SO

Sl. No. :	050069							PGCH			
		Register Number									

2012

CHEMICAL ENGINEERING

Time Allowed : 3 Hours } [Maximum Marks : 300

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

IMPORTANT INSTRUCTIONS

- 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.
- 2. Do not tick-mark or mark the answers in the Question Booklet.
- 1. The last sheet of the Question Booklet can be used for Rough Work.



- 1. Partial recirculation of warm and humid air leaving a tower is more likely to occur in
 - A) a natural draft tower
- a forced draft tower
- C) an induced draft tower
- D) spray tower.
- 2. The diffusivity of liquids is directly proportional to the temperature to the power of
 - A) 1

B) 2

C) 3

- D) 3/2.
- 3. If lattice sites are unoccupied, an atom in an adjacent site may jump into such a vacancy. It is
 - A) Interstitialcy mechanism
- B) Crowd-ion mechanism
- C) Interstitial mechanism
- Vacancy mechanism.
- 4. The absolute humidity Y' of water vapour-air mixture is given by
 - A) $Y' = \frac{\overline{P}_A}{P_t \overline{P}_A} \times \frac{29}{18}$

 $Y' = \frac{\bar{P}_A}{P_A - \bar{P}_A} \times \frac{18}{29}$

C) $Y = \frac{\bar{P}_A}{P_t - \bar{P}_A} \times \frac{18}{29}$

- D) $Y = \frac{\overline{P}_A}{P_{\ell} \overline{P}_A} \times \frac{29}{18} .$
- 5. The binary diffusivity in liquid is proportional to temperature
 - A) T

B) $T^{3/2}$

C) T^2

- D) T^3 .
- 6. The Knudsen diffusivity is proportional to
 - A) $D_{K.A} \propto T$

B) $D_{K,A} \propto T^{3/2}$

O $D_{K,A} \propto T^{1/2}$

- D) $D_{K,A} \propto T^2$.
- 7. Which one of the following scales is used for expressing specific gravity of petroleum products?
 - A) Baume scale

B) API scale

C) Twaddell scale

D) Brix scale.

8.	For air-water system at atmospher	ne condition	ns, Lewis number is
	A) > 1	B)	< 1
	C) 1	D)	0.
9.	For any reversible, cyclic process,	the entrop	y of the system is
	A) $\Delta s = 0$	B)	Δs < 0
	C) $\Delta s > 0$	D)	$\Delta s = 1.$
10.	In polytropic process ($PV^n = cons$	stant) n =	1. It means
	A) an adiabatic process	B	an isothermal process
	C) an isobaric process	D)	a reversible process.
11.	Proximate analysis of coal determin	nes	
	A) Moisture, ash, sulphur, volati	le matter	
	B) Carbon, ash, sulphur, nitroge	en	
	Moisture, volatile matter, ash	, fixed carb	oon
	D) Carbon, hydrogen, nitrogen, s	sulphur.	
12.	The most preferred material for to	wer fill is	
	A) wood	B)	concrete
	CY PVC	D)	chrome steel.
13.	A compound of which melecular v	weight is 1	03, analyses C - 81·5%, H - 4·9%,
	N - 13.6%. What is the formula?		
	$A C_7 H_5 N$	B)	$C_6H_4N_2$
	C) C ₇ H ₄ N	D)	C ₆ H ₅ N.
14.	The diffusivity coefficient is d	efined as	the ratio of its flux J_A to its
	gradient.	. 6	
	A) Temperature	B)	Pressure
	Concentration	D)	Velocity.
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15.	In r	nass transfer operations such as l	eachi	ng, drying, adsorption and reverse
	osn	nosis, diffusion occurs in the		phase.
	A)	Liquid	by	Solid
	C)	Gas	D)	Solid-solid.
16.	The	diffusion of solutes through certain	n type	s of polymeric solid is described in
	tern	ns of		
	A)	solubility	BY	permeability
	C)	diffusivity	D)	crystallinity.
17.	Elec	ctrostatic precipitator is used to cor	itrol tl	he pollutants.
	A)	Gas	B	Air
	C)	Water	D)	Solid.
18.	Diff	usive movement may be within the	fluid f	filling the pores or may also involve
		diffusion of adsorbed	solute	<u>,</u>
	A)	Liquid	B)	Solid
	C)	Gas	by	Surface.
19.	The	choice of solvent for absorption is a	not ba	sed on the property
	A)	viscosity	18)	thermal conductivity
	C)	volatility	D)	solubility.
20.	In a	a packed tower, the liquid and gas	comp	positions change continuously with
		of packing.		·
	A)	volume	B)	density
	dv	height	D)	area.
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21.	Dry bulb temperature of a vapour-gas mixture is determined by immersion of a			
	then	mometer in the		
	A)	Solute	B)	Gas
	C)	Vapour	M	Vapour gas mixture.
22.	The	total effective interfacial surface	for m	nass transfer is described as the
	prod	luct of specific interfacial surface an	ıd	
	A)	volume	By	height
	C)	area	D)	breadth.
23.	The	equilibrium vapour pressure that is	exert	ed by a component in a solution is
	prop	portional to the mole fraction of that	comp	onent. It is called as
	A)	Dalton's law	B)	Henry's law
	8	Raoult's law	D)	Amagat law.
24.	The	absolute humidity is given by the ra	itio of	
	A)	mass of solid/mass of gas	В)	mass of liquid/mass of gas
	Ø	mass of vapour/mass of gas	D)	mass of gas/mass of water.
25.	The	Grosvenor humidity is called as		
	A)	absolute humidity	B)	molar absolute humidity
	9	mass absolute humidity	D)	molal absolute humidity.
26.		solubility of any gas is influenceribed by	ced b	y the temperature, in a manner
	A)	Raoult's law	B)	Henry's law
	C)	Fick's law	rb)	van't Hoff's law.

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27.	The	overall tray efficiency can be compu	uted b	y the equation
	A)	equilibrium trays \times real trays	BY	equilibrium trays real trays
	C)	real trays × equilibrium trays	D)	real trays equilibrium trays
28.	The	material balance is an expression	of the	law of conservation of
	in a	ccounting terms.		
	A)	energy	B)	power
	CY	mass	D)	heat.
29.	The	most preferred material for the case	ing wa	alls of a cooling tower is
	A)	PVC	BY	FRP
	C)	CAB	D)	Wood.
30.	For	processes in which chemical reac	tions	occur, it is desirable to utilize the
		units.		
	A	gram-mole	B)	mole fraction
	C)	weight fraction	D)	mass fraction.
31.	Mol	e % of A is given by the equation		
	A)	weight fraction × 100	BY	mole fraction × 100
	C)	volumetric fraction \times 100	D)	atomic fraction \times 100.
32.	The	newton-metre is the work done w	vhere	a force of one newton acts over a
	dist	ance of one metre. It is equal to		in S.I. unit.
	A)	kilowatt	BA	joule
	C)	watt	D)	erg.
33.	Whi	ich of the following is a likelý value o er ?	of the	superficial air velocity in hyperbolic
	A)	100 m/s	B)	10 m/s
	de	l m/s	D)	0.1 m/s.

34.	ma	cooling tower terminology, the rang	ge me	ans
	N	the reduction in temperature of the	e hot	water
	B)	the difference between the maximu	im an	d minimum air flow rates
	C)	the change in the air temperature		
	D)	the reduction in temperature of the	e cold	water.
35.	If th	e 'approach' in a cooling tower is s	smalle	er, the height of the packed section
	will			_
	A)	be less	B	be more
	C)	remain unaffected	D)	be zero.
36.	Anti	mony oxide is an example of		
	A)	anodic inhibitor	B	cathodic inhibitor
	C)	anodic accelerator	D)	cathodic accelerator.
37.	Red	uction of moisture content of air to	such	an extent that the amount of water
	cond	densed on metal is too small to caus	se con	rosion. This is known as
	A)	Deaeration	B)	Neutralization
	er	Dehumidification	D)	Deactivation.
38.	The	function of addition of sodium su	lphide	e in cathodic inhibitors, in natural
	solu	tion, is		
	À	to eliminate oxygen	B)	to introduce oxygen
	C)	oxidation	D)	none of these.
39.	Anti	imony and arsenic oxides are use	ed as	inhibitors in cathodic inhibitors,
	beca	ause they		
	A)	decrease hydrogen overvoltage		
	BY	increase hydrogen overvoltage		
	C)	increase & decrease hydrogen ove	rvolta	ge
	D)	none of these.		•

40.	Cathodic coatings are obtained	by coating	
	a more noble metal		
	B) metal having lower electro-	de potential	
	C) a more active metal		
	D) none of these.		
41.	The caustic embrittlement corre	osion at high p	ressure is due to
	A) sodium sulphate	A	sodium carbonate
	C) tannin	D)	lignin.
42.	Which of the following is sa aluminium in Alclad?	andwiched bei	tween two layers if 99.5% pure
	A Duralumin	B)	Copper
	C) Zinc	D)	Nickel.
43.	The process of coating iron or	steel sheets v	with a thin coat of zinc to prevent
	from rusting is known as		
	A) tinning	Br	galvanizing
	C) metal cladding	D)	none of these.
44.	In cathodic inhibitor, corrosion	may be reduce	ed by
	slowing down the diffusion	n of hydrated H	to the cathode
	B) increasing the diffusion of	hydrated H + t	o the cathode
	C) increasing the diffusion to	cathodic area	$\epsilon_{\mathbf{x}}$
	§ D) aeration.		
45.	Zinc chloromate in primary coa	ting of paints is	s a powerful
	A) accelerator	B)	retarder
	inhibitor	D) ·	none of these.

46. Rusting of iron is

- A) prevented by zinc coating
- by prevented if the article is connected with a wire of Mg
- C) enhanced by wet air
- D) retarded by the presence of dissolved salts.

47. Chemical corrosion always takes place at

A anodic areas

- B) cathodic aveas
- C) anodic and cathodic areas
- D) in the interior of metal.

48. During galvanic corrosion, the more noble metal acts as

A) an anode

B) anode as well as cathode

(cathode

D) a corroding metal.

49. The corrosion will be rapid at

A) pH = 7

b) pH < 7

C) pH > 7

D) none of these.

50. Corrosion is an examplé of

oxidation

B) reduction

combination reaction

D) erosion.

51. What is the effect of dissolved carbon dioxide on rate of rusting of iron?

A) Decreases

- B) No effect
- C) Increases & decreases
- Increases.

52.		oure metal rod half-immersed ver	tically	in water s	tarts c	orroding	at the
	A)	the rod above & closely adjacent t	o wate	er line becom	ies ano	de	
	B)	the lower part of rod immersed in					
	C)	the lower part of rod becomes cat	hodic				
	OF	differential aeration.					
53.	The	addition of copper sulphate to zinc	place	d in 1NH ₂ S	SO 4 will	1	
	CAY	enhance the corrosion rate					
	B)	reduce the corrosion rate					
	C)	increase & decrease the corrosion	rate				
	D)	none of these.		•			
54.	ln a	erated atmosphere and elevated te	mpera	tures which	of the	following	metals
	will	have lowest rate of oxidation?					
	A)	Nickel	B)	Chromium			
	1et	Tungsten	D)	None of the	ese.		
55.	Whi	ch of the following anions in a med	dium r	esults to the	forma	tion of in	soluble
	reac	etion products, that inhibits further	corros	sion ?			
	A)	Chloride ion	B)	Ammonium	salts		,
	C)	Traces of copper	bor	Silica gel.			
56.	If ar	nodic area is smaller than cathodic	area, t	then			
	A)	cathodic current density is greater	than	anodic curre	ent dens	sity	
	B)	cathodic current density is equal	to ano	dic current d	lensity		
	œ	anodic current density is greater t	han ca	athodic curre	ent dens	sity	
	D)	none of these.					

57. In non-passivating type of corrostion, the corrosion rate may be decreased by B) minimizing flow velocity A) maximizing flow velocity \mathbb{C} enhancing the diffusion rate none of these. D) 58. In designing corrosion control, when two dissimilar metals are to be in contact, then those metals should be as far as possible to each other in the A) electrochemical series B) the anodic material should have small area LCY anodic material should have as large area as possible D) none of these. Mercaptan is an 59. Inorganic cathodic inhibitor B) Inorganic anodic inhibitor A) Organic cathodic inhibitor Organic anodic inhibitor. D) 60. What is the reduction range in corrosion rate observed during the transition from the active to the passive film? 10^{-3} to 10^{-4} mpy B) 10^{-2} to 10^{4} mpy A) 10³ to 10⁶ mpy. C) 10^{5} to 10^{9} mpy Deterioration of metal due to the activity of living organism is called 61. pitting corrosion B) passivity A) both (A) and (B). 1C) biological corrosion D) Depolarization is the result of interaction between the oxidizing agent and 62. neon gas on the surface nitrogen gas on the surface B) A)

helium gas on the surface

C)

by hydrogen gas on the surface.

- 63. 'Season cracking' is a term applied to
 - A) intergranular corrosion
 - B) caustic embrittlement
 - Ver stress corrosion of copper alloys, mainly brass
 - D) pitting corrosion.
- 64. The function of amine in protecting corrosion in iron is by keeping
 - A) high | H + | in solution
- low [H+] in solution
- C) low [OH -] in solution
- D) neutral.
- 65. Which of the following metal oxides is volatile?
 - A) AgO

B) Fe ₂O ₃

C) Al₂O₃

- MoO 3.
- 66. The chemical formula for rust is
 - A) FeO.x H $_2$ O

B) NaO.FeO.x H₂O

Fe 20 3.x H 20

- D) Fe $_{2}$ (SO $_{4}$) $_{3}$. Fe $_{2}$ O $_{3}$. x H $_{2}$ O.
- 67. Which of the following statements is not correct?
 - Aluminium corrodes faster than iron
 - B) Iron corrodes faster than aluminium
 - C) Impure metal corrodes faster than pure metal under identical condition
 - D) wire mesh corrodes faster at the joints.
- 68. In which of the following metals, specific volume of their oxide is less than that of the metal?
 - A) Aluminium

B) Chromium

Potassium

D) Copper.

69.	The	particle shape, size and distribution	ofaj	pigment influence the
	A)	lattice structure	В)	crystalline structure
	101	rheological properties	D)	coefficient of dispersion.
70.	Cho	ice of the pigments are dependent u	pon	
	A)	the dispersing resin	B)	main resin type and structure
	CV	both (A) and (B)	D)	none of these.
71.	Any	heat exchangers for vehicle like	car ı	adiators surface pretreatment is
	requ	nired because of		•
	A)	anti-corrosion property		
	B)	water splash proof property		
	C)	deodorizing and anti-bacterial prop	erty	
	DI	all of these.		
72.	For	emulsion polymerization normally th	ne viso	cous grade is of
	A)	high density	B	low viscous
	C)	high viscous	D)	low density.
73.	Cen	nentation process is classified accord	ding t	o
	A)	nature of alloy of iron only		UF
	LBT	nature of alloy of iron with coating	metal	
	C)	nature of coating metal		
	D)	none of these.		
74.	The	properties of acrylic acid methacry	lic est	er polymers depend mainly on
	A)	acid used	B)	ester used
	lar	alcohol used	D)	ether used.

75.	If tir	n is coated on iron, this process is o	alled	
	A)	Thinning	B)	Tanning
	Let	Tinning	D)	Thickening.
76.		tings of Zn, Al, Cd on steel are a	nodic	because of their higher value o
	A)	cathode potential	B	electrode potential
	C)	overpotential	D)	anode potential.
77.	Prus	ssian blue is also known as		
	A)	ferric blue	B)	manganese blue
	ier	iron bronze	D)	bronze.
78.	Opa	city in organic pigment is dependen	t on	
	LAT	dispersion condition and formulation	n	
	B)	inorganic mutual mixing		
	C)	toners		
	D)	suspension conditions.		
79.	The	chemical removal of a scale is called	d	
	A)	solvent cleaning	B)	abrasive cleaning
	LOT	pickling	D)	mill scale.
80.	Mec	hnical surface preparation includes		
	A)	hand-tool cleaning	B)	flame cleaning
	C)	abrasive blast cleaning	IDY"	all of these.
81.	Pign	nents consist of powder like crystall	ine pa	rticles which are
	A)	soluble in organic solvents only		
	B)	insoluble in organic solvents only		
	108	soluble either in organic solvents o	r in w	ater
	D)	soluble in water only.		

82.	Tag	open-cup apparatus is used for		
	A)	the solute allowed to diffuse in dry	air	
	B)	the solute allowed to diffuse in am	bient :	air '
	ver	the solvent vapours allowed to diff	use in	the ambient air
	D)	the solvent vapours allowed to diff	use in	dry air.
83.	Ano	odised coating is performed on non-f	errous	s metals and their alloys by
	A)	Cathodic process	B)	Anodic process
	'SY	Anodic oxidation process	D)	None of these.
84.	Lun	ninescent paints fluoresce under the	e influ	ence of
	A)	sunlight source	B)	artificial light source
	Ver	ultraviolet source	D)	none of these.
85.	The	relative solvent power of hydrocar	bon so	olvents or diluents are an indicator
	of			
	A)	Aniline point	B)	Mixed aniline point
	C)	Heptane number	DY	Kauri-butanol value.
86.	Cru	de titanium tetrachloride is purified	by	
	A)	liquor filtration	BI	fractional distillation
	C)	wet treatment	D)	oxidation.
87.	The	e better flow and lap-in properties	in so	lvent systems may be obtained by
	usii	ng solvent blends with	-	
	A)	higher volatility	B	lower volatility
	C)	higher density	D)	higher viscosity.
88.	Nor	n-drying oil contains		
	A)	high percentage of conjugated fatt	y acid	esters
	B)	low percentage of conjugated fatty	acid	esters
	by	only saturated fatty acid esters		
	D)	none of these.		

89. In solvent systems for spray applications, the percentage of low boiling point is

	(Ba	ised on total solvent composition)		
	A)	90% - 95%	B)	50% - 55%
	C)	25% - 40%	Dr.	1% - 10%.
90.	The	most efficient method of cleaning of	ement	t surfaces is
	A)	brush coating	B)	sandblasting and acid-etching
	C)	dip coating	D)	air-knife coating.
91.	The	saponification value of linseed oil is	3	
	A)	130 - 140	B)	110 - 120
	8	188 - 195	D)	175 – 193.
92.	Gly	ceryl monolaurate surfactant is		
	A)	Amphoteric	B)	Anionic
	C)	Cationic	by	Non-ionic.
93.		number of milligrams of potas- apletely the free acid present in one		hydroxide required to neutralize of an oil is known as
	A)	saponification value	19	acid value
	C)	ester number	D)	iodine value.
94.	Whi	ch of the following combinations is	comm	only known as varnish ?
	·A)	Binder and additive	B)	Additive and volatile liquid
	C)	Binder and solvent	197	Binder and volatile liquid.
95.	The	viscosity of cellulose based lacquer	s is m	easured by
	A)	Ubbelohde viscometer	B)	Ostwald viscometer
	C)	Gel permeation chromatography	DY	falling ball viscometer.
96.	Whe	en the varnished finish is exposed to	o sunl	ight and coloured, then it is known
	as			
	A)	baked enamel	By	brushed enamel
	C)	varnish	D)	paint.
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97.	The usual ratio of cellulose to resin ratio in lacquers is							
	A)	5:1	B)	1:3				
	OF	3:1	D)	1:4.				
98.	Colle	odion is a solution of						
	A)	cellulose in ether-alcohol solvent						
	B	cellulose-ester in ether-alcohol solv	ent					
	C)	cellulose in acetone						
	D)	cellulose ester in acetone.						
99.	Pain	at is						
	A)	a) baked enamel						
	B)	brushed enamel						
	CH	dispersion of a pigment in a varnis	h					
	D)	solution of resin in a volatile solven	ıt.					
100.	If a	fluid is stirred, brushed or otherwis	se wo	rked and become less viscous, it is				
	refe	rred to as						
	A)	application	B)	conversion				
	·Q}	thixotropic	D)	autotropic.				
101.	The	drying oil which is used in varnish	is					
	A)	Groundnut oil	BY	Soybean oil				
	C)	Sunflower oil	D)	Gingelly oil.				
102.	The	ease of polymerization of the given	set of	monomers is				
	A)	ethylene > propylene > isobutylene	:					
	B)	propylene > ethylene > isobutylene	;					
	C)	isobutylene > ethylene > propylene	e					
	by isobutylene > propylene > ethylene.							

103. Silica modulus in manufacture of good cement clinker is defined as

- A) SiO $_2$ / (MgO + Al $_2$ O $_3$)
- B) CaO/(MgO + SiO 2)
- C) SiO_2 / (CaO + Al $_2$ O $_3$)
- $\mathfrak{S}_{1} \circ \mathfrak{S}_{2} / (\mathfrak{A}_{2} \circ \mathfrak{S}_{3} + \mathfrak{F}_{2} \circ \mathfrak{S}_{3}).$

104. Waterproof cement contains which of the following, in addition to normal constituents?

- W Calcium stearate, oleic and lauric acids
- B) Calcium silicate
- C) Iron silicate
- D) Calcium and magnesium silicate.

105. The essential component of a acrocrete cement is

- A) sodium and potassium oxides .
- B) aluminium and sodium oxides
- C) sodium and potassium powder
- aluminium powder.

106. The composition of kaolinite is

- A) K $_2$ O.MgO.Al $_2$ O $_3$.SiO $_2$.H $_2$ O
- B Al 20 3.2SIO 2.2H 20
- C) Al $_2$ O $_3$.5SiO $_2$.n H $_2$ O
- D) Fe ₂O ₃.Al ₂O ₃.2SiO ₂.2H ₂O.

107. Which one of the following is acid refractory?

A) Magnesite

B) Silicon carbide

Silica

D) Chromite.

108. The increasing fusion temperature of the refractories is

- A) Kaolinite > Silica Brick > Magnesia Brick > Zirconia
- B) Silica Brick > Kaolinite > Zirconia > Magnesia Brick
- C) Kaolinite > Magnesia Brick > Silica Brick > Zirconia
- D) Zirconia > Magnesia Brick > Kaolinite > Silica Brick.

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109.	The	chromite	contains

Cr and Fe

Bì Cr and Sn

Cr and Zn

D) Cr and Cu.

110. The ore of Nickel, pentlandite contains

(Fe.Ni.Cu)S

(Ni.Mg) SiO 2.x H 2O B)

(Fe, Co, Ni) As

(Ni, As). D)

111. The anode mud in refinery of nickel contains

A) Cu, Ag, Fe B) Ag, Pb, Cu

C) Hg, Ag, Cu Hg, Au, Pb.

112. The compostion of cartridge brass is

$$Cu = 70\% : Zn = 20\% : Al = 10\%$$

$$Cu = 70\% : Zn = 30\%$$

$$Cu = 60\% : Zn = 10\% : Co = 10\% : Al = 20\%$$

D)

Cu =
$$50\%$$
 : Zn = 20% : Co = 10% : Al = 20% .

113. The hardest of all artificial abrasives is

A) Alundum B) Carborundum

Boron norbide

D) None of these.

114. The function of metal in high refractory ceramic particles is

A) suspending agent B) dissolution agent

binder

D) solubilizer.

115. The approximate composition of ordinary glass sodalime glass is

Na 2O.PbO.Al 2O 3 A)

Na 2O.CaO.6SiO 2

K₂O,PbO.6SiO₂ C)

Na $_2$ CO $_3$.CaO.6SiO $_2$. D)

116. Flint glass should contain which one of the following?

Red lead

Soda B)

C) Potash D) Borate.

[Turn over

117.	7. If the interfacial boundary energy of the adhesive and adherent surface is lower						
than the sum of the surface charges of the adhesive and adherent, the							
	adhesion results in						
	**	permanent	B)	temporary			
	C)	weak '	D)	none of these.			
118.	The	addition of small amount of maleic a	icid to	polyvinyl chloride results in			
	A)	reduction in adhesive strength					
	BI	enhancement of the adhesive stren	gth	•			
	C)	no change in adhesive strength					
	D)	no adhesion.					
119.	Whic	ch of the following adhesives is used	l for b	onding non-porous surfaces ?			
	A)	Shellac resin	B)	Soya bean glue			
	C)	Casein glue	by	Polyvinyls.			
120.	Glue	es of protein-origin exhibit better str	ength	by			
	M	addition of alkali	B)	addition of acid			
	C)	maintaining neutral pH	D)	none of these.			
121.	Whic	ch of the following polymers has the	highe	est glass transition temperature?			
	A)	Polystyrene	B)	Polyethylene			
	C)	Polyester	D)	Polycarbonate:			
122.	The	polydis persity of a polymer is giver	by				
	M	\bar{M}_w / \bar{M}_m	B)	\bar{M}_m / \bar{M}_w			
	C)	$\frac{\sum N_i M_i}{\sum N_i}$	D)	$\frac{\sum N_i M_i^2}{\sum N_i M_i}$.			
123.	In Zi	iegler-Natta polymerization, the reas	on for	stereo-specificity of polymerization			
	is du	ue to coordination of					
	A	Monomer with atom	B)	Polymer chain with atom			
	C)	Hydrogen	D)	Oxygen.			

124.	1. The catalysts used in cationic polymerization are compounds with pronounced				
	Λ)	electron donors	13)	electron acceptors	
	C)	neutral	D)	complex.	
125.	prov	emosetting polyester resins are uside a tough resistant finish. Whieling drying?		•	
	A)	Oxidation and degradation	B)	Reduction and degradation	
	c	Oxidation and cross linking	D)	Reduction and cross linking.	
126.	High	density polyethylene is prepared by	y		
	'Ay	low pressure polymerizaion			
	B)	high pressure polymerizaion			
	C)	high pressure with high temperature	re		
	D)	none of these.			
127.	7. The swelling behaviour of an elastomer can be predicted by				
	A)	Boltzmann distribution	B	Flory-Huggins treatment	
	C)	Arrhenius equation	D)	Mark-Houwink equation.	
128.	The	chief flux-forming components of th	e mix	in the cement manufacture are	
	M	alumina and iron oxide	B)	silica and iron oxide	
	C)	alumina and silica	D)	none of these.	
129.	Meta	allic glass was discovered by		-	
	A	Duwez	B)	Young	
	C)	Tassios	D)	Kevlar.	
130.	Amo	ong the following, which one retards	the ra	ate of hydration ?	
	A	Sugar	B)	CaCl ₂	
	C)	Both (A) and (B)	D)	None of these.	

131.	. Steel and concrete have						
	similar coefficients of thermal expansion						
	B) different coefficients of thermal expansion						
C) similar fracture strain							
	D)	same density.					
i32.	Phot	ochromic silicate glasses possess					
	A)	optical darkening property	B)	optical bleaching property			
	C)	thermal bleaching property	pl	all of these.			
133.	The	gradual cooling of glass products is	called	1			
	A)	tempering	B	annealing			
	C)	quenching	D)	galvanising.			
134.	The	setting and hardening of cement is					
	A)	an oxidation process	B)	a reduction process			
	C)	a decomposition process	br	a hydration process.			
135.	Phos	sphate adhesives are made by reacti	ing ph	osphoric acid with			
	A	Zinc oxide	B)	Copper oxide			
	C)	Aluminium oxide	D)	Lead oxide.			
136.	Λn c	example of a popular adhesive is					
	A	cyanoacrylite	B)	acrylonitrile			
	C)	polyamide	D)	epoxy resin.			
137.	Whi	ch of the following is an example for	adhe	esive?			
	A	Epoxy resin	B)	Amberlite			
	C)	Copper sulphate	D)	Deolite.			
138.	An e	engineering plastic is					
	A)	Polystyrene					
	B)	LDPE					
	C)	HDPE					
	101	Acrilonitrile-butadiene-styrene (AB	S).				

139. In rubber, the role of sulphur is as a/an

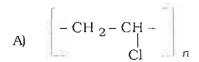
A) accelerator

vulcanising agent

C) softener

D) antioxidant.

140. The repeat unit of polymer in acylonitrile fibre is



C)
$$\begin{bmatrix} -CH_3 - CH - \\ CH_3 \end{bmatrix}_n$$

141. The degree of polymerization in radical polymerization by termination by coupling is (with usual notation)

A) R_p/R_i

 $\frac{1}{2R_p/R_i}$

C) $R_p / 2R_i$

D) $2R_p/R_1$.

142. The kinetic chain length in the radical polymerization is (with usual notation)

 R_{p}/R_{i}

B) R_i/R_p

C) R_1/R_p

D) $R_i / (R_p + R_t)$.

143. The polymerization of methyl methacrylate in water is an example of

- A) solution polymerization
- B) emulsion polymerization
- precipitation polymerization
- D) bulk polymerization.

144. In the polymerization of styrene, benzoquinone acts as

A) retarder

B) initiator

C) co-monomer

inhibitor.

- 145. The kinetic chain length for thermal generation of free radicals in the absence of an added initiator involving two molecules of monomer is
 - A) $(k_t)/(k_p/k_t)^{1/2}$
- $(k_p)/(k_i/k_i)^{1/2}$
- C) $(k_d)/(k_i/k_i)^{1/2}$
- D) $\left(k_p\right)/\left(\frac{k_l}{k_l}\right)^{1/2}$.
- 146. The polymerization of styrene initiated by azo-bis-isobutyronitrile (AIBN) proceeds normally at a rate proportional to
 - Ay square root of initiator concentration
 - B) initiator concentration
 - C) independent of initiator concentration
 - D) inverse of initiator concentration.
- 147. What is the role of polyvinyl alcohol in the suspension polymerization of vinyl chloride?
 - A) Retarder

B) Agglomerator

Suspension agent

D) Macro-initiator.

- 148. Terylene is a
 - A) polyamide

B) polyester

C) polyglycol

D) polycarbonate.

- 149. Nylon 6, 6 is
 - A) polyamide

B) polyester

C) polyether

- D) polyacrylate.
- 150. The principle mechanism involved in adhesion is
 - A) mechanical interlocking only
- B) diffusion theory only
- C) electrostatic theory only
- all of these.

151.	. Porosity and roughness of the surface will lead to							
	A)	weaker adhesion	BI	stronger adhesion				
	C)	significantly lesser adhesion	D)	none of these.				
152.	The	joint strength will be proportional t	o the	film strength of the adhesive when				
	the a	the adherent is						
	A	stronger than adhesive						
	B)	weaker than adhesive		•				
	C)	equal to the adhesive						
	D)	significantly lesser than the adhesi	ve.					
153.	Car	wind shield is made of						
	A)	polystyrene	B)	polyacrylic acid				
	Or	polycarbonate	D)	polymethacrylic acid.				
154.	A na	itural polymer is						
	A\	starch	B)	polystyrene				
	C)	polysulfone	D)	polyamide.				
155.	If th	e monomer molecular weight is 10	0, and	d if the polymer molcular weight is				
	1000	00 then the degree of polymerisation	n is					
	A)	50	A)	100				
	C)	1000	D)	10.				
156.		amorphous polymer is a conglomera						
	and calle	the extra empty space caused by ed	the i	random molecular arrangement is				
	A)	Matrix	B)	Chain coupling				
	Oj/	Free volume	D)	none of these.				
157.	The	solubility of polymer decreases with	l					
	A	increase in molecular weight of the	polyn	ner				
	B)	decrease in molecular weight of the	poly	mer				
	C)	increase in melting point of the poly	•					
	D)	D) decrease in melting point of the polymer.						

158.	8. Natural rubber is mainly			
	A)	Polybutadiene	B)	Polystyrene
	C)	Polychloroprene	D	Polyisoprene.
159.	Brar	nched chain polymer possesses		
	A)	low density and high melting point		
	br	low density and low melting point		
	C)	high density and low melting point		
	D)	high density and high tensile streng	gth.	
160.	The	monomer which is used in the prod	uctior	of polystyrene plastics is
	A)	Butadiene	BI	Styrene
	C)	Chloroprene	D)	Acrylonitrile.
161.	Buty	le rubber is mainly used in tubeles	s tyres	s because
	M	impermeable to air	B)	permeable to air
	C)	impermeable to water	D)	impermeable to light.
162. Which one of the following compounds reduces the time required for vulcanization?				
	At	Mercaptobenzothiazole	B)	Carbon black
	C)	Thiophenols	D)	Benzoic acid.
163.	Dacı	ron is a		•
	A	fibrous polymer	B)	rough polymer
•	C)	soft polymer	D)	strong polymer.
164.	Poly	tetrafluoroethylene (PTFE) is know	n as	
	A)	Dacron	BI	Teflon
	C)	Nylon	D)	Perspex.
165.	Lubi	ricants are used particularly in		- January Company
	A)	Granulation	B	Cold-molding
	C)	Extrusion	D)	Zone melting.

166.	66. In America, latex is obtained from the tree			
	A)	Bully tree	18)	Haveabrasiliensis
	C)	Kok-saghir	D)	Gutta Parcha.
167.	Epox	cy resins are obtained by the conde	nsatio	n of
	A)	ketone	B)	aldehyde
	8	phenol	D)	alkanes.
168.	Amo	ng the following, which one offers n	nore e	fficiency?
	A	Venturi scrubber	B)	Spray tower
	C)	Wet cyclone scrubber	D)	Gravitational settler.
169.	'Fun	nigation' is the term used to indicat	te	behaviour.
	A)	plume	B)	smog
	C)	fog	DI	smoke.
170.	Gase	eous sampling may be carried out by	y	
	A	adsorption	B)	distillation
	C)	vaporization	D)	desorption.
171.	The	air to cloth ratio of fabric filter for fl	y ash	emissions is around
	A)	20:30	B)	8:10
	C)	2:20	D	2.
172.	•	aration of particulates from an air acce forms a basis of	strean	n by abrupt collision against a flat
	A	Impingement	B)	Centrifugal
	C)	Thermal precipitation	D)	Filtration.
173.	Colle	ector in sedimentation process is co	nstru	cted of
	A)	Aluminium	B)	Cement
	C)	Polyethylene glycol	p	Polyethylene.
174.	Lone	don smog is mainly contributed by		
	A)	NO 2 from thermal power plant		
	B)	SO $_{2}$ from thermal power plant		
	C)	CO 2 from thermal power plant		
	D)	CO from thermal power plant.		

- 175. Among the following, which one is not a primary air pollutant?
 - A) Sulphur dioxide

B) Nitrogen dioxide

C) Hydrogen sulphide

- My Smog.
- 176. A statistically derived figure indicating the concentration of a material that could be expected to kill 50% of test animals under a particular condition or upon exposure for a specified period of time is known as
 - A) LD 50

BY LC 50

C) TLV

- D) TWA.
- - **λ**/ 1 μm

B) 500 µm

C) 2 µm

- D) 1000 μm
- 178. The air pollution detection and analysis device is
 - A) dust fall bucket

- B) paper-tape sampler
- C) high-volume sampler
- all of these.
- 179. The equation, which relates efficiency to particle size with respect to electrostatic precipitator is

$$\eta = 1 - \exp{-\frac{AW}{Q}}$$

B)
$$\eta = 1 - \exp \frac{AW}{Q}$$

C)
$$\eta = 1 - \exp \frac{Q}{AW}$$

D)
$$\eta = 1 - \exp \frac{AQ}{W}$$
,

where

A =area of the collection plates, m²

W = drift velocity. m/s of the charged particles

- Q =flow rate.
- 180. Centrifugal field consists of
 - A) inertial force

B) sweeping force

both (A) and (B)

D) van der Waals force.

181.	31. Cyclone separator works based on the principle of						
	N	centrifugal force	B)	centripetal force			
	C)	gravitational force	D)	electrostatic force.			
182.	Low	voltage two-stage electrostatic preci	pitato	rs operate at a voltage range of			
	A)	30,000 - 1.00,000 V	B)	15,000 - 20,000 V			
	C)	1.000 - 5.000 V	ist	6.000 - 12.000 V.			
183.	The	secondary air pollutant from the foll	owing	is			
	1	O 3	B)	NO			
	C)	SO ₂	D)	CO.			
184.		important climatic factor not affe itants is	cting	the response of vegetation to air			
	A)	light quality	B)	light intensity			
	C)	temperature	DI	pressure.			
185.	Cart abou	oon monoxide is commonly found	in city	y airs at a concentration of up to			
	A)	25 ppm	B)	35 ppm			
	C)	45 ppm	BI	55 ppm.			
186.	Whi	ch one is true for cyclone separator	?	,			
	A)	Requires large floor area		8			
	B) Very high collection efficiency even for very small particles ($< 10 \ \mu m$)						
	Ability to operate at high temperature						
	D)	High capital cost.					
187.	Ozo	ne Day is celebrated on					
	W	16th September every year	B)	16th November every year			
	C)	16th June every year	D)	16th August every year.			
188.	Pho	tochemical oxidants are produced in					
	A	Troposphere	B)	Stratosphere			
	C)	Ionosphere	D)	Mesosphere.			

1.80	Pick	out	the	wrong	ODO	
LOY.	PICK	CHIL	THE	within	OHIL.	

	I. Acidic oxidising solution is employed in solution impingers						
		11.	Impingement devices a	re mainly f	or collection of aerosols		
	III. Centrifugal method is not used for particle size greater than 5μm						
		IV.	Plastic bags are not us	ed for grab	sampling.		
	Of th	he stat	ements :				
	A)	I alo	ne	В)	II alone		
	C)	II an	d III	id	III and IV.		
190.	Whi	ch type	e of lilters are inert to be	oth acids ai	nd organic solvents ?		
	A)	Millip	ore	13)	Teflon .		
	C)	Pallifle	ex	D)	Acrapor.		
191.			ment which cannot be to evaporate too rapidly is		nperature where the liquid is easily		
	A	wet s	crubber	B)	fabric filter		
	C)	mecha	anical collector	D)	cyclone separator.		
192.	Polli	ution c	aused by SO $_{ m 2}$ in sulph	uric acid ca	in be reduced effectively by using		
,	W	doubl	e catalyst double absorp	tion techni	que		
	B)	B) single catalyst single absorption technique					
	C)	single catalyst double absorption technique					
	D)	doubl	e catalyst single absorpt	ion techniq	ue.		
193.	The	metho	d which is used to collec	ct hydrocar	bons & radioactive gases is		
	A)	adsor	ption sampling	B)	absorption sampling		
	C)	grab s	sampling	de	condensation sampling.		
				701	[Turn over		

31 .

194.	 The equipment which collects particulate matter by gravity or centrifugal force 			
	but	which do not depend upon a vortex	is	
	A)	electrostatic precipitator	B)	cyclone separator
	AS.	mechanical collector	D)	wet scrubber.
195.	Whi	ch one of the secondary meteorologic	cal pa	rameters influences air pollution?
	A)	Atomspheric stability	B)	Wind direction & speed
	C)	Mixing height	DI	Humidity.
196.	Pexo	oxyacetylnitrate (PAN) in photochem	nical s	smog is measured by
	A)	ultravisible spectrophotometer		
	B)	gas chromatography		
	C)	infrared spectroscopy		
	Dr	gas chromatography and infrared s	spectr	oscopy.
197.	Pois	oning of catalyst in catalytic convert	er is r	nainly due to
	h'	Olefins	B)	Paraffins
	9)	Lead compounds in fuel	D)	Alkenes.
198.	Whi	ch one of the following is the foul sr	nelling	ggas?
	A)	SO ₂	18)	H ₂ S
	C)	H $_2$ O $_2$	D)	Hydrogen fluoride.
199.	Whi	ch one of the following is major cont	tribute	or to the smog forming potential?
	A)	Alkanes	B)	Alkenes
	de	Olefins	D)	Paraffins.
200.	The	change of temperature with height	in the	troposphere is called
	A	Lapse rate	B)	Thermal rise
	C)	Inversion	D)	Plume.

(SPACE FOR ROUGH WORK)

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