
	C)	in between low and large discharge	es	
	D۱	all of these.		

- 113. In the equation  $\frac{\Delta u^2}{2\alpha} + g\Delta z + \int v \, dp + w_s + F = 0$ , if the flow is turbulent, the kinetic energy factor  $\alpha$  is
  - A) 0.5



C) 0

- D) none of these.
- 114. Which evaporator is used for the production of condensed milk?
  - A) Long tube vertical type evaporator
  - B) Forced circulation evaporator
  - C) Open-pan solar evaporator
  - D) None of these.
- 115. Characteristic curve for centrifugal pump plotted against volumetric flow rate, efficiency, and head as a function of discharge rate is



- power input, efficiency, head
- B) head, efficiency, power input
- C) efficiency, power input, head
- D) power input, head, efficiency.
- 116. With increase in shear rate, apparent viscosity of pseudoplastic fluid
  - A decreases
  - B) increases
  - C) may increase or decrease depending on the magnitude of shear rate
  - D) none of these.
- 117. Euler's equation of motion is a statement expressing
  - A) conservation of mass
- B) conservation of energy
- C) Newton's 1st law of motion
- D) Newton's 2nd law of motion.

118. Each term of Bernoulli's equation represents total energy per unit

AY	mass
----	------

B) volume

C) specific weight

D) none of these.

119. The type of fluid which is not characterised by power law is



B) Pseudoplastic

C) Newtonian

D) Dilatant.

120. As per Newton's law of viscosity shear stress is proportional to (viscosity =  $\mu$ )



 $\mathbf{B}) \qquad \frac{1}{\mu}$ 

C)  $\mu^2$ 

D)  $\frac{1}{\mu^2}$ 

121. What is the absorptivity of a black body?

A) 0

B) 1

C) 0.78

D) 0.95.

122. Dropwise condensation occurs in

- A) clean and dirt free surfaces
- B contaminated cooling surfaces
- C) smooth clean surfaces
- D) polished surfaces.

123. In the equation  $Q = UA\Delta T$ ,  $\Delta T$  is

- A) geometric mean temperature difference
- B) arithmetic mean temperature difference
- logarithmic mean temperature difference
- D) the difference of average bulk temperature in hot and cold fluids.

124. Prandtl number is the reciprocal of

A) thermal diffusivity / momentum diffusivity

- B) thermal diffusivity × momentum diffusivity
- C) thermal diffusivity × mass diffusivity constant
- D) mass diffusivity × momentum diffusivity.

125. What is the logarithmic mean of  $r_1$  and  $r_2$ ?



$$B) = \frac{r_1 - r_2}{\ln \frac{r_2}{r_1}}$$

C) 
$$\frac{r_2 - r_1}{\ln \frac{r_1}{r_2}}$$

D) 
$$\frac{r_1 - r_2}{-\ln \frac{r_1}{r_2}}$$

126. Fourier's law of heat transfer applies to

A) convection

B) radiation

conduction

D) all of these.

127. In backward operation of multiple effect evaporators

- A) feed is fed in the middle effect and concentrated product is taken out from the last effect
- B) feed is fed in the middle effect and product is discharged from the first effect feed is fed in the last effect and product is taken out from the first effect
- D) feed is fed in the first effect and product is drawn from the last effect.

128. Which of the following is not true about a double-pipe heat exchanger?

- A) Flows are co-current or counter-current
- B) Differential expansion is absent

Used when the required surface area is very large

- D) Simplest type of heat exchanger.
- 129. Overall heat transfer coefficient, U is related to conductive resistances,  $R_{cd}$  and conductive resistances,  $R_{cv}$  by

$$U = \frac{1}{\sum R_{cd} + \sum R_{cv}}$$

$$B) \qquad \frac{1}{U} = \frac{1}{\sum R_{cd} + \sum R_{cv}}$$

C) 
$$U = \frac{1}{\sum R_{cd} - \sum R_{cv}}$$

D) 
$$U = \sum R_{cd} + \sum R_{c\nu}.$$

130. In natural convection, which of the following is true?

A) Pr = f(Re, Gr)

B) Nu = f(Re, Pr)

Nu = f(Gr, Pr)

D) Nu = f(Re, St).

131. In steady state thermal conduction, the heat flux is given by

A) Fick's law

B) Newton's law

() Fourier's law

D) Knudsen's law.

132. The rate of heat loss through a wall of red brick (k = 0.70 W/mK), of area 20 m<sup>2</sup>, with 0.25 m thickness, if the wall temperatures are at 100°C and 30°C, is

A) 3920 W

B) 3920 kW

C) 392 W

D) 392 kW.

133. Which heat exchanger is used in paraffin-wax plants and in petrochemical plants for crystallization?

- A) Double pipe heat exchanger
- B) Scraped surface heat exchanger
- C) Plate type heat exchanger
- D) All of these.

134. The value of Stefan-Boltzmann constant in SI unit is

- A) 5.6697×10<sup>-8</sup> W/m<sup>2</sup>K<sup>4</sup>
- B)  $5.6697 \times 10^{-8} \text{ kcal/m}^2\text{K}^4$
- C)  $0.1714 \times 10^{-8} \text{ W/m}^2\text{K}^4$
- D)  $0.1714 \times 10^{-8} \text{ kcal/m}^2 \text{K}^4$ .

135. Which of the following is correct?

- A) Driving force = Rate × Resistance
- B) Rate = Driving force × Resistance
- C) Resistance = Driving force × Rate
- D) Rate = Resistance / Driving force.

136. The heat lost per  $m^2$  of surface area for a wall of 254 mm thick, where the inside temperature is 352.7 K and outside temperature is 297.1 K is (thermal conductivity is 0.048 W/m K)

A)  $100 \text{ W/m}^2$ 

B) 105·1 W/m<sup>2</sup>

C) 200 W/m<sup>2</sup>

D) 150 W/m<sup>2</sup>.

137.	are called				
	A)	evaporators	BI	condensers	
	C)	heat exchangers	D)	all of these.	
138.	The	most economical absorption factor	will be	in the range of	
	A)	5 - 10	BI	1.25 - 2	
	C)	0.1 - 1	D)	none of these.	
139.	The	overall heat transfer coefficient is ge	neral	ly low for fluids having	
	A)	high thermal conductivity	<b>B</b> )	low thermal conductivity	
	Ċ)	constant thermal conductivity	D)	none of these.	
140.		t transfer occurs by natural conv	ection	n because change in temperature	
	cau	ses difference in	,		
	A)	viscosity	B)	density	
	C)	thermal conductivity	D)	heat capacity.	
141.	As t	he product size from a ball mill decr	eases		
	A)	the capacity and power requirement	t of th	ne mill increases	
	B)	the capacity increases, but the pow	ver rec	quirement decreases	
	C)	the capacity and power requirement	at of th	ne mill decrease	
i	(שק	the capacity decreases, but the po	wer re	equirement increases.	
142.	Whe	en a ball mill rotates at a speed high	er tha	n the critical speed, its efficiency is	
	A)	maximum	B	minimum .	
	C)	optimum	D)	none of these.	
143.	Tyle	er standard screen are based on the	openi	ng	
	X)	200 mesh screen	B)	400 mesh screen	
	C)	300 mesh screen	D)	500 mesh screen.	
		•		,	

144.	If sp	f specific cake resistance is independent of pressure in a filtration process, then				
	the	cake is				
,	A)	incompressible .				
·	B)	compressible				
	C)	both compressible and incompressible				
	D)	none of these.				
145.	Ene	rgy requirement (per unit mass of material crushed / ground) is highest for				
	A)	Jaw crusher B) Rod mill				
	C)	Ball mill Fluid energy mill.				
146.	Equ	ivalent diameter of a particle is the diameter of sphere having the same				
`	A	ratio of surface to volume as the actual volume				
•	B)	volume of the particles				
	C)	ratio of volume to surface of the particle				
	D)	none of these.				
147.	Ball	mill is used for				
,	A)	fine grinding B) crushing				
·	C)	coarse grinding D) attrition.				
148.	In ro	oll crushers				
	A)	both the rolls have same diameter				
	B)	are related towards each other				
	C)	run either at same or different speeds				
	15)	all of these.				
149.	Whi	ch of the following statements does not apply for plate and frame filte	r			
	pres	s ?				
	A)	Intermittent in operation				
	<b>B</b> )	Very less labour requirement				
·	C)	Maintenance cost is low				
	D)	Large filtering area on a small floor space.				

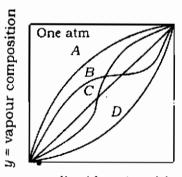
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150.	According to the Tyler standard screen scale, each successive screen has its					
	mes	esh and wire dia so adjusted that the linear sizes of the openings in any two				
,	succ	uccessive screens have the ratio of				
	A)	1:2	B	$1:\sqrt{2}$		
	C)	1:22	D)	$1:\sqrt{3}$		
151.	Whi	ch of the following statements abou	t the b	pall mill is not true?		
	A)	The mill may be used wet or dry		; ,		
	B)	The mill can be used with inert atr	nosph	ere for grinding explosive materials		
	C)	It may be used for batch or continu	ious o	peration		
•	D)	It can be used to grind only soft ma	aterial	s.		
152.	Jaw	crushers and gyratory crushers em	iploy p	redominantly		
	A)	impact force	В)	shear force		
	C)	attrition force	DI	compressive force.		
153.	Extr	uders are used for mixing extensive	ly in			
	A)	plastic industry	B)	alkali industry		
	C)	fertilizer industry	D)	petroleum industry.		
154.	Whi	ch of the following is not a function	of the	filter medium ?		
	A)	Support for the filter cake				
,	B	Offer resistance to the flow of filtra	te			
	C)	Resistant to the corrosive action of	the fl	uid		
	D)	Mechanically strong.				
155.	Whi	ch of the following is a possible	value	of the one angle of nip of a roll		
	crus	sher?		٠,		
	A)	5°	BI	20°		
	C)	50°	D)	75°.		
156.	Star	ndard screen always have				
	A)	rectangular aperture	B)	triangular aperture		
	ρΥ	square aperture	D)	circular aperture.		

157.	According to Rittinger's law, crushing efficiency				
	A)	depends on the feed size	•		
	B)	depends on the product size			
	C)	depends on both feed and product	sizes		
1	<b>D</b>	is constant and for a particular m	achine	e and feed material is independent	
		of the feed and product size.			
158.	A ro	tary drum filter is			
/	A	a continuous vacuum filter	B)	a discontinuous pressure filter	
	C)	a continuous pressure filter	D)	none of these.	
159.	The	compressibility coefficient for an inc	ompre	essible sludge is	
	A)	1.0	B)	0.2	
	C)	0.8	<b>D</b> )	0.	
160.	In S	system the specific cake resistance	has a	unit of	
	A)	m/s	B)	kg/s	
	C)	$m^3$ / s	DI	m/kg.	
161.	Whi	ch of the following methods will com	e und	er mechanical separation?	
	A)	Drying	B)	Distillation	
	C)	Evaporation	DY	Sedimentation.	
162.	The	rate of diffusion is high for			
	A)	solids	B)	liquids	
,	er	gases or vapours	D)	colloidal solution.	
163.	Whi	ch is not the dimension of individua	1 mass	s transfer coefficient?	
	A)	Moles transferred Area time mole fraction	B)	Moles transferred Area time pressure	
	C)	Moles transferred Area time concentration	DY	Moles transferred Area time temperature	

164.	Posi	tive deviation from ideality gives		
	A)	alloy mixtures	B)	maximum boiling mixtures
	C)	maximum boiling azeotropes	<b>,</b> D)	minimum boiling mixtures.
165.	In a	ternary liquid system where one p	air ( A	A and $B$ ) is partially soluble, above
	the	critical solution temperature,		,
	A	A and B dissolve completely	B)	A precipitates out
	C)	C separates out	D)	the mixture forms three layers.
166.	An i	deal binary liquid mixture obeys		
	A)	Henry's law	B	Raoult's law
	C)	Boyle's law	D)	Dalton's law:
167.	Whi	ch of the following driers operates in	n batcl	hes?
	A)	Spray drier	BÍ	Tray drier
	C)	Rotary drier	D)	Tunnel drier.
168.	In M	IcCabe-Thiele method, if the feed is	a boili	ing liquid, $q$ -line will be
,	A)	vertical	B)	horizontal
·	C)	with a positive slope	D)	with a negative slope.
169.	In d	rying, Leidenfrost point means	•	
	A)	equilibrium moisture content	В)	free moisture content
	C)	internal moisture content	D)	critical moisture content.
170.	A m	ixture of benzene and toluene boils	at 95	°C under a pressure of 101·3 kPa.
	At 9	95°C, the vapour pressures of ber	nzene	and toluene are 155.56 kPa and
	63.9	8 kPa respectively. The composition	of the	e boiling liquid is
	A)	40.75 mole % toluene	B)	26·15 mole % toluene
	2	40.75 mole % benzene	D)	59·25 mole % benzene.
171.	The	temperature of air in a room is 40°0	and	the total pressure is 101 3 kPa abs.
	Air o	contains water vapour with a partia	al pres	ssure $p_A = 3.74$ kPa. The absolute
	hum	idity is		
	AY	0.0238	B)	0.0386
	C)	0.049	D)	0.0037.

- 172. Supersaturation is achieved by
  - A) cooling a solution through indirect heat exchange
  - B) evaporation of part of solvent
  - C) adding new substance which reduces the solubility of original solute
  - D all of these.
- 173. Molecular diffusion is due to
  - A) thermal motion of the molecules B) potential energy of the molecules
    - C) activation energy of the molecules D) none of these.
- 174. Rayleigh equation applies to
  - A differential distillation
- B) flash vaporisation
- C) equilibrium distillation
- D) molecular distillation.
- 175. For a binary mixture with low relative volatility
  - A) use steam distillation
  - B) use molecular distillation
  - C) use high pressure distillation
  - DI an azeotrope may be formed during distillation.
- 176. Which of the following curves represent a minimum boiling azeotrope?



x =liquid composition

- BY E
  - D) D.

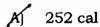
- A) A
- C) . C

177. Very tall packed towers are divided into series of beds to

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A)	reduce the overall pressure	drop	)BY	avoid channelling
C)	avoid flooding		D)	none of these.
178. We	tted wall tower experiment de	termine	es	· .
A)	molal diffusivity		B)	volumetric coefficient
es	mass transfer coefficient		D)	none of these.
179. Co-	-current absorbers are usua	lly use	d who	en the gas to be dissolved in the
. liqi	uid is			
A)	sparingly soluble		B)	highly soluble
R	a pure substance		D)	a mixture.
180. If (	G is an insoluble gas stream	and $L$	is a n	on-volatile solvent in liquid stream,
the	n the slope of the operating li	ne for t	he ab	sorber is
A	L/G		<b>B</b> )	G/L
C)	always < 1		D)	none of these.
181. Pro	ximate analysis of coal gives			•.
A)	carbon, hydrogen and ash			
₽Y	volatile matter, moisture, as	sh and	fixed o	carbon
C)	carbon, hydrogen, sulphur	and nit	rogen	
D)	volatile matter, moisture, ni	trogen	and c	arbon.
182. The	e chemical formula for rust is			
AI	${ m Fe_2O_3}$ . $x{ m H_2O}$		В)	$Fe_2O_3$
C)	Fe <sub>3</sub> O <sub>4</sub> . <i>x</i> H <sub>2</sub> O		D)	Fe <sub>3</sub> O <sub>4</sub> .
183. The	e average molecular weight of	air is		•
A)	25		B)	27
C)	30		D)	<b>.</b> 29.
:	orr is equivalent to		• '	
A	1 mm Hg		B)	1 pascal
C)	1 atm		D) _	1 mm water column.
ŕ	•	607	- <i>';</i> 1	
		607		Turn over

185. 1 BTU is equivalent to



B) 0.252 cal

C) 1 kcal

D) 252 kcal.

186. The specific gravity of liquid is the ratio of its density to the density of

A) air

B) water

C) liquid

D) none of these.

187. The value of R in  $\frac{\text{m}^3 \text{ mm Hg}}{\text{mol. K}}$  is

A) 6.2364×10<sup>-2</sup>

B) 1.987

C) 8.314

D) 10.73.

188. A wet substance containing 25% water on dry basis, is dried to 2.5% water on dry basis. The amount of water removed in percentage is

A) 90%

B) 75%

C) 10%

D) 60%.

189. If the heat capacity is given by  $C_p = a + bT$ , where  $C_p$  is in kJ/k mol.K and T is in K

- A) the constants a and b are dimensionless constant
- B) both a and b have dimensions kJ/k mol.K
- C) the dimension of a is kJ/k mol.K and that of b is kJ/k mol
- the dimension of a is kJ/k mol.K and that of b is kJ/k mol.K<sup>2</sup>.

190.  $N_2 + 3H_2 \rightarrow 2NH_3$ . In the ammonia converter, mixture of  $N_2$  and  $H_2$  containing 20%  $N_2$  by volume is sent to the converter. The limiting reactant is



B) H<sub>2</sub>

C) NH<sub>3</sub>

D)  $N_2$  or  $H_2$ .

191. 100 kg coal containing 66% C, 15% O<sub>2</sub>, 19% ash by weight is burned in air. How many moles of air are theoretically required by 100 kg coal?

A) 23·95

B) 5.5

C) 26·19

D) 38.

192. For real gases, the partial volume and pure component volume will be

A) same

- B) different
- C) may be same or different
- D) none of these.

193. In SO<sub>3</sub> production, 100 k mol of SO<sub>2</sub> and 200 k mol of O<sub>2</sub> are fed to reactor. The product contains 80 k mol of SO<sub>3</sub>. The per cent conversion of SO<sub>2</sub> is

AT 80

B) 100

C) 50

D) 40.

194. An aqueous solution of triethanolamine (TEA) contains 50% TEA by wt. The density of solution is 1.05 kg/L. The molecular wt. of TEA is 149. The molality of solution is

A) 335.6 M

B) 0.3524 M

C) 35.24 M

æ∫ 3·524 M.

195. A plot of boiling point of solution against boiling point of pure water at same pressure for a given concentration is known as

A Dühring's rule

B) heat of solution

C) Trouton's rule

D) none of these.

196. The heat of combustion data for the following reactions are:

$$CH_4(g) + 2O_2(g) \rightarrow CO_2(g) + 2H_2O(l) \quad \Delta H^\circ = -890 \cdot 4 \text{ kJ}$$

$$C(s) + O_2(g) \rightarrow CO_2(g)$$

$$\Delta H^{\circ} = -393 \cdot 51 \, kJ$$

$$H_2(g) + \frac{1}{2}O_2(l) \rightarrow H_2O(l)$$

$$\Delta H^{\circ} = -285 \cdot 84 \text{ kJ}$$

The heat of formation of methane is

197.	In a	chemical process, per cent yield is		
	A)	$\frac{\text{moles of the feed unreacted}}{\text{moles of the feed charged}} \times 100$		•
	B)	$\frac{\text{moles of the feed reacted}}{\text{moles of the feed charged}} \times 100$		•
	C)	moles of the reactant converted to the total moles of the reactant fed	he des to the	process × 100
/	Ø)	moles of the reactant converted to d	esired	$\frac{1 \text{ product}}{\text{ed}} \times 100$ .
198.	In a	gas-liquid contact system, for dilute	e mixt	ures, the equilibrium compositions
	on b	oth the phases are given by		•
	A)	Raoult's law	BY	Henry's law
	C)	Hess's law	D)	Fick's law.
199.	In ar	absorption column, the absorption	facto	r is the ratio of the slopes of the
_	AYA	operating line to equilibrium line		
	B)	equilibrium line to operating line		
	C)	tangent of the equilibrium line to op	peratii	ng line
	D)	tangent of the operating line to equi	ilibriu	m line.
200.	The	gas which constitutes the maximum	to th	e heating value of natural gas is
	A)	СО	B)	CO <sub>2</sub>
	<b>(1)</b>		DV	CII

## ( SPACE FOR ROUGH WORK )

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