UPSEE 2019

PAPER-ES: CODE AA*

ANSWER KEY, Examination Date: 21-04-2019

1	C	26	C	51	B	76	A	101	A	126	C	151	C	176	A	201	C
2	A	27	B	52	C	77	B	102	D	127	B	152	D	177	D	202	A
3	A	28	D	53	C	78	C	103	D	128	B	153	A	178	B	203	A
4	C	29	A	54	D	79	A	104	C	129	B	154	C	179	B	204	C
5	D	30	C	55	B	80	D	105	C	130	C	155	A	180	A	205	A
6	C	31	C	56	A	81	A	106	D	131	C	156	A	181	B		
7	B	32	C	57	A	82	A	107	A	132	A	157	C	182	D		
8	A	33	D	58	D	83	C	108	D	133	C	158	A	183	C		
9	D	34	A	59	C	84	B	109	B	134	B	159	D	184	B		
10	B	35	D	60	D	85	C	110	A	135	C	160	B	185	A		
11	D	36	D	61	C	86	B	111	B	136	D	161	A	186	A		
12	B	37	C	62	C	87	A	112	B	137	A	162	C	187	A		
13	B	38	C	63	C	88	B	113	D	138	B	163	D	188	A		
14	A	39	B	64	B	89	B	114	D	139	A	164	A	189	C		
15	B	40	D	65	C	90	D	115	A	140	B	165	A	190	A		
16	B	41	C	66	A	91	A	116	A	141	D	166	B	191	B		
17	B	42	C	67	C	92	B	117	D	142	B	167	D	192	B		
18	A	43	D	68	A	93	B	118	D	143	B	168	C	193	B		
19	A	44	D	69	B	94	D	119	B	144	B	169	B	194	B		
20	B	45	C	70	B	95	B	120	B	145	C	170	C	195	B		
21	D	46	D	71	B	96	D	121	C	146	A	171	B	196	B		
22	C	47	B	72	A	97	B	122	C	147	A	172	B	197	A		
23	B	48	C	73	B	98	C	123	B	148	B	173	B	198	B		
24	A	49	A	74	C	99	B	124	B	149	A	174	C	199	B		
25	D	50	B	75	B	100	A	125	B	150	C	175	B	200	B		

Note: **In case of any grievance, it must be reported at upseegrievance@aktu.ac.in along with Students Roll No. with Paper Code, Question Booklet Code, Question No. and suggested answer with supporting documents on or before 03rd May 2019.**

*प्रश्न पुस्तिका क्रमांक **AA** का प्रश्नपत्र एवं कुंजी प्रकाशित की जा रही है। प्रश्न पुस्तिका क्रमांक **BB, CC** तथा **DD** में प्रश्नों एवं उनके विकल्पों का क्रम परिवर्तित है कृपया तद्नुसार उत्तर मिलान करें।

ES

Question Booklet Sr. No.

Q. Booklet Code

AA

Roll No.

OMR Answer Sheet No.

Declaration :
I have read and understood the instructions given on page No. 1

Signature of Candidate
as signed in application)

Seal of Superintendent of Examination Centre

Signature of the Invigilator

Name of Candidate :

To be copied by the candidate in your own handwriting in the space given below for this purpose is compulsory.
"You will know you are in the right profession when : you wake anxious to go to work, you want to do your best daily, and you know your work is important."

*** After cutting half upper part of this page, invigilator preserve it along with student's OMR sheet.**

No. of Pages in Booklet including title	32	Time 2 Hours	Marks 400	No. of Questions in Booklet	205	Section **A** :	30
				No. Of Questions to be attempted	100	Section **B** :	70 (Any TWO Subsections)

ES

Question Booklet Sr. No.

Roll No.

Signature of the Invigilator

Q. Booklet Code

AA

Name of Candidate :

INSTRUCTIONS TO CANDIDATE

1. Use BLUE or BLACK BALL POINT PEN only for all entries and for filling the bubbles in the OMR Answer Sheet.
2. Before opening the SECURITY SEAL of the question booklet, write your Name, Roll Number (In figures), and OMR Answer-sheet Number in the space provided at the top of the Question Booklet. Non-compliance of these instructions would mean that the Answer Sheet can not be evaluated leading the disqualification of the candidate.
3. Each question carries FOUR marks. There will be negative marking on wrong answer. FOUR marks will be awarded for each correct answer and ONE mark will be deducted for each wrong answer. No marks will be deducted/awarded for unattempted questions.
4. Each multiple choice question has only one correct answer. More than one answer indicated against a question will be treated as incorrect answer.
5. Use of log table, mobile phones, any electronic gadget and slide rule, etc. is strictly prohibited. Non-programmable calculator is permitted
6. Candidate will be allowed to leave the examination hall at the end of examination time period only.
7. If a candidate is found in possession of books or any other printed or written material from which he/she might derive assistance, he/she is liable to be treated as disqualified. Similarly, if a candidate is found giving or obtaining (or attempting to give or obtain) assistance from any source, he/she is liable to be disqualified.
8. OMR sheet is placed within this paper and can be taken out from this paper but seal of paper must be opened only at the start of paper.
9. This booklet contains TWO Sections, Section A (Aptitude, Mathematics/Chemistry) has 30 Questions to be attempted and Section B has FIVE sub-sections of 35 Questions each, out of which TWO sub-sections to be attempted.
10. Candidates are expected to attempt any TWO subsections ONLY. In case more than two sub-sections are attempted, Section B would be treated as void.

ES

Section - A :

General Aptitude	:	Q. 1 to Q. 15
Mathematics	:	Q. 16 to Q. 30

Section - B - Engineering Science :

Fluid Mechanics	:	Q. 31 to Q 65
Material Sciences	:	Q. 66 to Q. 100
Solid Mechanics	:	Q. 101 to Q. 135
Thermodynamcis	:	Q. 136 to Q. 170
Food Technology	:	Q. 171 to Q. 205

(Candidates are expected to attempt any TWO subsections ONLY. In case more than two sub-sections are attempted, Section B would be treated as void)

General Aptitude

001. Antonym of word "Dissent" is:

(A) Renounce (B) Adopt

(C) Agree (D) Give

002. Synonym of work "Impudent" is:

(A) Insolent (B) Partial

(C) Bankrupt (D) Restive

003. Find out which part of the sentence has an error. If there is no mistake, the answer is 'No error'

(A) I have seen

(B) that film last year

(C) but I do not remember its story

(D) No error

004. Chose the correct meaning of the phrase "To get into hot water":

(A) To be impatient

(B) To suffer huge financial loss

(C) To get into trouble

(D) To be in confused state of mind

005. Find out the word with correct spelling:

(A) Brassere (B) Brissiere

(C) Brasiiere (D) Brassiere

006. The value of 25-5 [2+3{2-2(5-3)+5}-10]÷4 is

(A) 5 (B) 23.25

(C) 23.75 (D) 25.75

007. If the sum of a number and its square is 182, what is the number?

(A) 12 (B) 13

(C) 28 (D) 91

008. The sum of the ages of a father and his son is 45 years. Five years ago, the product of their ages was 34. The ages of the son and the father are respectively:

(A) 6 and 39 (B) 7 and 38

(C) 9 and 36 (D) 11 and 34

009. A number, when 35 is subtracted from it, reduces to its 80%. What is four fifth of that number?

(A) 70 (B) 90

(C) 120 (D) 140

010. If the ratio of areas of two circles is 4:9 then the ratio of their circumstances will be:

(A) 3:2 (B) 2:3

(C) 4:9 (D) 9:4

011. Army is related to Soldier as Galaxy is related to:

(A) Planet (B) Satellite

(C) Meteor (D) Star

012. IGH:TRS::?:KIJ

(A) POQ (B) QOP

(C) OPQ (D) QPO

013. '1+2+3' stands for the 'the brave boy' '2+3+4' stands for 'brave boy swims' '1+2+4+5' stands for 'the brave girl swims'. What stand for 'brave'?

(A) 1 (B) 2

(C) 3 (D) 4

014. Manipulate the symbol and find the missing number.

If 3*6=18

4*7=22

9*1=20

then 5*2 =?

(A) 14 (B) 10

(C) 7 (D) 3

015. In a row of children, Kamal is sixth from the left and Appu is fourth from the right. When Kamal and Appu exchange positions, Appu becomes seventeenth from the right. Which will be Kamal's position from the left?

(A) Twentieth

(B) Nineteenth

(C) Twenty-first

(D) Seventh

016. If $A=\begin{bmatrix}3 & -3 & 4\\ 2 & -3 & 4\\ 0 & -1 & 1\end{bmatrix}$, then

(A) $A^2=A^{-1}$ (B) $A^3=A^{-1}$

(C) $A^4=A^{-1}$ (D) $A^5=A^{-1}$

where A^{-1} is the inverse matrix of A.

017. The rank of the matrix

$$A=\begin{bmatrix}1 & 1 & -1 & 1\\ -1 & 1 & -3 & -3\\ 1 & 0 & 1 & 2\\ 1 & -1 & 3 & 3\end{bmatrix}$$ is

(A) 1 (B) 2

(C) 3 (D) 4

018. If $A=\begin{bmatrix}1 & 0 & 0\\ 1 & 0 & 1\\ 0 & 1 & 0\end{bmatrix}$ then for every integer n ≥3

(A) $A^n=A^{n-2}+A^2-I$

(B) $A^n=A^{n-2}-A^2+I$

(C) $A^n=A^{n-3}+A^2-I$

(D) $A^n=A^{n-3}-A^2-I$

where I is the identity matrix of order 3.

019. $\lim_{x\to 0} x\sin\frac{1}{x}=$

(A) 0 (B) 1

(C) ∞ (D) $-\infty$

020. If $f(x)=\begin{cases}\dfrac{x\left(e^{\frac{1}{x}}-e^{\frac{1}{x}}\right)}{\left(e^{\frac{1}{x}}+e^{\frac{1}{x}}\right)}, x\neq 0\\ 0, x=0\end{cases}$, *then*

(A) f is continuous and derivable at $x=0$

(B) f is continuous but not derivable at $x=0$

(C) f is discontinuous at $x=0$

(D) f is derivable everywhere.

021. The sum of the serie

$1-\frac{1}{2^2}+\frac{1}{3^2}-\frac{1}{4^2}+....,$ is equal to

(A) $\frac{\pi^2}{4}$ (B) $\frac{\pi^2}{6}$

(C) $\frac{\pi^2}{8}$ (D) $\frac{\pi^2}{12}$

022. The general solution of the partial differential equation

$\left(\frac{y-z}{yz}\right)\frac{\partial z}{\partial x}+\left(\frac{z-x}{zx}\right)\frac{\partial z}{\partial y}=\frac{x-y}{xy}$, is

(A) $\phi(xyz, x^2+y^2+z^2)=0$

(B) $\phi(xyz, xy+yz+zx)=0$

(C) $\phi(xyz, x+y+z)=0$

(D) $\phi(xyz, x^2y+y^2z+z^2x)=0$

023. A unit vector normal to the surface $x^3+y^3+3xyz=3$ at the point *(1,2,-1)* is

(A) $\frac{\hat{i}+3\hat{}+2\hat{}}{\sqrt{14}}$ (B) $\frac{-\hat{i}+3\hat{j}+2\hat{k}}{\sqrt{14}}$

(C) $\frac{\hat{i}+2\hat{j}+3\hat{k}}{\sqrt{14}}$ (D) $\frac{-\hat{i}+2\hat{j}+3\hat{k}}{\sqrt{14}}$

024. The vector field defined by

$\vec{F} = (x + 2y + az)\hat{i} + (bx - 3y - z)\hat{j} + (4x + cy + 2z)\hat{k}$

is irrotational, if

(A) $a=4, b=2, c=-1$

(B) $a=4, b=-2, c=1$

(C) $a=1, b=2, c=4$

(D) $a=-1, b=4, c=2.$

025. The value of $\oint_c \left(x^2 + xy\right)dx + \left(x^2 + y^2\right)dy$ where C is the square formed by the lines $y = \pm 1, x = \pm 1$, is equal to

(A) 2π (B) 2

(C) 1 (D) 0

026. The only solution of the differential equation $x\frac{dy}{dx} - \frac{1}{2}y = x + 1$ for which x and y can attain the value unity is given by

(A) $y = 2x - \sqrt{x} + 2$

(B) $y = 2x + \sqrt{x} + 2$

(C) $y = 2x - \sqrt{x} - 2$

(D) $y = 2x + \sqrt{x} - 1$

027. The Laplace transform of $e^x x^{\frac{1}{2}}$ is

(A) $\frac{x}{\sqrt{s-1}}$ (B) $\frac{\sqrt{\pi}}{\sqrt{s-1}}$

(C) $\frac{\sqrt{\pi}}{\sqrt{s+1}}$ (D) $\frac{\pi}{\sqrt{s+1}}$

028. A die is tossed thrice. A success is getting *1* or *6* on a toss. Then the mean of the number of success is

(A) $\frac{1}{2}$

(B) $\frac{1}{3}$

(C) $\frac{2}{3}$

(D) 1

029. A manufacturer knows that the condensers he makes contain on an average 1% of defectives. He packs them in boxes of 100. The probability that a box picked at random will contain 4 or more faulty condensers is

(A) $1 - \frac{8}{3e}$

(B) $1 - \frac{3}{8e}$

(C) $1 - \frac{4}{3e}$

(D) $1 - \frac{3}{4e}$

030. The order of convergence of Newton Raphson method is

(A) 0 (B) 1

(C) 2 (D) 3

031. Shear stress in the Newtonian fluid is proportional to

(a) pressure

(b) strain

(c) strain rate

(d) the inverse of the viscosity

032. If, for a fluid in motion, pressure at point is same in all directions then the fluid is

(a) a real fluid

(b) a Newtonian fluid

(c) an ideal fluid

(d) a non-Newtonian fluid

033. A glass tube of 3.7 mm diameter is dipped in water. If the contact angle of meniscus is 0^0 and surface tension is 0. 074 N/m, determine the capillary effect in mm. (Take specific weight of water as 10000 N/m^2)

(a) 4 mm (dep) (b) 4 mm (rise)

(c) 8 mm (dep) (d) 8 mm (rise)

034. Consider the following fluid properties:

I. Viscosity

II. Surface tension

III. Capillarity

IV. Vapour pressure

Which of the above properties can be attributed to the flow of jet of oil in an unbroken stream?

(a) I only (b) II only

(c) I and III (d) II and IV

035. A floating body with its centre of gravity at G, centre of buoyancy at B and meta centre at M is stable when

(a) G lies above B

(b) B lies above M

(c) B lies below M

(d) G lies below M

036. A 15 cm length of steel rod with relative density of 7.4 is submerged in a two layer fluid. The bottom layer is mercury and the top layer is water. The height of top surface of the rod above the liquid interface in cm is

(a) 8.24 (b) 7.82

(c) 7.64 (d) 7.38

037. X - component of velocity in a tow dimensional incompressible flow is given by $u = y^2 + 4xy$. If Y - component of velocity v equals zero at y = 0, then the expression for v is given by

(a) 4y (b) $2y^2$

(c) $-2y^2$ (d) 2xy

038. A horizontal water jet with velocity of 10 m/s and cross sectional area of 10 mm^2 strikes a flat plate held normal to the flow direction. The density of water is 1000 kg/m^3. The force on the plate due to the jet is

(a) 100 N (b) 10 N

(c) 1 N (d) 0.1 N

039. Which of the following two-dimensional incompressible velocity field satisfies the conservation of mass?

(a) $u = x, v = y$

(b) $u = -2x, v = 2y$

(c) $u = xy, v = xy$

(d) $u = x^2 - y^2, v = 0$

040. For a three dimensional flow, the velocity components in m/s are given by

$u = yz + t$

$v = xz - t$

$w = xy$

Total acceleration in m/s^2 at a point (1, 1, 1) after 2 seconds is

(a) 4.96 (b) 4.28

(c) 4.32 (d) 4.47

041. A two-dimensional flow field is given by $u = -3y$ and $v = -3x$. Discharge between streamlines passing through points (2, 6) and (6, 6) is

(a) 16 units (b) 32 units

(c) 48 units (d) 64 units

042. Bernoulli's equation is an equation of

(a) conservation of mass

(b) conservation of linear momentum

(c) conservation of energy

(d) conservation of angular momentum

043. If the velocity distribution is rectangular, the kinetic energy correction factor is

(a) greater than zero but less than unity

(b) less than zero

(c) equal to zero

(d) equal to unity

044. Water flows through a 100 mm diameter pipe with a velocity of 0.015 m/s. If the kinematic viscosity of water is 1.13×10^{-6} m^2/s, the friction factor of the pipe material is

(a) 0.0015 (b) 0.032

(c) 0.037 (d) 0.048

045. The shear stress in a fully developed laminar flow in a circular pipe is

(a) constant over the cross section

(b) varies parabolically across the section

(c) maximum at the pipe wall

(d) maximum at the pipe centre line

046. The predominant forces acting on an element of fluid in the boundary layer over a flat plate placed in a uniform stream include

(a) inertia and pressure forces.

(b) viscous and pressure forces.

(c) viscous and body forces.

(d) viscous and inertia forces.

047. The streamline and an equipotential line in a flow fluid

(a) are parallel to each other.

(b) are perpendicular to each other.

(c) intersect at each other.

(d) are identical.

048. The head loss for a laminar incompressible flow through a horizontal circular pipe is h_1. Pipe length and fluid remaining the same, if the average flow velocity doubles and pipe diameter reduces to half its previous value, the head loss is h_2. The ratio h_1/h_2 is

(a) 1

(b) 4

(c) 8

(d) 16

049. A 1 : 50 scale model of a spillway is to be tested in the laboratory. The discharge in the prototype is 1000 m^3/s. The discharge to be maintained in the model test is

(a) 0.057 m^3/s

(b) 0.08 m^3/s

(c) 0.57 m^3/s

(d) 5.7 m^3/s

050. The repeating variable in dimensional analysis should

(a) include the dependent variable.

(b) have amongst themselves all the basic dimensions.

(c) be derivable from one another.

(d) exclude one of the basic dimensions.

051. The height of a hydraulic jump in the stilling pool of 1 : 25 scale model was observed to be 10 cm. The corresponding prototype height of the jump is

(a) cannot be determined.

(b) 2.5 m

(c) 0.5 m

(d) 0.1 m

052. Both Reynolds and Froude numbers assume significance in one of the following examples

(a) motion of submarine at large depths

(b) cruising of a missile in air

(c) motion of ship in deep seas

(d) flow over spillways

053. The Prandtl mixing length for turbulent flow through pipes is

(a) independent of shear stress

(b) a universal constant

(c) zero at the pipe wall

(d) independent of radial distance from pipe axis

054. The flow of water (mass density = 1000 kg/m^3 and kinematic viscosity = 10-6 m^2/s in a commercial pipe, having equivalent roughness k_s as 0.12 mm, yields an average shear stress at the pipe boundary is 600 N/m^2. The value of ks/δ' (δ' being the thickness of laminar sub layer) for this pipe is

(a) 0.25 (b) 0.50

(c) 6.0 (d) 8.0

055. The thickness of laminar boundary layer on a flat plate at a point A is 2 cm and at a point B, 1m downstream of A, is 3 cm. What is the distance of A from tge leading edge of the plate?

(a) 0.50 m

(b) 0.80 m

(c) 1.00 m

(d) 1.25 m

056. The dynamic similarity is said to exist between two fluid flows when at corresponding points there are

(a) geometric similarity and similarity of forces involved

(b) kinematic similarity and geometric similarity

(c) interactions of inertia and viscous forces

(d) interactions among inertia, viscous and pressure forces

057. The flow separation is likely to occur when the pressure gradient is

(a) positive

(b) zero

(c) negative

(d) negative and only when equal to -0.332

058. An automobile with projected area 2.6 m^2 is running on a road with a speed of 120 km/h. The mass density and kinematic viscosity of air are 1.2 kg/m^3 and 1.5 x 10^{-5} m^2/s respectively. The drag coefficient is 0.30. The drag force on automobile is

(a) 620 N

(b) 600 N

(c) 580 N

(d) 520 N

059. The stresses arise due to fluctuations in the velocity components in a turbulent flow are

(a) Euler stresses

(b) limit stresses

(c) Reynolds stresses

(d) principal stresses

060. Eddy viscosity means that it is

(a) a physical property of fluid

(b) same as the kinematic viscosity

(c) always associated with laminar flow

(d) an apparent viscosity due to the turbulent nature of flow

061. In an iceberg, 15% of the volume projects above the sea surface. If the specific weight of sea water is 10.5 kN/m^3. The specific weight of iceberg in kN/m^3 is

(a) 12.52

(b) 9.81

(c) 8.93

(d) 7.83

062. A stream function is given by

$\Psi = 2x^2y + (x + 1)\, y^2$

The flow rate across a line joining points A (3, 0) and B(0, 2) is

(a) 0.4 unit

(b) 1.1 unit

(c) 4 unit

(d) 5 unit

063. Pitot tube is used to measure

(a) static pressure of flowing fluid

(b) dynamic pressure of flowing fluid

(c) total pressure of flowing fluid

(d) surface tension of flowing fluid

064. The discharge coefficient C_d of an orifice meter is

(a) greater than the C_d of a venturimeter

(b) smaller than the C_d of a venturimeter

(c) equal to the C_d of a venturimeter

(d) equal to one

065. A venturimeter having a throat diameter of 0.1 m is used to estimate the flow rate of a horizontal pipe having a diameter of 0.2 m. For a observed pressure difference of 2 m of water head and coefficient of discharge equal to unity, assuming that the

energy losses are negligible, flow rate in m^3/s is

(a) 0.500 (b) 0.150

(c) 0.050 (d) 0.015

066. The particle which is electrically neutral is

(A) Neutron

(B) Proton

(C) Electron

(D) Nucleus

067. Energy will be emitted when an electron

(A) Never jumps from one orbit to the other

(B) Jumps from lower orbit to higher orbit

(C) Jumps from higher orbit to lower orbit

(D) None of the above

068. Millar indices represent

(A) Orientation of the crystallographic planes

(B) Direction of the crystallographic plane

(C) Both (A) and (B)

(D) None of the above

069. Coordination number for an HCP Structure is same as that of

(A) BCC

(B) FCC

(C) SC

(D) None of the above

070. Because of imperfactions in a crystal lattice

(A) Theortical stress is lower than the actual stress

(B) Theortical stress is higher than the actual stress

(C) Theortical stress is equal to the actual stress

(D) Theortical and actual results cannot be compared

071. Carbon in an iron crystal structure is an example for ---------- defect.

(A) Vacancy

(B) Interstitial

(C) Surface

(D) Substitutional

072. Substitutional impurity implies

(A) Solute atom replaces the solvent atom

(B) Solute atom occupies the void space in the crystal

(C) Atomic diameter of the solute is too small than that of the solvent

(D) None of the above

073. In some ionic crystal structures,a pair of ions missing is called

(A) Frenkel defect

(B) Schottky defect

(C) Line defects

(D) Surface defects

074. Dislocations are mainly responsible for increase in

(A) Fracture

(B) Wear resistance

(C) Strength

(D) None of the above

075. In decarburizing process, the atoms are diffused

(A) Out of crystal

(B) Into the crystal

(C) Within the crystal

(D) All of the above

076. Diffusion that takes place within the single crystal structure is known as

(A) Self diffusion

(B) Inter-diffusion

(C) Volume diffusion

(D) Both (A) and (B)

077. Carburization of a low carbon steel is the best example for

(A) Substitutional diffusion

(B) Interstitial diffusion

(C) Both (A) and (B)

(D) None of the above

078. The energy required by an atom to change its position by diffusion in the crystal is called

(A) Mechanical energy

(B) Thermal energy

(C) Activation energy

(D) Vibration energy

079. Rate of diffusion is higher for a crystal having

(A) Fine grain

(B) Coarse grain

(C) Higher packing factor

(D) None of the above

080. Diffusion is more sensitive to

(A) Type of alloy

(B) Size of the metal

(C) Time

(D) Temperature

081. Grain boundary moment of atoms implies

(A) Movement of atoms from one grain to another grain at the grain boundary

(B) Movement of atoms within the grain

(C) Movement of atoms from one grain surface to the inner part

(D) All of the above

082. Linear elastic properties can be observed in

(A) Mild steel

(B) Rubber

(C) Both (A) and (B)

(D) None of the above

083. Energy stored during elastic deformation is known as

(A) Stiffness

(B) Toughness

(C) Resilience

(D) Ductility

084. Higher the stiffness of metal,

(A) Higher the elastic deformation

(B) Restricts the elastic deformation

(C) Higher the plastic deformation

(D) Fracture at low stress

085. Secant modulus is determined for

(A) Steel

(B) Copper

(C) Rubber

(D) Ceramics

086. Offset yield strength is measured in

(A) Mild steel

(B) Pure copper

(C) Rubber

(D) Cast iron

087. The Bauschinger effect is related to

(A) Both tensile and compressive loading

(B) Both compressive and shear loading

(C) Both tensile and shear loading

(D) Tensile, compressive and shear loading

088. Before ductile fracture

(A) Yielding of metals takes place

(B) Tri-axial stress develop in a point

(C) Crack nucleates and enlarges

(D) Cross section increases

089. Brittle fracture

(A) Occures after large deformation

(B) Occures suddenly

(C) Broken pieces can not be fitted together

(D) None of the above

090. Creep is a inique property which is commonly observed in

(A) Boiler shell

(B) Rotating axils

(C) Overhead cables

(D) All of the above

091. Creep can be stated as

(A) Time dependent stress under constant temperature

(B) Time dependent strain under constant stress

(C) Time dependent strain with varying load

(D) Time dependent stress with varying temperature

092. Temperature and stress level are high in case of

(A) Steady state creep

(B) Transient creep

(C) Viscous creep

(D) None of the above

093. High temperature creep is characterized by

(A) Twinning of atoms

(B) Dislocation of atoms

(C) Slip of atoms

(D) None of the above

094. Insulator are ceramic materials and they prevent

(A) Flow of heat

(B) Flow of electricity

(C) Low thermal expansion

(D) All of the above

095. Electrically conductive ceramics are used as

(A) Gears

(B) Semiconductors

(C) Bearings

(D) All of the above

096. Optical ceramics can be responsive to

(A) Infrated light

(B) Normal light

(C) Ultraviolet light

(D) All of the above

097. During corrosion, the area over which the metal is attached (oxidized) is called

(A) Cathode

(B) Anode

(C) Neutral metal

(D) None of the above

098. Brown rust is the result of

(A) Iron reacting with water

(B) Iron reacting with oxygen

(C) Iron reacting with both water and oxygen

(D) All of the above

099. Corrosion due to static tensile strength and corrosive environment is called

(A) Pit corrosion

(B) Stress corrosion

(C) Galvanic corrosion

(D) Uniform corrosion

100. Galvanic corrosion occurs due to

(A) Two or more dissimilar metals in electrical contact

(B) Two or more dissimilar metals in atmospheric contact

(C) Two or more dissimilar metals in water contact

(D) All of the above

101. Possible resultant for a concurrent coplanar force system is

(a) Force
(b) Force or a couple
(c) Force and a couple
(d) None of the above

102. Temperature stress developed in a bar depends upon

(a) Coefficient of linear expansion
(b) Change in temperature
(c) Young's modulus
(d) All of the above

103. Characteristic of couple is

(a) Algebraic sum of forces constituting a couple is zero
(b) Algebraic sum of moments of the forces constituting the couple about any point is same
(c) Couple can never be balanced by a single force but can be balanced by only a couple but of opposite sense
(d) All the above

104. The ratio of moment of inertia with respect to base to the moment of inertia with respect to centroid in a triangle is equal to

(a) One (b) Two
(c) Three (d) Four

105. If the width b and depth d of the cross section of a simply supported beam are interchanged, the moment of inertia (I_{xx}) will be changed in the ratio of

(a) b/d (b) d/b
(c) $(d/b)^2$ (d) $(b/d)^2$

106. A rectangular beam is to cut from a circular log of wood of diameter D. The ratio of width to depth for strongest section in bending should be

(a) $\sqrt{(2/3)}$ (b) (3/2)
(c) $(1/\sqrt{2})$ (d) (3/4)

107. A simply supported beam AB carries a point load at mid span. Another identical beam CD carries the same load uniformly distributed over the whole span. The ratio of the maximum bending moment in beam AB to that in beam CD will be

(a) 2 (b) 1/2
(c) 4 (d) 1/4

108. The maximum hogging moment in a fixed beam carrying uniformly distributed loading on entire span is at

(a) mid-span
(b) one-third of the span
(c) quarter span
(d) supports

109. A cast iron block 500 mm^2 cross-section carries a tensile load of 100 kN. The maximum shear stress in the block is given by

(a) 200 MPa (b) 100 MPa

(c) 50 MPa (d) 25 MPa

110. The shear stress distribution in a rectangular section is

(a) parabolic (b) linear

(c) elliptical (d) circular

111. The maximum energy stored at the elastic limit of a material is

(a) resilience

(b) proof of resilience

(c) modulus of resilience

(d) none of these

112. A bar of square section is subjected to a pull of 100 kN. If the maximum allowable stress is 50 N/mm^2, the side of square section will be

(a) $\sqrt{5}$ cm (b) $\sqrt{10}$ cm

(c) $\sqrt{15}$ cm (d) $\sqrt{20}$ cm

113. In a plane truss, if M is the number of members, J the number of joints and R the number of support reactions, the condition to be satisfied for the determinate truss is

(a) $J = M + R$

(b) $J = 2M + R$

(c) $3J = M + 2R$

(d) $2J = M + R$

114. The moment carrying capacity of a beam of circular section of diameter D and a beam of square section of size D is

(a) $\pi/4$

(b) $\pi/3$

(c) $3\pi/8$

(d) $3\ \pi/16$

115. The stress at which a material gets fractured under a large number of reversals of stress is called

(a) endurance limit

(b) creep

(c) ultimate strength

(d) plastic limit

116. The shear centre of a section is defined as that point

(a) through which load must pass to produce no twisting of the section.

(b) at which the shear force is zero.

(c) at which the shear force is a maximum.

(d) at which the shear force is a minimum.

117. If the depth of a simply supported beam carrying a central point load is doubled. The deflection of the beam will change by a factor of

(a) 1/6 (b) 1/4

(c) 1/2 (d) 1/8

118. The square root of the ratio of moment of inertia of the cross-section to its cross-sectional area is called

(a) second moment of area
(b) slenderness ratio
(c) section modulus
(d) radius of gyration

119. A hollow circular shaft has an outer diameter of 100 mm and a wall thickness of 25 mm. Allowable shear stress in the shaft is 125 MPa. The maximum torque the shaft can transmit is

(a) 46 kN-m
(b) 24.5 kN-m
(c) 23 kN-m
(d) 11.5 kN-m

120. The major and minor principal stresses at a point are 3 MPa (tensile) and 3 MPa (compressive) respectively. The maximum shear stress at the point is

(a) zero (b) 3 MPa
(c) 6 MPa (d) 9 MPa

121. The number of independent elastic constants for a linear, elastic, isotropic and homogeneous material is

(a) 4 (b) 3
(c) 2 (d) 1

122. A simple beam of span L is subjected to a couple M at mid-span. The maximum shear force is

(a) ML (b) zero
(c) M/L (d) ML/2

123. In order to produce bending and shear stresses of equal magnitudes at the extreme fibres of a circular section under the combined action of bending and torsion, the ratio of the bending and twisting moments must be

(a) 1 : 4 (b) 1 : 2
(c) 1 : 1 (d) 2 : 1

124. A bar of 4 cm diameter is subjected to an axial load of 4 kN. The extension of bar over a gauge length of 20 cm is 0.03 cm. The decrease in diameter is 0.018 cm. The Poisson's ratio is

(a) 0.25 (b) 0.30
(c) 0.33 (d) 0.35

125. The shape of the core of a rectangular section is a

(a) square (b) rhombus
(c) circle (d) rectangle

126. The limiting eccentricity for 'no tension' when a vertical load acts on a short vertical strut of rectangular cross-section of width b is

(a) (b/4) (b) (b/3)
(c) (b/6) (d) (b/2)

127. If the principal stresses at the point are P_1 and P_2, the plane on which the shear stress is the maximum is inclined to the major principal plane at an angle

(a) 30° (b) 45°

(c) 60° (d) 75°

128. If the length of cantilever beam carrying point load at its free end is doubled, the deflection of the free end will increase by

(a) 8 (b) 1/8

(c) 1/2 (d) 2

129. If the momentum of a given body is tripled, its kinetic energy will

(a) increase by three times

(b) increase by nine times

(c) decrease by three times

(d) decrease by nine times

130. A thin wall long cylindrical tank of inside radius r is subjected simultaneously to internal gas pressure p and axial compressive force F at its end. In order to produce pure shear state of stress in the wall of the cylinder, F should be equal to

(a) πpr^2 (b) $2\pi pr^2$

(c) $3\pi pr^2$ (d) $4\pi pr^2$

131. The maximum bending stress induced in a steel wire of modulus of elasticity 200 kN/mm^2 and diameter 1 mm when wound on a drum of diameter 1 m is approximately equal to

(a) 50 N/mm^2 (b) 100 N/mm^2

(c) 200 N/mm^2 (d) 400 N/mm^2

132. The response steadily decreases when the frequency ratio is

(a) <1 (b) >1

(c) = 1 (d) = $\sqrt{2}$

133. The transmissibility is equal to 1 at the frequency ratio (ω/ω_n) equal to

(a) 0.5 (b) 1.0

(c) $\sqrt{2}$ (d) 22

134. In which of the following cases, the dynamic system has no oscillation but returns to equilibrium at a slower rate?

(a) critically damped case

(b) over-damped case

(c) under-damped case

(d) none of the above

135. The steady-state motion depends predominately on

(a) natural frequency

(b) damped natural frequency

(c) excitation frequency

(d) all the above

136. Which of the following is not an intensive property?

(A) Temperature (B) Pressure

(C) Density (D) Enthalpy

137. The properties of a certain fluid are related as follows

$u = 196 + 0.173\ t,\ pv = 0.287(t + 273)$

Where u is specific internal energy (kJ/kg), t is temperature (°C), P is pressure (kN/m^2), and v is specific volume (m^3/kg). The value of c_p in kJ/kg-K will be

(A) 0.46 (B) 0.173

(C) 0.287 (D) 0.25

138. A piston–cylinder device initially contains air at 200 kPa and 27 °C. At this state, the piston is resting on a pair of stops and the enclosed volume is 200 litre. The mass of the piston is such that a 400 kPa pressure is required to move it. The air is now heated until its volume has doubled. The total work done (kJ) by the air and final temperature (°C) of air will be respectively,

(A) 0; 27 (B) 80; 927

(C) 40; 1200 (D) 60; 1027

139. A 1.0 m^3 cylinder contains Oxygen gas at 600 kPa and 300 K. Now the gas is compressed isothermally to a volume of 0.5 m^3. The work done (in kJ) on the gas during this compression process is

(A) 416 (B) Zero

(C) 54 (D) 300

140. Heat and work are

(A) intensive properties

(B) path functions

(C) extensive properties

(D) point functions

141. A heat exchanger is used to heat cold water at 15°C entering at a rate of 2 kg/s by hot air at 100°C entering at a rate of 3 kg/s. The heat exchanger is not insulated and is losing heat at a rate of 40 kJ/s. If the exit temperature of hot air is 20 °C, the exit temperature of cold water (in °C) will be

(c_p values of air and water can be assumed to be 1 kJ/kg-K and 4 kJ/kg-K)

(A) 44 (B) 72

(C) 49 (D) 40

142. Air at 20°C and 5 atm is throttled by a valve to 2 atm. If the valve is adiabatic and the change in kinetic energy is negligible, the exit temperature of air (in °C) will be

(A) 10 (B) 20

(C) 14 (D) 24

143. A paddle wheel is installed in a rigid insulated vessel containing 2 kg of air (c_v = 0.7 kJ/kg-K, c_p = 1 kJ/kg-K). The paddle wheel does a stirring work at the rate of 100 W for 2 minutes to the air inside the vessel. At the end of the process, the increase in air temperature (in °C) is

(A) 17.14 (B) 8.57

(C) 0.71 (D) zero

144. A compressor undergoes a reversible steady flow process. The gas at inlet and outlet of the compressor is designated as state 1 and state 2 respectively. Potential and kinetic energy changes are to be ignored. The specific work required to be supplied to the compressor for this compression process is (symbols have usual meaning)

(A) $\int_1^2 pdv$ (B) $\int_1^2 vdp$

(C) $-p_2 (v_2-v_1)$ (D) $-v_1 (p_2-p_1)$

145. A unit mass of an ideal gas at temperature T undergoes a reversible isothermal process from pressure p_1 to pressure p_2 while losing heat to the surroundings at temperature T in the amount of q. If the gas constant of the gas is R, the entropy change of the gas Δs during this process is

(A) $R\ ln(p_2/p_1)$ (B) $R\ ln(p_2/p_1)-q/T$

(C) $R\ ln(p_1/p_2)$ (D) zero

146. An apple with an average mass of 0.15 kg and average specific heat of 3.65 kJ/kg-°C is cooled from 20 °C to 5 °C. The entropy change (in kJ/K) of the apple is

(A) - 0.0288 (B) - 0.192

(C) - 0.526 (D) zero

147. A rigid tank contains an ideal gas at 40 °C that is being stirred by a paddle wheel. The paddle wheel does 200 kJ of work on the ideal gas. It is observed that the temperature of the ideal gas remains constant during this process as a result of heat transfer between the system and the surroundings at 30°C. The entropy change of the ideal gas (in kJ/K) will be

(A) Zero (B) 6.66

(C) 5 (D) 0.66

148. Air is compressed by a 10 kW compressor from p_1 to p_2. The air temperature is maintained constant at 27°C during this process as a result of heat transfer to the surrounding medium at 10 °C. The rate of entropy change of the air in kW/K will be

(A) -0.370

(B) -0.033

(C) -0.541

(D) -0.1

149. A Carnot heat engine operates between a source at 1000 K and a sink at 400 K. If the heat engine is supplied with heat at a rate of 600 kJ/min, the power output (in kW) of this heat engine will be

(A) 6

(B) 360

(C) 16.7

(D) 4.5

150. A heat pump is absorbing heat from the cold outdoors at 5 °C and supplying heat to a house at 22 °C at a rate of 18,000 kJ/h. If the power consumed by the heat pump is 2.5 kW, the coefficient of performance of the heat pump is

(A) 0.5 (B) 1.0

(C) 2.0 (D) 17.3

151. A heat engine receives heat from a source at 1500 K at a rate of 600 kJ/s and rejects the waste heat to a sink at 300 K. If the power output of the engine is 400 kW, The second-law efficiency of this heat engine will be

(A) 66.7

(B) 80

(C) 83.3

(D) 75

152. Consider a Carnot refrigerator and a Carnot heat pump operating between the same two thermal energy reservoirs. If the COP of the refrigerator is 4.4, the COP of the heat pump is

(A) 2.2

(B) 3.4

(C) 4.4

(D) 5.4

153. Which of the following expression is true for a refrigerator?

(A) $\oint \delta q < 0$

(B) $\oint \delta q = 0$

(C) $\oint \delta w > 0$

(D) $\oint \delta w \leq 0$

154. The specific Helmholtz function of a particular gas is: $f = f_0(T) - a/v - RT\ln(v - b)$ where a and b are constants, v is specific volume and is a function of T only. The pressure of the gas is given by

(A) $p = \frac{df_0}{dT}$

(B) $p = \frac{RT}{v}$

(C) $p = \frac{RT}{v-b} - \frac{a}{v^2}$

(D) $p = \frac{a}{v^2}$

155. The fundamental thermodynamic relation for a rubber band is $dU = TdS + \tau dL$ where U is the internal energy, T is the absolute temperature, S is the entropy, τ is the tension in the rubber band, and L is the length of the rubber band. Which of the following relation is true for this system?

(A) $\left(\frac{\partial T}{\partial L}\right)_S = \left(\frac{\partial \tau}{\partial S}\right)_L$

(B) $\left(\frac{\partial T}{\partial L}\right)_S = -\left(\frac{\partial \tau}{\partial S}\right)_L$

(C) $\left(\frac{\partial T}{\partial S}\right)_L = \left(\frac{\partial \tau}{\partial L}\right)_S$

(D) None of the above

156. A block of metal with heat capacity C_p = 1000 J/K is cooled from 200 K to 100 K by immersing the block into a large bath of liquid at 100 K. The entropy change of the liquid in the bath in J/K is

(A) 1000 (B) 1000 ln(2)

(C) 1000 / ln(2) (D) zero

157. The sublimation and vaporization curves for a particular material are given by:

sublimation: $\ln p = 0.03 - 5 / T$

vaporization: $\ln p = 0.01 - 3 / T$

where pressure p is in atmospheres and temperature T is in Kelvin. The temperature (in K) of the triple point is

(A) 200 (B) 273.16

(C) 100 (D) 400

158. A rigid container contains 5 kg of water at 100°C. If only 30% of water is in the liquid form, find the volume (m^3) of the container. (At T = 100°C, specific volume of saturated liquid v_f = 0.001043 m^3/kg and specific volume of saturated vapour v_g = 1.6720 m^3/kg).

(A) 5.85 (B) 2.51

(C) 8.36 (D) 6.43

159. Which one of the statement is true about the internal energy of a gas that obeys the equation of state $pv = RT$.

(A) The internal energy is always a linear function of temperature

(B) The internal energy is always directly proportional to absolute temperature

(C) The internal energy depends on both temperature and pressure

(D) The internal energy can be a nonlinear function of temperature

160. The Van der Waals equation of state is given by

$$\left(p + \frac{a}{v^2}\right)(v - b) = RT$$

where a and b are constants. The Van der Waals equation of state matches the ideal gas equation at

(A) high pressure and high temperature

(B) low pressure and high temperature

(C) high pressure and low temperature

(D) low pressure and low temperature

161. A Carnot engine works between a hot reservoir at temperature T_H and a cold reservoir at temperature T_C where $T_H > T_C$ We wish to increase the efficiency of the engine by varying the temperatures of hot and/or cold reservoirs by the same amount ΔT Which of the following options will give greater increase in the efficiency of the engine?

(A) Decreasing T_C by ΔT while keeping T_H fixed

(B) Increasing T_C by ΔT while keeping T_H fixed

(C) Increasing T_H by ΔT while keeping T_C fixed

(D) The efficiency of the Carnot engine cannot be varied.

162. A gas is filled in a cylinder fitted with frictionless piston. The gas is taken from state A to B along a particular path (Path 1) on the p-v diagram. On this path, the system does 40 J of work and 80 J of heat flows into the system. Next, the gas is brought back to state A from state B but along a different path (Path 2). The work done on the system along Path 2 is 20 J. Calculate the amount of heat transferred (in J) out of the system when the system is brought from B to A along Path 2.

(A) 20 (B) 40

(C) 60 (D) 80

163. Consider an ideal Otto cycle with an ideal gas as the working fluid whose ratio of specific heats $c_p / c_v = 3/2$. The thermal efficiency of this Otto cycle is 50%. If the compression ratio of the cycle is doubled, the new efficiency of the cycle will be

(A) 53.3%

(B) 59.2%

(C) 62.2%

(D) 64.6%

164. An ideal Brayton cycle operates with an ideal gas as a working fluid ($c_p / c_v = 1.4$). The maximum and minimum temperatures in the cycle are 1000 K and 300 K. The temperature of the gas at the exit of the compressor is 600 K. What is the temperature (K) of the gas at the exit of turbine?

(A) 500

(B) 450

(C) 400

(D) 300

165. A Carnot cycle operates between the temperature limits of 300 K and 1500 K. The net power output of the cycle is 500 kW. The rate of change of entropy (kW/K) of the working fluid during the heat addition process is:

(A) 0.42 (B) Zero

(C) 0.33 (D) 2.35

166. A rigid tank with volume 100 litre contains an ideal-gas mixture consisting of 6 g of nitrogen (molecular weight 28 g/mol) and 6 g of oxygen (molecular weight 32 g/mol). If oxygen were separated from the mixture and stored at mixture temperature and pressure, its volume (litre) would be

(A) 50

(B) 47

(C) 53

(D) 32

167. An air stream at a particular temperature and relative humidity is cooled by evaporative cooling by spraying water into it at about the same temperature. What is the lowest temperature that the air stream can be cooled to?

(A) Dry bulb temperature at the given state

(B) Triple point temperature of water

(C) Dew point temperature at the given state

(D) Wet bulb temperature at the given state

168. A refrigerator works on the ideal vapour compression refrigeration cycle with R-134a as the working fluid. The refrigeration cycle works between pressure limits of 100 kPa and 800 kPa. Selected data of the refrigerant are provide below:

P, kPa	T_{sat}, °C	h_f, kJ/kg	h_g, kJ/kg
100	-26.37	17.27	234.46
800	31.31	95.48	267.34

The rate of heat removal from the refrigerated space is 40 kJ/s. The mass flow rate (kg/s) of the refrigerant is

(A) 0.18

(B) 0.16

(C) 0.29

(D) 0.23

169. A refrigerator removes heat from the refrigerated space at -4°C at the rate of 2 kJ/s and rejects to an environment at 30°C. The minimum required power input (W) is

(A) 131

(B) 253

(C) 79

(D) 129

170. In a simple ideal Rankine cycle the turbine inlet conditions are 3 MPa and 600 °C (specific entropy s = 7.5103 kJ/(kg K)). The outlet pressure of the turbine is 10 kPa (specific entropy of saturated liquid s_f = 0.6492 kJ/(kg K) and specific entropy of saturated vapour s_g = 8.1488 kJ/(kg K)). The mass fraction of steam that condenses at the turbine exit is

(A) 2.5 %

(B) 6.5 %

(C) 8.5 %

(D) 10.5 %

171. Match the enzymes in Column I with their functions in Column II

	Column I		Column II
P.	Amylase	1.	Conversion of sucrose to glucose and fructose
Q.	Invertase	2.	Softening of dough
R.	Phosphatase	3.	Effectiveness of pasteurization
S.	Protease	4.	Conversion of starch to maltose

(A) P-1, Q-2, R-3, S-4

(B) P-4, Q-1, R-3, S-2

(C) P-1, Q-4, R-2, S-3

(D) P-2, Q-4, R-3, S-1

172. Which of the following is oil soluble pigment present in fruits and vegetables?

(A) Flavonoids

(B) Carotenoids

(C) Anthocyanins

(D) Tannins

173. Which of the following is an example of a classical diffusional mass transfer process without heat transfer?

(A) Drying of food grains

(B) Carbonation of beverages

(C) Distillation of alcohol

(D) Concentration of fruit juice

174. Production of low calorie light bears specifically uses which of the following enzymes?

(A) Glucoamylase

(B) Fungal α-amylase

(C) Either or both (a) and (b)

(D) Neutral proteases

175. Aflatoxins is produced by

(A) Streptococcus sp.

(B) Fusarium sp.

(C) Aspergillus sp.

(D) Salmonella sp

176. Campylobacters cause

(A) Acute enterocolitis

(B) Neural disorder

(C) Tuberculosis

(D) Cholera

177. Why it is better to use jacketed vessel in a dairy industry than a stainless steel container?

(A) To prevent milk from charring

(B) For better temperature control

(C) The temperature of food and wall is equal which is very high

(D) All of the above

178. Which of the following is insoluble precursor of pectin?

(A) Pectin

(B) Protopectin

(C) Methyl alcohol

(D) Pectic acid

179. What if full form of PFA and ISI?

(A) Predictive Food Analysis and Indian Science Institute

(B) Prevention of Food Adulteration and Indian Science Institute

(C) Prevention of Food Adulteration and International Science Institute

(D) Predictive Food Analysis and International Science Institute

180. What does HACCP stand for?

(A) Hazard Analysis and Critical Control Point

(B) Hazard and Critical Control Point

(C) Health Analysis and Critical Control Point

(D) Hazard and Critical Cooking Point

181. At its core what does HACCP stipulate?

(A) That companies should use the right ingredients in the preparation of food.

(B) That all organizations involved in the food business should implement and maintain hygiene procedures based on HACCP principles.

(C) That people should wash their hands before handling food.

(D) That food processing organizations should keep their administrative records in good order

182. Which of the following is NOT a step in the process involved in dry milling of maize?

(A) Degermination

(B) Sifting

(C) Removal of moisture

(D) Diluting

183. Which of the following microbe is used in the production of blue cheese?

(A) Streptococcus thermophilus

(B) Lactobacillus bulgaricus

(C) Penicillium roqueforti

(D) Rhizopus stolonifer

184. The reciprocal of heat transfer co-efficient is

(A) Volume

(B) Thermal insulation

(C) Density

(D) Temperature difference

185. Ratio of equilibrium concentrations of solute A in liquid phase and gas phase i.e. CA_L* and CA_g* respectively is α. α is called

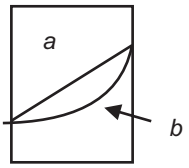
(A) Diffusion coefficient

(B) Distribution coefficient

(C) Mass transfer coefficient

(D) None of the above

186.



In the above diagram, 'a' and 'b' refers to

(A) Steady state heat transfer, Unsteady state heat transfer

(B) Unsteady state heat transfer, Steady state heat transfer

(C) Unsteady state heat transfer, Unsteady state heat transfer

(D) All of the above

187. Which among the following is the statement of the 'Fick's Law'?

(A) The molar flux of species relative to an observer moving with the molar average velocity is proportional to the concentration gradient of the species.

(B) The mass flux of species relative to an observer moving with the molar average velocity is proportional to the concentration gradient of the species.

(C) The molar flux of species relative to an observer moving with the mass average velocity is proportional to the concentration gradient of the species.

(D) The molar flux of species relative to a stationary observer is proportional to the concentration gradient of the species.

188. What does the term absolute humidity?

(A) Moisture content of a gas by mass

(B) Moisture content of a gas by moles

(C) Ratio of humidity to humidity at saturation

(D) Temperature at which moisture begins to condense when it is cooled

189. Humidification is a

(A) Mass transfer operation

(B) Heat transfer operation

(C) Simultaneous heat and mass transfer

(D) None of the above

190. In which of the following process, enthalpy is constant?

(A) Adiabatic

(B) Non-adiabatic

(C) Isothermal

(D) Non-isothermal

191. De-humidification is done in

(A) Adiabatic temperature

(B) Adiabatic saturated temperature

(C) Adiabatic unsaturated temperature

(D) None of the above

192. Rittingers law can be defined as

(A) Energy required is proportional to new particle size

(B) Energy required is proportional to new surface created

(C) Input energy is directly proportional to square root of diameter of the new particle

(D) Energy required to reduce size of a particle to its 80 % of the actual size

193. The ratio of initial particle size to final particle size is defined as

(A) Reduction ratio

(B) Kick's ratio

(C) Rittingers ratio

(D) Bond's ratio

194. The ratio of inertial force to the viscous force is known as

(A) Grashof number

(B) Reynolds number

(C) Prandlt number

(D) Fourier number

195. What are Sequestrants?

(A) Food stabilizers

(B) Form a complex ion with metals like copper, iron

(C) Added for color

(D) They keep the food oxidized

196. Which of these can be termed as critical limit?

(A) Washing vegetables before using them

(B) Cooking chicken to reach a temperature of 165°F (74°C) for 15 seconds

(C) Checking the use by date on canned ingredients

(D) The temperature food is kept at in a fridge

197. Which of the following refers to amount of protein absorbed by the body from a food?

(A) Biological Value

(B) Limiting Value

(C) Reference pattern

(D) None of the above

198. Which of the following enzymes is tested to ensure adequate pasteurization?

(A) Peroxidase

(B) Alkaline phosphatase

(C) Catalase

(D) Kinase

199. Choose one of the correct statements about fatty acids:

(A) Melting point of fatty acid increases with increasing degree of unsaturation

(B) Melting point of fatty acid depends on chain length and degree of unsaturation

(C) Absence of double bond leads to lower melting point

(D) All of the above

200. The class of trans-fat predominantly present in fat of ruminants and dairy product is

(A) Oleic acid

(B) Vaccenic acid

(C) Eicosapentaenoic acid

(D) Arachidonic acid

201. Which of the following is an amino acid with uncharged polar side chain?

(A) Tryptophan

(B) Phenylalanine

(C) Tyrosine

(D) Histidine

202. Which of the following is not correct about vitamins?

(A) Vitamins are inorganic elements whereas minerals are organic elements

(B) Fats soluble vitamins have more tendency to cause hypervitaminosis

(C) Fat soluble vitamins are absorbed by lipids in the intestinal tract

(D) B and C are water soluble vitamins

203. Vitamin D_3 is also known as

(A) Cholecalciferol

(B) Biotin

(C) Riboflavin

(D) Ascorbic acid

204. What is Glycemic Index of carbohydrates?

(A) It shows which other nutrient it is being ingested with

(B) It shows how quickly a carbohydrate is digested

(C) It shows how carbohydrate affects blood sugar level

(D) All of the above

205. Milk not properly cooled may encounter this off flavor

(A) Malty (B) Foreign

(C) Feed (D) Rancid

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