PART 03 — C M L ENGINEERING AND GEOINFORMATICS

(Answer ALL questions)

76. The acceleration of a particle moving along the circumference of a circle with a uniform speed is directed

1. radially

2. tangentially at the point

3. away from the center

4. towards the center

77. The inherent property of a body which offers reluctance to change its state of rest or uniform motion is

1. weight

2. mass

3. inertia

4. momentum

78. A satellite goes on moving along its orbit round the earth due to

1. gravitational force

2. centrifugal force

3. centripetal force

4. none of the above

79. Stress in a beam due to simple bending is

1. directly proportional

2. inversely proportional

3. curvilinearly released

4. none of the above

80. The phenomenon of slow growth of strain under a steady tensile stress is called

1. yielding

2. creeping

3. breaking

4. none of the above

81. Vicats apparatus is used to perform the test of

1. finess

2. setting time

3. consistency

4. compressive strength

82. For M 150 mix concrete, according to I.S. specification local bond stress is

1. 5 kg/cm^2

2. 10 kg/cm^2

3. 15 kg/cm^2

4. 20 kg/cm^2

83. A prestressed concrete member is

1. made of concrete

2. stressed

3. made of reinforced concrete

4. none of the above

84. A column splice is used to increase

1. length of column

2. strength of column

3. cross sectional area of column

4. none of the above

85. The stress in the wall or a thin cylinder subjected to internal pressure is

1. hoop compression

2. shear

3. torsional shear

4. hoop tension

86. The inventor of the term soil mechanic was

1. Kray

2. Dr. Karl Terzaghi

3. Laygue

4. Fellenius

87. Pycrometer is used to determine

1. void ratio

2. dry density

3. watercontent

4. density index

88. The co-efficient of compressibility of soil is the ratio of

1. stress to strain
2. strain to stress
3. stress to settlement
4. rate of loading to that of settlement

89. The ultimate bearing capacity of soil is

1. total load on the bearing area
2. safe load on the bearing area
3. load at which soil fails
4. load at which soil consolidates

90. Under reamed piles are generally

1. driven piles
2. board files
3. precast piles
4. all of the above

91. The unit of Kinematic viscosity is

1. m^2/sec
2. newton sec per m^2
3. newton – sec^2 per m^3
4. m^2 per sec

92. From a nozzle exposed to atmosphere, the liquid jet traverses along

1. a straight line
2. a circular path
3. an elliptical path
4. a parabolic path

93. The standard height of a standard rain gauge is

1. 10 cm
2. 20 cm
3. 30cm
4. 50 cm

94. The formula V = 4001 (D_{10}^2 / 4) used for determining the velocity of groundwater flow in meter per day is known as

1. Meinzer's formula
2. Slichter's formula
3. Darcy's formula
4. Hazen's formula

95. For the estimate of high floods in fan – shaped catchment, the formula used is

1. Dicken's formula
2. Ryves formula
3. Inglish formula
4. None of the above

96. A circular sewer section is preferred to other shapes because

1. it is cheaper in construction
2. it provides a maximum area for a given perimeter
3. it provides maximum hydraulic mean depth
4. all of the above

97. The coagulant widely used for sewage treatment is

1. alum
2. ferricchloride
3. ferric sulphate
4. chlorinated sulphur

98. The maximum pressure to which a pipe is subjected to during its operation is known as

1. working pressure
2. design pressure
3. test pressure
4. pipe pressure

99. For controlling the algae, the most commonly used chemical is

1. copper sulphate .
2. alum
3. lime
4. bleaching powder

100. The most commonly used chemical for dechlorination of water is

1. sodium thiosulphate
2. sodium bisulphate
3. sodium sulphate
4. all of the above

101. The boundary of water of a still lake, represents a

1. level surface
2. horizontal surface
3. contour line
4. concave surface

102. Removal of parallax may be achieved by

1. refocusing the objective
2. refocusing the eye-piece
3. refocusing the objective and eye piece
4. none of the above

103. International date line is located along

1. Standard meridian
2. Greenwich meridian
3. Equator
4. 180° longitude

104. The position of the sun when its north declination is maximum is known as

1. Vernal equinox
2. Autumnal equinox
3. Summer solstice
4. Winter solstice

105. Triangulation surveys are carried out for providing

1. planimetric control
2. height control
3. both planimetric and height control
4. none of the above

106. If no super evaluation is provided on a road along curves pot holes may develop at

1. Inner edge of the road
2. Outer edge of the road
3. Centre of the road
4. No where on the road

107. The length of transition curve is governed by

1. rate of change of radial acceleration
2. rate of change of super-elevation
3. both (1) and (2)
4. neither (1) nor (2)

108. The basic formula for the determination of thickness of pavements was first suggested by

1. Spanglar
2. Picket
3. Kelly
4. Gold beck

109. Maximum wheel base distance provided on Indian B.G. track is

1. 4.096 m
2. 5.096 m
3. 6.096 m
4. 7.096 m

110. The spike commonly used to fix rails to wooden sleepers in Indian railway is

1. dog spike
2. screw spike
3. round spike
4. all of the above

111. The relation between the air base (B) photographic base (b) flying height (H) and the focal length (f) of a vertical photograph is

1. B = bH / f
2. B = f / bH
3. B = b / fH
4. B = H / bf

112. The rotation of the aircraft about 'Y' axis is designated by the letter

1. 'w' is sometimes called 'roll'
2. 'Φ' is sometimes called 'pitch'
3. 'z' is sometimes called 'swing'
4. none of the above

113. The satellite launched by USA is

1. IRS — 1C
2. SPOT
3. ERS
4. Landsat

114. The spatial resolution of IRS — IC PAN satellite data is

1. 23.5 m
2. 36.25 m
3. 5.8 m
4. 20 m

115. During the cloud, the satellite sensor used to take observation is

1. optical sensor
2. microwave sensor
3. both optical and microwave sensor
4. none of the above

116. The vector data base structure used in GIS is

1. Network database structure
2. Hierarchical data structure
3. relational data base structure
4. all of the above

117. Data used to study the details of data available in GIS environment is called

1. relational data base
2. oracle
3. meta data
4. Informix

118. The input device used to enter the data in GIS environment is

1. scanner
2. digitizer
3. key board
4. all of the above

119. GIS is used for

1. urban planning
2. utility planning
3. disaster management
4. all of the above

120. The two data models used in GIS are

1. TIN model and grinded DEM
2. DEM and DTM
3. Raster and vector
4. None of the above

PART 04 — MECHANICAL, AUTOMOBILE AND AERONAUTICAL ENGINEERING

(Answer ALL questions)

76. The efficiency of a Screw Jack is given by

1. $\frac{\tan\alpha}{\tan(\alpha+\phi)}$
2. $\frac{\tan a}{\tan(\alpha-\phi)}$
3. $\frac{\tan(\alpha+\phi)}{\tan a}$
4. $\frac{\tan(a-\phi)}{\tan a}$

77. The train value of a gear train is

1. equal to velocity ratio of a gear train
2. reciprocal of velocity ratio of a gear train
3. always greater than unity
4. always less than unity

78. The ratio of the maximum displacement of the forced vibration to the deflection due to the static force is known as

1. damping factor
2. damping coefficient
3. logarithmic decrement
4. magnification factor

79. A plate with a circular hole is subjected to a transverse load. The magnitude of stress infront of the hole in the axial direction is

1. same as the stress in the transverse direction
2. 3 times the stress in the transverse direction
3. 2 times the stress in the transverse direction
4. the magnitude of the stress is zero

80. The main constituent of duralumin is

1. aluminium
2. manganese
3. copper
4. magnesium

81. The steel used for rails under heavy traffic and on sharp curves is

1. manganese steel
2. chrome steel
3. cast steel
4. mild steel

82. Corrosion resistance of stainless steel is due to

1. Chromium
2. Vanadium
3. Carbon
4. Sulphur

83. Which material will have highest limiting strength?

1. Aluminium
2. Cast iron
3. Mild steel
4. Wrought. iron

84. A 3 m^2 hot black surface at 80° C is losing heat to the surrounding air at 25" C by convection with a convection coefficient of 12 $W/m^2{}^\circ C$, and by radiation to the surrounding surfaces at 15° C. The total heat loss from the surface is

1. 1987 W
2. 2239 W
3. 2348 W
4. 3451 W

85. For an irreversible process, entropy change is

1. greater than $\delta Q/T$
2. equal to S Q $/T$
3. less than $\delta Q/T$
4. equal to zero

86. Joule–Thomson coefficient is given by

1. $(\delta T / \delta P)_h$
2. $(\delta T / \delta V)_h$
3. $(\delta T / \delta V)_s$
4. $(SSISP)$,

87. Following relationship defines the Gibbs free energy G

1. $G = H + TS$
2. $G = H - TS$
3. $G = U + TS$
4. $F = U - TS$

88. Internal energy and enthalpy of an ideal gas are functions of

1. temperature and pressure
2. pressure only
3. temperature only
4. temperature and specific volume

89. In S.I. Units one ton of refrigeration is equal to

1. 210 kJ/min
2. 21 kJ/min
3. 420 kJ/min
4. 840 kJ/min

90. Domestic refrigerator working on vapour compression cycle uses the following type of expansion valve

1. electrically operated throttle valve
2. capillary tube
3. expansion valve
4. thermostatic valve

91. Which of the following refrigerants has the lowest freezing point?

1. Freon – 12
2. NH_3
3. CO_2
4. Freon – 22

92. The most suitable refrigerant for a commercial ice plant is

1. Brine
2. Freon – 12
3. NH_3
4. CO_2

93. Air is dehumidified by

1. heating
2. cooling
3. injecting water
4. injecting steam

94. In which type of welding a pool of molten metal is used

1. electroslag
2. submerged arc
3. MIG
4. TIG

95. A brazed joint may be satisfactorily used on components made of

1. tin plate
2. brass
3. copper
4. aluminium

96. In sand moulding, the middle part of flask is called

1. cope
2. check
3. drag
4. flask-middle

97. For grinding cast iron, brass and aluminium which one of the following material is used for wheel?

1. Aluminium oxide
2. Silicon carbide
3. Borazon
4. Diamond

98. The process in which higher hydrocarbons are decomposed into smaller hydrocarbons is called

1. cracking
2. reforming
3. polymerization
4. alkylation

99. One effect of detonation is

1. delay in ignition
2. interruption in lubrication
3. loss of power
4. deterioration in the quality of air-fuel mixture

100. An indication of ignition quality of diesel fuel is given by

1. detonation
2. octane number
3. pre-ignition
4. cetane number

101. The most widely used fuel supply system for car engine is

1. Gravity system
2. Pressure system
3. Vacuum system
4. Pump system

102. Fuel pump pressure should be approximately

1. 3 kPa
2. 30 kPa
3. 100 kPa
4. 300 kPa

103. The inertia of the rotating parts of the clutch should be

1. maximum
2. minimum
3. zero
4. 50 % of minimum

104. Cushioning springs in clutch plate are mean; to reduce

1. torsional vibrations
2. vehicle speed
3. jerky starts
4. engine speed

105. The thrust bearings should come into contact with the release levers when the

1. vehicle is stationary
2. vehicle is running very fast
3. vehicle is driven very slow
4. clutch pedal is depressed

106. Free pedal play in car clutches is about

1. 3 mm
2. 30 mm
3. 60mm
4. 100 mm

107. Thin airfoil theory predicts the lift curve slope of a thin airfoil is

1. π per degree
2. π per radian
3. 2π per degree
4. 2n per radian

108. NACA 0014 implies that the airfoil is

1. symmetric
2. positively cambered
3. negatively cambered
4. cusped

109. The component of a transonic airplane for which transonic area rule applied is

1. nose
2. wing
3. tail
4. fuselage

110. Induced drag of an airplane can be reduced by

1. boundary layer fence
2. spoilers
3. winglets
4. decreasing aspect ratio

111. V–n diagram is a plot of

1. Velocity Vs normal force
2. Volumetric flow Vs normal force
3. Velocity Vs load factor
4. Volumetric flow Vs load factor

112. The order of temperature in the primary zone of a can type coinbustor is

1. 2600 K
2. 1200 K
3. 400 K
4. 3400 K

113. The overall air to fuel ratio in a turbojet engine is approximately

1. 67
2. 15
3. 8
4. 4

114. The order of pressure ratio that can be achieved in a single sided centrifugal compressor is

1. 24
2. 6
3. 42
4. 2

115. For turbine blade cooling, the coolant air is tapped from the following range of stages of a multistage-axial flow compressor

1. 10 to 12
2. 4 to 6
3. 18 to 20
4. 1st and 2nd stages only

116. In an optimally expanded jet engine nozzle, the nozzle exit pressure is equal to

1. half of ambient pressure
2. ambient pressure
3. one-fourth of combustion chamber pressure
4. pressure at inlet section of the intake of the engine

117. In case of pure shear at a point, the sum of normal stresses on two rectangular orthogonal planes is equal to

1. maximum shear stress
2. twice the maximum shear stress
3. half the maximum shear stress
4. zero

118. A hollow shaft of same cross sectional area as solid shaft transmits

1. same torque
2. less torque
3. more torque
4. depends on the external diameter

119. The effective length of a column with one end fixed and the other end free is

1. its own length
2. twice its length
3. half its length
4. $2^{-1/2}$ x its length

120. A spherical vessel with an inside diameter of 2 m is made of material having an allowable stress in tension of 500 kgf / cm^2. The thickness of the shell to withstand a pressure of 25 bar should be

1. 5 cm
2. 10 cm
3. 2.5 cm
4. 1.25 cm

PART 05 — ELECTRICAL, ELECTRONICS, COMMUNICATIONAND INSTRUMENTATION ENGINEERING

(Answer ALL questions)

76. How much energy is stored by a 100 mH inductance with a current of **1 A?**

1. 100 J
2. **1 J**
3. 0.05 J
4. 0.01 J

77. If a network contains B branches and N nodes then the number of mesh current equations would be

1. $B-(N-1)$
2. $N-(B-1)$
3. B – N – 1
4. $(B+N)-1$

78. When $R = 10\ \Omega, X_C = 18\ \Omega$ and $X_L = 12\ \Omega$, the current

1. leads the applied voltage
2. lags behind the applied voltage
3. is in phase with the voltage
4. is in quadrature with the voltage

79. In a certain series RC circuit, the true power is 2W and the reactive power is **3.5** VAR. What is the apparent power?

1. **3.5** VA
2. 2VA
3. 4.03 VA
4. 3VA

80. A sine wave voltage is applied across an inductor when the frequency of voltage is increased, the current

1. increases
2. decreases
3. remains the same
4. is zero

81. A shunt generator running at 1000 r.p.m. has generated e.m.f. as 200 V. If the speed increases to 1200 rpm, the generated emf will be nearly

1. 150 V
2. 175 V
3. 240 V
4. 290V

82. In a d.c. generator in case the resistance of the field winding is increased then output voltage will

1. increase
2. decrease
3. remain unaffected
4. fluctuate heavily

83. D.C. motors are widely used in

1. Pump sets
2. Air compressors
3. Electric traction
4. Machine shops

84. The starting winding of a single-phase motor is placed in

1. armature
2. field
3. rotor
4. stator

85. An over-excited synchronous motor takes

1. leading current
2. lagging current
3. both (1) and (2)
4. in phase current

86. In open loop system the control action

1. depends on the size of the system
2. depends on system variables
3. depends on the input signal
4. is independent of the output

87. **A** controller is essentially a

1. Sensor
2. Clipper
3. Comparator
4. Amplifier

88. **A** signal flow graph is a

1. topological representation of a set of differential equations
2. polar graph
3. log log graph
4. special type of graph to analyse modern control systems

89. When the gain margin is positive and the phase margin is negative, the system is

1. stable
2. unstable
3. stable or unstable depending on the system
4. undeterministic

90. The effect of adding poles and zeros can be determined quickly by which of the following?

1. Root locus
2. Nyquist plot
3. Bode plot
4. Nicholar chart

91. **A** Norton's equivalent is

1. parallel circuit
2. series circuit
3. series-parallel circuit
4. none of the above

92. **A** resistor of **5** ohms is connected in one branch of a complex network. The current in this branch is 5 **A.** If this **5** Ω resistor is replaced by **10** Ω resistor the current in this branch will be

1. 10 A
2. 2.5 **A**
3. **5 A**
4. less than 5 **A**

93. To determine the polarity of the voltage drop across a resistor, it is necessary to know the

1. value of the resistor
2. value of current through the resistor
3. direction of current through the resistor
4. power consumed by the resistor

94. In a network the number of tree branches

1. is equal to the number of links
2. cannot be equal to number of links
3. is twice the number of links
4. has no relation with the number of link branches

95. For a voltage source

1. the source emf and terminal voltage are equal
2. terminal voltage is always lower than source emf
3. terminal voltage cannot be higher than source emf
4. terminal voltage is zero

96. Kirchoff's voltage law states that the

1. total voltage drop in a series circuit is always finite
2. sum of emf and voltage drops in a closed mesh is zero
3. sum of emfs in a series circuit is zero
4. sum of emf and voltage drops in a closed mesh is not zero

97. In a thyristor, the magnitude of anode current will

1. increase if gate current is increased
2. decrease if gate current is decreased
3. increase if gate current is decreased
4. not change with variation in gate current

98. For an SCR, $\frac{di}{dt}$ protection is achieved through the use of

1. R in series with SCR
2. L in series with SCR
3. RL in series with SCR
4. RLC in series with SCR

99. Inverter gain is given by the ratio

1. dc output voltage/ac input voltage
2. ac output voltage/ac input voltage
3. dc output voltage/dc input voltage
4. ac output voltage/dc input voltage

100. A zener diode works on the principle of

1. tunnelling of charge carriers across the junction
2. thermionic emission
3. diffusion of charge carriers across the junction
4. hoping of charge carriers across the junction

101. The major application of chopper drive is in

1. traction
2. computers
3. heating furnishes
4. miniature motors

102. When a thyristor gets turned on, the gate drive

1. should not be removed or it will turn off the SCR
2. may or may not be removed
3. should be removed
4. should be removed in order to avoid increased losses and higher function temperature

103. Computer cannot do anything without a

1. chip
2. memory
3. output device
4. program

104. The first computer made available for commercial use was

1. Mark–I
2. ENIAC
3. EDSAC
4. UNIVAC

105. When did Intel announce its 16-bit 80286 chip?

1. 1980
2. 1982
3. 1984
4. 1986

106. How many bits can be stored in the 8 K RAM?

1. 8000
2. 8192
3. 4000
4. 4096

107. The larger the RAM of a computer, the faster its processing speed is since it eliminates the

1. need of ROM
2. need for external memory
3. frequent disk I/Os
4. need for wider data path

108. Which of the following types of transducers can be used for measuring the angular position?

(a) Circular potentiometer

(b) LVDT

(c) E-Pick off

(d) Synchro

Select the correct answer using the codes given below :

1. (a), (b), (c) and (d)
2. (a) and (c)
3. (a), (b) and (d)
4. (a) and (d)

109. The most suitable thermocouple to be used for measuring temperature in the range of 1300° C to 1500" C is

1. Chromel–Constantan
2. Iron–Constantan
3. Chromel–Alumel
4. Platinum–Rhodium

110. LVDT is a

1. displacement transducer
2. velocity transducer
3. acceleration transducer
4. pressure transducer

111. In a strain measuring equipment using a resistance strain gauge the output quantity is

1. resistance
2. voltage
3. current
4. impedance

112. If the temperature increases by 100° C, the resistivity of a thermistor is likely to become

1. one half of initial value
2. one fiftieth of initial value
3. twice the initial value
4. no change

113. The purpose of duplexer is

1. to convert TDM to FDM
2. to provide same antenna both for transmission and reception
3. to convert pulsed transmission to CW transmission
4. both (1) and (3)

114. In FM transmission, amplitude of the modulating signal determines

1. rate of frequency variations

2. amount of frequency shift

3. total balance of transmission

4. distance of broadcast

115. The highest harmonic generated in human voice is

1. 1 kHz

2. 5 kHz

3. 3 kHz

4. 10 kHz

116. If the reflection coefficient of a line is zero, the line is

1. Infinite line

2. Open-circuited

3. Short-circuited

4. Very short line

117. The receiving antenna most commonly used for TV broadcasting in the UHF band is

1. turnstile antenna

2. dipole antenna

3. yagi antenna

4. rhombic antenna

118. Generally the aircraft electrical system uses supply frequency of

1. 50 Hz

2. 60 Hz

3. 400 Hz

4. 115 Hz

119. In GPS Navigation, there can be integration between

1. GPS and INS

2. GPS and LORAN C

3. GPS and ILS

4. GPS and DME

120. Mach Number is defined as the ratio between True air speed and speed of the sound at

1. sea level

2. any altitude

3. a particular altitude

4. all altitudes

PART 06 — EARTH SCIENCES

(Answer ALL questions)

76. The margins at which the plates neither gain nor lose surface area are called
1. Continental margins
2. Destructive margins
3. Conservative margins
4. None of the above

77. Geosynclines located on the tectonically stable margins of the continents are referred as
1. Paralia-geosynclines
2. Mio-geosynclines
3. Exo-geosynclines
4. Eugeosynclines

78. A network of parallel or sub-parallel streams developed along strike and dip direction is known as
1. Resequent
2. Trellis
3. Dendritic
4. Pinnate

79. The Hawaiian islands are examples of
1. Transform fault
2. Fissure eruption
3. Interplate volcanoes
4. Intra volcanic chain

80. Part of the sea floor adjoining a landmass is known as
1. Continental shelf
2. Continental slope
3. Beach
4. Continental rise

81. The crustal model of isostasy was proposed by
1. Washington and Clark
2. Wegener
3. Jacob
4. Sir George Airy

82. Higher roundness of grains indicates
1. Degree of Weathering
2. Longer distance of transport
3. Maturity of sediment
4. Shorter distance of transport

83. Amphibolite Schist is a rock associated with
1. Tin
2. Gold
3. Copper
4. Aluminium

84. Which among the following is the first to crystallize on cooling?
1. Quartz
2. Feldspar
3. Olivine
4. Mica

85. Diamonds are usually associated with
1. Granite
2. Sandstone
3. Dolerite
4. Kimberlite

86. Leucocratic rocks are
1. Dark coloured
2. Medium grey coloured
3. Light grey coloured
4. Medium to dark grey coloured

87. Dolerite is a rock that possesses
1. Porphyro-blastic texture
2. Granitic texture
3. Vesicular texture
4. Ophitic texture

88. Joints that are perpendicular to fold axes and having steep dips are called
1. Release joints
2. Extension joints
3. Shear joints
4. None of the above

89. Petrofabric diagram occurring as girdle will represent
1. B–Tectonite
2. R–Tectonite
3. S–Tectonite
4. Both (1) and (2)

90. Dome and basin structures are characteristic of

1. Type I interference pattern
2. Type II interference pattern
3. Type III interference pattern
4. None of the above

91. The ratio of transverse strain to axial strain is called

1. Compressibility
2. Poisson's ratio
3. Modulus of Elasticity
4. Breaking strength

92. A group of beds which are able to lift their own weight and that of overlying rock strata without much internal flowage is called

1. Incompetent beds
2. Ductile material
3. Competent beds
4. Rheid

93. The hingeline of a doubly plunging fold will be

1. Curvilinear
2. Horizontal
3. Rectilinear
4. None of the above

94. The host rocks for banded iron formation are

1. Quartzites
2. Dolerite
3. Granite
4. Schist

95. Fluorspar deposits at Amba Dongar are associated with

1. Granites
2. Carbonatites
3. Phyllites
4. Marbles

96. Bauxite mining in India is mainly done in

1. Deccan traps
2. Lateritic terrains
3. Phyllites
4. Granites

97. Blue Quartz veins are of special value in searching for

1. Gold
2. Silver
3. Lead
4. Zinc

98. The metallic mineral known to be a good conductor of electricity is

1. Hematite
2. Chromite
3. Braunite
4. Galena

99. In cavity filling deposits, the ore is built up in successive layers called

1. Vugs
2. Geode
3. Druse
4. Crustification

100. The geophysical technique in which the fields measured are not stationary but vary with time is

1. Electrical
2. Magnetic
3. Gravity
4. Seismic

101. Overbreak is a term associated with

1. Construction of dams
2. Tunneling operation
3. Bridge construction
4. Drilling bore wells

102. Idukki dam in Kerala is an example of

1. Masonry dam
2. Arch dam
3. Gravity dam
4. Embankment dam

103. Well diameter and mud content of the walls of a well can be measured by

1. Caliper logging
2. Neutron logging
3. Photoelectric logging
4. Electrical logging

104. The geophysical method that can successfully locate copper, lead and zinc deposits is

1. Seismic method

2. Magnetic method

3. Gravity method

4. Airborne electromagnetic method

105. Airborne magnetometry, used to locate magnetic minerals can be effective upto a depth of

1. 600 to 800 metres

2. 400 to 600 metres

3. 1000 to 1200 metres

4. 200 to 400 metres

106. The fastest method of drilling for groundwater is

1. Cable tool method

2. Hydraulic rotary method

3. Boring method

4. None of the above

107. In an unconsolidated aquifer, where the water table is at shallow depth, the suitable well would be

1. Dug well

2. Driven well

3. Bored well

4. Jetted well

108. Water of magmatic origin is known as

1. Meteoric water

2. Capillary water

3. Connate water

4. Juvenile water

109. Recharge area is that region which

1. Supplies water to perched aquifer

2. Supplies water to unconfined aquifer

3. Receives water from confined aquifer

4. Supplies water to confined aquifer

110. The coefficient of permeability (T) is expressed as

1. $T = \frac{b}{k}$

2. $T = QA$

3. $T = Kb$

4. None of the above

111. Which one of the following has the highest porosity?

1. Limestone

2. Sandstone

3. Clay

4. Gravel

112. The water stored and released after flood is called as

1. Specific retention

2. Specific yield

3. Flood yield

4. Bank storage

113. Specific retention may be expressed as

1. $S_r = \frac{Y}{100\,W}$

2. $S_r = \frac{100W}{Y}$

3. $S_r = \frac{V}{100W_r}$

4. $S_r = \frac{100W_r}{V}$

114. Water containing less than **1** gm of salts per kilogram of water is classified as

1. Hot water

2. Salt water

3. Cold water

4. Fresh water

115. The relationship between fresh and saline water can be understood by

1. Hill's method

2. Ghyben–Herzberg principle

3. Darcy's law

4. Reynold's number

PART 07 — PRODUCTION AND INDUSTRIAL ENGINEERING

(Answer **ALL** questions)

76. Electroforming is particularly useful for
   1. Non-ferrous components
   2. Thin walled parts requiring high order of accuracy and internal surface finish
   3. Manufacturing electrical conductors
   4. Parts that cannot be machined

77. The investment castings tolerances may be expected to the extent of
   1. ±1 mm
   2. ±0.1mm
   3. ±0.05 mm
   4. ±0.001mm

78. Shot peening
   1. is done at recrystallisation temperature
   2. changes the crystalline structure of materials
   3. improves the fatigue life of small parts
   4. refines the grain structure

79. The process used for manufacturing the body of a carburettor is
   1. Fine sand casting
   2. Metal spraying
   3. Die casting
   4. Continuous casting

80. Construction of FLD curve is based upon
   1. Applied load during forming
   2. Circumferential strains
   3. Frictional stresses
   4. Chemical composition of material

81. Hidden welding is mainly carried out by
   1. TIG
   2. Under water welding
   3. EBW
   4. LBW

82. The concept of HAZ can be easily explained by
   1. Lap joint
   2. T joint
   3. Butt joint
   4. V joint

83. The shielding gases used in GMAW is
   1. any gas
   2. only inert gas
   3. combination of gases where inert gas is a must
   4. combination of two different inert gases only

84. In machine tools chatter occurs due to
   1. Free vibration
   2. Forced vibration
   3. Random vibration
   4. Self excited vibration

85. In cutting tool materials, considering the property of hardness, the next hard material to diamond is
   1. Stellite
   2. CBN
   3. Coated carbides
   4. SiC

86. Profile of a gear tooth can be checked by
   1. Sine bar
   2. Bench micrometer
   3. Optical pyrometer
   4. Optical projector

87. Optical flats are made of
   1. Quartz
   2. Glass
   3. Plastic
   4. Silicon

88. Vee Block used in the workshop is to check the
   1. Roundness of a cylindrical work
   2. Surface roughness
   3. Dimensions of an oval job
   4. Taper on a job

89. Electron beam machining removes materials by

1. Shear
2. Melting and vapourisation
3. Erosion
4. Abrasive action

90. The type of chip produced when cutting cast iron is

1. Discontinuous
2. Continuous
3. With built up edge
4. Curled

91. The percentage of Pearlite present in 0.4 % C steel is

1. 25
2. 50
3. 75
4. 100

92. Duralumin is an alloy of Aluminium and

1. Copper
2. Magnesium
3. Zinc
4. Silicon

93. Which one of the following pair constitutes Pearlite?

1. Ferrite + Austenite
2. Austenite + Cementite
3. Cementite + Ferrite
4. Ferrite + Martensite

94. The corrosion resistance of stainless steel is due to the presence of

1. Chromium
2. Nickel
3. Silicon
4. Tungsten

95. During Vulcanizing, the rubber is heated with

1. Sodium
2. Sulphur
3. Silicon
4. Zinc

96. The coding system which consist of 5 digit form code and 4 digit supplementary code is

1. MICLASS system
2. OPITZ system
3. DCLASS system
4. COFORM system

97. The hardware/software protocol developed jointly by industries for Network Communication is

1. MAP
2. JIT
3. TQM
4. SNA

98. The data structure used to represent the B-Rep model is known as

1. Edge vertice data structure
2. Winged edge data structure
3. Model based data structure
4. Linked list data structure

99. The Euler-Pontcare formula to check the validity of the solid model is

1. $F + E - V = 4$
2. $F - E + V = 4$
3. $F - E + V = 2$
4. $F + E - V = 2$

100. Which of the following datum selection is difficult for process planning engineer?

1. The machine datum
2. The fixture datum
3. The part datum
4. The tool datum

101. A small firm produces 100 pens per day. The direct material cost is found to be Rs. 160, direct labour cost is Rs. 200 and factory overheads chargeable to it is Rs. 250. If the selling on cost is 40 % of the factory cost, what must be the selling price of each pen to realise a profit of 14.6 % of the selling price?

1. Rs. 8.54
2. Rs. 10
3. Rs. 6.10
4. Rs. 8.10

For a shop producing one type (or) class of product, the suitable over-head allocation method would be

1. Man-hour rate
2. Machine hour rate
3. Unit rate
4. Machine and man hour rate

103. The material used for the manufacture of Jig Bush is

1. Bronze
2. Brass
3. Copper
4. Hardened Steel

104. The locator used in milling operation is

1. Stepping block
2. Height gauge
3. Setting block
4. V-block

105. In press operation, the size of the blanked part is dependent on the size of

1. die and clearance
2. punch and clearance
3. die
4. punch

106. Queuing theory deals with problems of

1. material handling
2. reducing the waiting time
3. better utilization of manpower
4. effective utilization of machines

107. PERT has the following time estimates

1. One time estimate
2. Two time estimate
3. Three time estimate
4. Four time estimate

108. The simplex method is the basic method for

1. Value analysis
2. Queueing problems
3. Linear programming
4. Network analysis

109. The probability distribution of project completion in PERT follows

1. Normal distribution
2. Binomial distribution
3. Beta distribution
4. Exponential distribution

110. A two person zero sum game is known as

1. n person game
2. Fair game
3. Zero sum game
4. Rectangular game

111. Work study is concerned with

1. improving present method and finding standard time
2. motivation of workers
3. improving production capability
4. improving production planning and control

112. String diagram is used when

1. a team of workers is working at a place
2. material handling is involved
3. idle time is to be reduced
4. machining time is to be reduced

113. ABC analysis deals with

1. analysis of process chart
2. flow of material
3. scheduling of jobs
4. controlling inventory costs

114. Process layout is employed for

1. batch production
2. continuous production
3. effective utilization of machines
4. mass production

115. The economic order, quantity is the

1. highest level of inventory
2. lot corresponding to break even point
3. capability of the plant
4. optimum lot size

PART 08 — COMPUTER SCIENCE AND ENGINEERING

(Answer ALL questions)

76. Which of the following languages cannot be expressed using regular expression?

I. A string of a's followed by an equal number of b's

II. All possible strings consisting of a's and b's

III. A string with zero or more occurrences of a's followed by zero or more occurrences of b's

IV. A string in which every occurrence of 'a' is followed by an even number of b's

1. I
2. II
3. III
4. IV

77. The contrapositive of the formula $P \rightarrow Q$ is

1. $Q \rightarrow P$
2. $\neg P \rightarrow Q$
3. $\neg Q \rightarrow P$
4. $\neg Q \rightarrow \neg P$

78. Given the premises $H1 : P \rightarrow Q$ and $H2 : \mathrm{P}$, the conclusion is

1. Q
2. P
3. $\neg Q$
4. $\neg P$

79. The instructions for which equivalent object code are not generated during assembling are

1. machine operations
2. pseudo operations
3. binary operations
4. macro operations

80. The tool Yacc in UNIX generates

1. lexer
2. parser
3. code generator
4. code optimizer

81. Top down parsers cannot be built for the following grammar

1. left factored
2. right factored
3. left recursive
4. right recursive

82. The tenn 'dead code' refers to that section of the source program that is

1. dead
2. reentrant
3. unreachable
4. redundant

83. The descriptor table registers are used for implementing

1. task switches
2. interrupt transfers
3. virtual memory
4. control transfers

84. Call gates are used for Accessing

1. higher privileged code
2. interrupt service routines
3. subroutines
4. control segments

85. Which of the following cannot be used to connect external devices?

1. PCI
2. SCSI
3. USB
4. Firewire

86. Masking of an interrupt

1. enables the interrupt
2. disables the interrupt permanently
3. changes the priority of the interrupt
4. temporarily hides the interrupt from the processor

87. Pick out the odd one

1. 8087
2. 80287
3. 80387
4. 8257

88. The Intel family of microprocessors supports ———— number of privilege levels

1. 2
2. 3
3. 4
4. 1

89. The ASSUME assembler directive is used to

1. load the segment registers with their appropriate values
2. indicate which logical segment is to be associated with the physical segment
3. make the assembler assume certain default settings
4. tell the assembler to ignore certain default settings

90. The value represented by the hex number 411000, representing a floating point number, with 1 is

1. 4.5
2. 45000000
3. 2.5
4. 0.22

91. A microprogramme control unit is better than a hardwired control unit, because it is

1. flexible
2. faster
3. easier to design manually
4. cheaper

92. Which of the following is not part of a microprogrammed control unit?

1. Micro PC
2. Control store
3. Clock
4. Control step counter

93. A delayed branch

1. is a branch that is executed after a certain delay
2. is the penalty paid for speculating a branch
3. refers to placing useful instructions after the branch instructions
4. none of the above

94. A superscalar processor is

1. a vector processor
2. a processor which issues more than one instruction per cycle
3. a number of scalar processors working together
4. all of the above

95. Segmentation results in

1. internal fragmentation
2. external fragmentation
3. both external and internal fragmentation
4. neither external nor internal fragmentation

96. A computer with a 32-bit address uses a two level page table. Virtual addresses are split into a 9-bit top level page table field, a 11-bit second level page table field and an offset. How large are the pages?

1. 9 K
2. 11 K
3. 12 K
4. 4 K

97. Consider a swapping system in which memory consists of the following hole sizes in memory order :

10 K, 4 K, 20 K, 18 K, 7 K, 9 K, 12 K and 15 K

Which hole is taken for successive segment requests of 12 K, 10 K, 9 K for best fit?

1. 10 K, 20 K, 18 K
2. 20 K, 18 K, 10 K
3. 12 K, 10 K, 9 K
4. 20 K, 10 K, 18 K

Disk requests come into the disk driver for cylinders 10, 22, 20, 2, 40, 6 and **38** in that order. A seek takes 4 m sec per cylinder moved. How much seek time is needed for First Come First Served disk scheduling? The arm is initially at cylinder 15.

1. 569 m sec
2. 564 m sec
3. 596 m sec
4. 112 m sec

99. The system call to create a process in UNIX is

1. execve
2. wait
3. creat
4. fork

100. Process P_1 holds resource R_1 and waits for resource Rz. Process P_2 holds resource R_2 and waits for resource R_1. There are only single instances of R_1 and Rz. The system is said to be

1. synchronized
2. deadlocked
3. waiting
4. running

101. A running process makes a read system call. Then the process will

1. move to ready state
2. remain in running state
3. move to blocked state
4. move to terminated state

102. MAR register maintains the

1. address of data values in the memory
2. address of the current instruction being executed
3. contents of the word being addressed
4. address of the next instruction to be executed

103. Pseudocode

1. is a counterfeit and abbreviated version of actual computer instruction
2. is used for machine level programming
3. is used to solve complex logical programming
4. is used in transmission of signals

104. The output of assembler in machine code is referred to as

1. assembly program
2. object program
3. source program
4. macro instructions

105. The speed of computers used for AI application is measured in ———— per second

1. cycles
2. instructions
3. logical inferences
4. revolutions

106. LISP machines are known as

1. AI work stations
2. Super mini computers
3. Time sharing terminals
4. Graphic work stations

107. Which of the following value for SQLCODE indicates successful execution of embedded SQL statements

1. Negative
2. Zero
3. Positive
4. Hundred

108. Recovery in distributed databases uses the

1. Two phase locking protocol
2. Two phase commit protocol
3. Three phase commit protocol
4. Mobile locking protocol

109. Which of the following is not a recovery technique?

1. Deferred update
2. Immediate update
3. Shadow paging
4. Write ahead logging

110. Which of the following is an integrity constraint?

1. Domain constraint

2. Entity integrity

3. Referential integrity

4. All of the above

111. Which of the following is not a front end tool?

1. Oracle

2. Visual Basic

3. VC++

4. Power Builder

112. The physical layer protocol directly specified for the X·25 protocol is

1. RS **232**

2. $X \cdot 21$

3. DB–15

4. DB 37

113. In frame relay which bit in the address field is set to one to signify the last address byte?

1. DE (discard eligibility)

2. EA (extended address)

3. C/R (command/response)

4. FECN (forward explicit congestion notification)

114. A bridge has access to the ———— address of a station on the same network

1. physical

2. network

3. service access point

4. IP

115. A device that has two IP addresses is

1. a computer

2. a router

3. a gateway

4. any of the above

PART 09 — CHEMISTRY, CHEMICAL ENGINEERING AND CERAMIC TECHNOLOGY

(Answer ALL questions)

76. How much work is done by 1 mol of a gas during a reversible non-flow isothermal expansion from an initial volume V_1 to a final volume V_2 when the equation of state is $P(V-b)=RT$, where b is a positive constant?

1. $W = RT \ln \frac{V_2}{V_1}$
2. $W = RT \ln(V_2 - V_1)$
3. $W = RT \ln \frac{V_1 - b}{V_2 - b}$
4. $W = RT \ln \frac{V_2 - b}{V_1 - b}$

77. Clausius–Clapeyron equation is applicable in

1. melting processes only
2. vaporization processes only
3. sublimation processes only
4. all of the above

78. Mollier chart is a

1. pressure Vs enthalpy chart
2. pressure Vs volume chart
3. enthalpy Vs entropy chart
4. temperature Vs entropy chart

79. Which of the following factors control the deactivation of a porous catalyst pellet?

1. decay reactions
2. pore diffusion
3. form of surface attack by poison
4. all of the above

80. Which of the following is an autocatalytic reaction?

1. Photochemical reactions
2. Microbial fermentation reaction
3. Enzyme fermentation reaction
4. Ammonia synthesis reaction

81. Viscous heat sensitive liquids are concentrated in

1. open pan evaporators
2. long tube vertical evaporators
3. agitated film evaporators
4. none of the above

82. In a boiling curve, the peak heat flux is called ———— point

1. the melting
2. Leiden frost
3. the boiling
4. burn out

83. The binary diffusivity in gases and liquids vary respectively as

1. $T^{3/2}$ and T
2. T and $T^{3/2}$
3. $\sqrt{T}$ and $T^{3/2}$
4. $T^{3/2}$ and $\sqrt{T}$

84. In McCahe-Thiele method, at infinite reflux ratio

1. the overhead product is minimum
2. both the operating lines coincide with diagonal
3. both (1) and (2)
4. neither (1) nor (2)

85. Peclet number (N_{Pe}) for mass transfer is defined as

1. N_{Re}/N_{SC}
2. $N_{Re}N_{SC}$
3. N_{SC}/N_{Re}
4. $N_{Sh} \cdot N_{SC}$

86. Dynamic similarity is the similarity of
1. shapes
2. streamline pattern
3. forces influencing the fluid motion
4. discharge

87. The pressure drop in laminar flow through pipe is equal to
1. $\frac{8\mu \bar{V} L}{g_c D^2}$
2. $\frac{g_c D}{32\mu \bar{V} L}$
3. $\frac{32\mu \bar{V} L}{\rho g_c D^2}$
4. $\frac{32\mu \bar{V} L}{g_c D^2}$

88. The discharge through a sharp-crested rectangular weir is proportional to
1. H
2. $H^{5/2}$
3. $H^{3/2}$
4. $H^{1/2}$

89. Turbulent flow generally occurs for cases involving
1. highly viscous fluid
2. very narrow passages
3. very slow motion
4. none of the above

90. The continuity equation
1. represents the conservation of energy
2. represents the conservation of mass
3. represents the conservation of momentum
4. none of the above

91. Which of the following impurities in feed water for high pressure boiler is most detrimental?
1. Silica
2. Dissolved oxygen
3. Suspended salt
4. Dissolved salt

92. Catalytic oxidation of naphthalene produces
1. Styrene
2. Phenol
3. Phthalic anhydride
4. None of the above

93. In a fuel cell
1. electrical energy is converted into chemical energy
2. chemical energy is converted into electrical energy
3. electrical energy is converted into mechanical energy
4. mechanical energy is converted into electrical energy

94. Yeast cannot be used in the manufacture of
1. loaf of bread in bakeries
2. pencillin
3. wine
4. all of the above

95. In Kraft process of paper manufacture, white cooking liquor consists of caustic soda
1. Sodium sulphide, Sodium carbonate
2. Sodium sulphite, Sodium carbonate
3. Sodium sulphite, Sodium sulphide
4. None of the above

96. The optical component in IR is made up of
1. Nernst Glower
2. Copper Chloride
3. Sodium Chloride
4. Pyro electric cell

97. Which one among the following compounds is IR active?
1. N_2
2. O_2
3. CO_2
4. H_2

98. Inter and Intra molecular hydrogen bonding can be distinguished by

1. vapourising the sample and eluting through a chromatographic column
2. diluting the sample and recording IR spectra
3. using C, H, N, O, S analyzer
4. applying Beer-Lambert's law

99. The NMR signal for ethanol would be

1. a triplet, a doublet, a singlet
2. two triplet, one doublet
3. two triplet, one singlet
4. two singlet, one triplet

100. Using GC–mass spectrophotometer, we can do

1. Structural determination
2. Separation of compounds from mixture and identification
3. Quantitative determination
4. (2) and (3)

101. The material with least hardness is

1. talc
2. zircon
3. diamond
4. carbon

102. Whiskers are

1. Monocrystalline
2. Polycrystalline
3. Nono-crystalline
4. Noncrystalline

103. Rice hulls are used to produce ———— whiskers

1. Carbon
2. SiC
3. Cellulose
4. SiO_2

104. The material used as a dehumidifying and dehydrating agent is

1. Hydro gel
2. Ionic gel
3. Silica gel
4. Alumina gel

105. Ceramic materials generally have an extremely low value of

1. elastic modulus
2. hardness
3. strength
4. fracture toughness

106. The strength is highest for a

1. glass-ceramic
2. annealed glass
3. glass fiber
4. tempered glass

107. Glass which is completely soluble in water is

1. Sodium Silicate
2. Borosilicate
3. Vitreous Silica
4. None of the above

108. The prescribed cooling rate for a fiber of 0.065 cm diameter with 1000 g of suspended load as per ASTM is

1. 0.4' C/sec
2. 4° C/sec
3. 0.4' C/min
4. 4.0" C/min

109. The operating temperature of rotary kiln for cement making is

1. 1700 – 1800° C
2. 900 – 1000° C
3. 1400 – 1500° C
4. 700 – 800° C

110. Ring formation inside a rotary kiln occurs in

1. steaming zone
2. transition zone
3. sintering zone
4. cooling zone

111. Which of the following characteristic is not represented by graphite refractories?

1. High resistance to corrosion action of slag and bases
2. They do not allow the heat to pass through them
3. Closure texture
4. Excellent refractory material and can be used under neutral or reducing conditions

112. Periclase refractory contains mainly

1. CaO
2. Al_2O_3
3. MgO
4. SiO_2

113. Heat conduction of a fired brick when compared to unfired brick is

1. high
2. low
3. similar
4. none of the above

114. Point out the wrong statement in addition polymerisation

1. The presence of one or more double bonds in monomers and generally only one monomer is used
2. Monomer units simply add to one another
3. Small molecules such as H_2O, HCl, CO_2 are evolved during reaction
4. Process is faster than condensation polymerisation

115. An injection molding machine may be a

1. plunger type
2. piston type preplasticating
3. reciprocating screw
4. any one of above

116. The sequence of various steps involved in galvanising process is

1. preliminary treatment, pickling, zinc bath treatment and annealing respectively
2. pickling, preliminary treatment, zinc bath treatment and annealing respectively
3. preliminary treatment, pickling, annealing and zinc bath treatment
4. annealing, pickling, preliminary treatment and zinc bath treatment respectively

117. Strong electrolytes are those which

1. dissolve readily in water
2. dissolve readily in organic solvents
3. completely dissociate into ions at all concentrations
4. pass electricity

118. According to Debye-Bueche theory, the viscosity of a polymer solution or melts is proportional to

1. concentration
2. molecular weight
3. both (1) and (2)
4. none of the above

119. Hydrogen bonding is maximum in

1. ethanol
2. diethyl ether
3. ethyl chloride
4. trimethylamine

120. Which of the following compounds is oxidised to prepare methyl ethyl ketone?

1. Propanol–2
2. Butanol–1
3. 2–butanol
4. t–butyl alcohol

PART 10 — TEXTILE TECHNOLOGY

(Answer ALL questions)

76. The tensile strength of polynosic fibre is around

1. 3 to 3.5 gmsldenier
2. 8 to 10 gms/denier
3. 12 to 14 gmsldenier
4. 0.5 to 1 gm/denier

77. In viscose solution preparation xanthation process takes normally from

1. 10 minutes
2. 60 to 180 minutes
3. 5 hours
4. 24 hours

78. The temperature of molten polymer in nylon 66 manufacture is around

1. 280 to 300°C
2. 100°C
3. 27°C
4. 120°C

79. In acrylic fibre manufacture, the polymer concentration ranges from

1. 2 to 5 %
2. 15 to 40 %
3. 80 to 90 %
4. 70 to 80 %

80. The work factor of viscose staple fibre is around

1. 0.62
2. 0.2
3. 0.1
4. 0.4

81. The tenacity range of acrylic fibre in gmsldenier is

1. 1.0 to 1.2
2. 5.0 to 5.2
3. 2.2 to 3.5
4. 10 to 10.2

82. The modern false twist texturizing machines can impart false twist in to moving yarn at the rate of

1. upto six million RPM
2. 12 million RPM
3. only upto 30,000 RPM
4. upto 1 lakh RPM only

83. High bulk yarns are produced from

1. relaxed fibres
2. unrelaxed fibres
3. a blend of relaxed and unrelaxed fibres
4. filaments

84. The cord fabrics used in conveying belt applications approximately weigh

1. 1 kg / sq.metre
2. 100 gms / sq.metre
3. 25 kg / sq.metre
4. 25 kg / sq.cm

85. The cotton cloth construction normally applied in V-belts in ends/inch. and picks/inch is

1. 23×4
2. 30×10
3. 50×50
4. 12×12

86. The standard breaking strength of nylon parachute cloth in kgs/cm width is

1. 2 to 3
2. 7 to 10
3. 25 to 30
4. 50 to 100

87. The number of twistslmetre involved in high stretch yarns is around

1. 100
2. 2500
3. 500
4. 250

88. An unbalanced structure in weft knitting process is

1. Polka rib
2. Royal rib
3. Eight lock
4. Derby rib

89. In Jacquard knitting the maximum design width of intermediate Jacquard is

1. 48 wales
2. 24 wales
3. 144 wales
4. 182 wales

90. The normal cut of the non-Jacquard knitting machine is around

1. 24
2. 48
3. 72
4. 88

91. Knitted fabric width is expressed as

1. Total number of needles x wales per inch
2. Total number of needles / wales per inch
3. Total number of needles – wales per inch
4. Wales per inch / Total no. of needles

92. According to Tompkin's law which of the following relations is correct in weft knitting?

1. $K_S = l^2/S$
2. $S = \frac{K_S}{l^2}$
3. $K_S = l^2 + S$
4. $l^2 + K_S = S$

where S = Stitch density

K_S is constant

l = Stitch length

93. In purl knitting machine the two needle beds are set at

1. 60°
2. 120°
3. 180°
4. 90°

94. From tricot knitting machine the fabric comes off the machine at an angle of

1. 90°
2. 120°
3. 180°
4. 240°

95. The width of Raschel machines varies from

1. 480 to 600 cm
2. 200 to 350 cm
3. 1000 to 1500 cm
4. 150 to 200 cm

96. In the dielectric phenomenon of fibres water is considered to be

1. Induced dipole
2. Permanent dipole
3. Temporary dipole
4. An ordinary molecule

97. The percentage amorphous region in wool fibre is around

1. 44
2. 20
3. 65
4. 25

98. Higher the bi-refringence of a fibre

1. higher will be the orientation
2. lower will be the orientation
3. higher will be the amorphous portions
4. higher will be the crystallinity

99. The optical orientation factor of an isotropic fibre is

1. 0.8
2. 0.21
3. 0
4. 1

100. With increase in relative humidity, the strength of wool fibre

1. increases
2. decreases
3. first increases and then decreases
4. does not change

101. The best synthetic fibre for good elastic recovery is

1. Polyester
2. Nylon
3. Acrylic
4. Polypropylene

102. The % absorption moisture regain of nylon 6.6 at 65% R.H. and 20°C is

1. 4.1
2. 2.1
3. 8.0
4. 0.4

103. The chemical potential of a solute in an ideal solution may be expressed as

1. $A = \mu + RT \ln C$
2. $C = A + RT \ln \mu$
3. $\mu = A + RT \ln C$
4. $R = A + T \ln C$

104. The reactive dyeing process for 100 % cotton garment involves duration of dyeing as

1. 1 to 2 hours
2. 2 to $2\frac{1}{2}$ hours
3. 3 to 4 hours
4. 5 to 6 hours

105. The interfibrillary swelling takes place in

1. water solution
2. acid and strong alkali solution
3. water and weak alkali solution
4. alkali solution

106. The heat of combustion for cotton fibre is

1. 17.9 kJg^{-1}
2. 18.2 kJg^{-1}
3. 16.3 kJg^{-1}
4. 27.8 kJg^{-1}

107. The simple test for mercerization of cotton is

1. Examining under sunlight
2. Examining under U.V. light
3. Examining through microscope
4. Examining through infra-red light

108. The cross-section of cotton fibre changes due to mercerization from

1. Flat shape to oval shape
2. Bean shape to round shape
3. Round shape to elliptical shape
4. Elliptical shape to bean shape

109. The removal of sericine results in a weight loss of silk by

1. 40 to 75 %
2. 70 to 90 %
3. 20 to 25 %
4. 12 to 17 %

110. The california bearing ratio resistance in geo-textiles is expressed as

1. CBR resistance = failure load / cross-sectional area
2. CBR resistance = cross-sectional area / failure load
3. CBR resistance = failure load x cross-sectional area
4. CBR resistance = cross-sectional area – failure load

111. The top roller of two bowl calender used for calendering process is made of

1. hard plastic
2. hard steel
3. soft paper
4. wood

112. Which one of the following fibres is not used for the production of tyre cord?

1. Viscose rayon
2. Glass
3. Polyester
4. Silk

113. The stelometer is made of CRL system by

1. step synchronous motor
2. dashpot damping device
3. cam drive
4. beam design

114. For 3 % trash in mixing the cleaning efficiency expected in blowroom is

1. 65 %
2. 35 %
3. 80 %
4. 25 %

115. In single yarn tensile strength test, higher the strain rate ———— will result

1. lower the strength
2. no change in strength
3. higher the strength
4. no change in extension

PART 11 — LEATHER TECHNOLOGY

(Answer ALL questions)

76. The cells that synthesis collagen are called as
1. myoblasts
2. fibroblasts
3. lymphocyte
4. erythrocytes

77. Hair and wool are made up of
1. β-keratin
2. gelatin
3. a-keratin
4. elastin

78. Collagen in animal skin is mainly of the type
1. I
2. II
3. IV
4. IX

79. Iso-electric point of native collagen in skin is at a pH of ————
1. 4.25 – 4.5
2. 5.0 – 5.25
3. 6.0 – 6.25
4. 6.75 – 7.0

80. The percentage of nitrogen present in collagen is around
1. 1.75
2. 2.75
3. 17.5
4. 27.5

81. During soaking of wet salted skins/hides, which of the following protein is released into spent liquor?
1. collagen
2. keratin
3. elastin
4. globulin

82. Preservation of hides/skins by dry salted method reduces the average moisture content from ———— % to ———— %
1. 65, 45
2. 60, 45
3. 65, 35
4. 65, 15

83. The mechanism of unhairing by sodium sulphide and lime system can be better described as
1. nucleophilic addition
2. nucleophilic substitution
3. oxidative addition
4. free radical displacement

84. Fibre opening in liming is enhanced by the addition of
1. common salt
2. hypo
3. KCl
4. glucose

85. Hydrochloric acid based pickling is preferred for ———— leathers
1. Upper
2. Glove
3. Sole
4. Harness

86. Which part of the tree does the vegetable tannin wattle is sourced predominantly?
1. Fruits
2. Root
3. Bark
4. Leaves

87. How many electrons are there in 4d orbital for Zirconium(IV)?
1. 0
2. 1
3. 2
4. 4

88. Synthetic fatliquors are based on long chain hydrocarbons of chain length
1. $C_2 - C_8$
2. $C_{10} - C_{14}$
3. $C_{14} - C_{24}$
4. $C_{30} - C_{38}$

89. The glass transition temperature of a film forming material for leather application should be
1. $< -10°C$
2. $0°C$
3. $< 10°C$
4. $> 10°C$

90. The abrasion resistant sole leather is characterized by
1. high angle of weave
2. medium angle of weave
3. low angle of weave
4. none of the above

91. The Indian cow hide is referred to in the international trade as
1. light cow
2. freezer hide
3. kip
4. butty

92. Penetration of vegetable tannin is aided by treatment with
1. chrome
2. aluminium
3. zirconium
4. syntans

93. Plate releasing property in finishing is due to the use of ———— in the season mixture
1. resin binder
2. plasticiser
3. pigment
4. wax emulsion

94. Which of the following dyes will exhibit good wash fastness characteristics for chrome tanned leathers?
1. Acid dyes
2. Direct dyes
3. Basic dyes
4. Metal complex dyes

95. Use of phenolic syntans ———— the light fastness of leather
1. decreases
2. increases
3. does not change
4. none of the above

96. BOD standard for the discharge of tannery waste water in inland water bodies is
1. 10 ppm
2. 20 ppm
3. 30 ppm
4. 40 ppm

97. Which of the following is an important requirement for upholstery leather?
1. fullness
2. softness
3. fire resistance
4. wrinkle free

98. Treatment using trickling filters is a ———— treatment system
1. primary
2. secondary
3. tertiary
4. aerobic

99. Dog chews are prepared from
1. crushed bones
2. meat meal
3. poultry feathers
4. hide trimmings and splittings

100. BOD of spent lime liquors range in the order of (ppm)
1. 500 – 2000
2. 2000 – 4000
3. 4000 – 6000
4. 6000 – 10000

101. UASB is a ———— Treatment system
1. aerobic
2. secondary
3. primary
4. tertiary

102. Speed of the liming drum should be around
1. 3 rpm
2. 6 rpm
3. 10 rpm
4. 16 rpm

103. If the radius 'r' of a drum is doubled, effective volume is increased by a factor of

1. 2

2. 8

3. 4

4. 0.5

104. Hydraulic motors are useful because of their

1. constant speed characteristics
2. high speed characteristics
3. variable speed characteristics
4. low speed characteristics

105. One Baume is equal to

1. 6.9' BK

2. 10.1^0 BK

3. 13.0^0 BK

4. 2.1^0 BK

106. The finish adhesion test is carried out by

1. tensometer
2. lastometer
3. flexoineter
4. penetrometer

107. The time of incubation for BOD test is

1. 24 hrs
2. 48 hrs
3. 72 hrs
4. 120 hrs

108. Run in glove leather is

1. non elastic stretch
2. elastic stretch
3. contraction across the backbone
4. cloth like feel

109. Degree of tannage is the ratio of

1. final dry weight of the leather to limed pelt weight
2. fixed vegetable tannins to hide substance
3. final dry weight of the leather to shared weight
4. final dry weight of the leather to raw weight

110. Eriochrome Black T is used in

1. checking the complete penetration of chrome in the cut cross section of pelt
2. quantitative analysis of water
3. estimation of chrome content in chrome tanning salt
4. dyeing of chrome tanned leather

111. Minimum stitch tear strength (double hole) of lining leathers should be

1. 50 kg/cm
2. 50 kg/cm thickness
3. $50\ kg/cm^3$
4. 50 kg/mm thickness

112. Which of the following property is more essential for sole leather?

1. Bursting strength
2. Elongation
3. Abrasion resistance
4. Water absorption

113. The line where bottom and upper surface of the last meet is known as

1. central line
2. lasting line
3. feather line
4. all of the above

114. Which of the following is an Ornament in leather goods?

1. zip
2. lining cloth
3. piping
4. brass chain

115. A material shaped to conform to the last and inserted between lining and upper is known as

1. Toe puff
2. Stiffners
3. Insole
4. Sock

PART 12 — ARCHITECTURE

(Answer ALL questions)

76. Which one of the following comes under the category of 'Rock Cut Architecture'?

1. Stupa, Sanchi
2. Saranath Pillar
3. Chaitya Hall, Karli
4. Shore temple, Mahabalipuram

77. Find the odd monument/fort available in the following city

1. Gingee
2. Vellore
3. Thanjavur
4. Thiruvannamalai

78. Which one of the following is not a tomb?

1. Tajmahal
2. Golgumbaz
3. Qutub complex
4. Bibi Ka Maqbara

79. Who designed the Piazza S. Pietro, Rome?

1. Michelangelo
2. Bramante
3. Bernini
4. Alberti

80. Flying buttresses were used in

1. Peterborough Cathedral
2. Notre-Dame, Paris
3. AbbeyAux-Hommes, Caen
4. Pisa Cathedral

81. The Image of the city was written by

1. Sigfried Gideon
2. Kevin Lynch
3. Aldo Rossi
4. Lewis Mumford

82. Which of the following books did Robert Venturi write?

1. Vers une architecture
2. The Language of Post Modern Architecture
3. Complexity and contradictions in Architecture
4. Pattern Language

83. 'Structure is the giver of light'. To which Architect this statement attributed?

1. Paul Rudolph
2. Oscar Nimeyer
3. Louis Khan
4. Le Corbusier

84. Which one of the following is associated with De Stijil movement?

1. Piet Mondarin
2. John Ruskin
3. Bob Willis
4. Richard Rogers

85. Which one of the following is a key figure amongst constructivist artists and architects?

1. Kandinsky
2. Tolstoy
3. Richard Neutra
4. Mario Botta

86. Who wrote the book 'Cities In History'?

1. Golden Cullen
2. Edmund Bacon
3. John Ruskin
4. Lewis Mumford

87. 'Brise-Soleil' is a principle of architectural design adopted by

1. Louis Sullivan
2. Frank Lloyd Wright
3. Le Corbusier
4. Alvar Aaalto

88. Forest Institute of Management at Bhopal was designed by

1. Anant Raje
2. Charles Correa
3. Raj Rewal
4. Doshi. B

89. Bharat Diamond Bourse Complex at Mumbai was designed by

1. Hafeez contractor
2. Doshi. B
3. Correa
4. Raj Rewal

90. Which one of the following is associated with 20th Century Art Nouveau Movement?

1. Schindler
2. Albert Speer
3. Adolf Loos
4. Mackintosh

91. The book 'Architecture for poor' was written by

1. Lauries Baker
2. Hasan Fathy
3. M. Gandhi
4. B. Doshi

92. Which one of the following is not designed by F.L. Wright?

1. Fransworth House
2. Falling Waters
3. Unity temple
4. Praire House

93. Which of the following were key figures in Arts and Crafts movement?

1. John Ruskin and William Moris
2. John Ruskin and Santa Elia
3. Gaudi and Lissitsky
4. Mackintosh and Brunelschi

94. Which one of the following is a conceptfposition that engages universal modern and yet retains regional identity?

1. Regionalism
2. Critical Regionalism
3. Neo-classicism
4. Neo Modernism

95. Which one of the following redesigned the new Bhubaneswar city in India?

1. Otto Koenigsberger
2. Le Corbusier
3. Charles Correa
4. Ravi Valia

96. Which one of the following were involved in the planning of Chandigarh before LeCorbusier was commissioned?

1. Maxewell Fry and Navinder Lamba
2. Maxewell Fry and Jane drew
3. Edward Lutyen and Jane drew
4. Homi Bhaba and Kanvinde

97. Autobhan is a kind of

1. Airport
2. Automobile
3. Road
4. Building structure

98. Jaipur city was built by

1. Correa
2. Doshi .B
3. Sawai Mansingh
4. Sawai Jaisingh

99. Who said "House form is not simply the result of physical forces or any single casual factor but is the consequence of a whole range of socio cultural factors"?

1. Amos Rapoport
2. Joseph Rykwert
3. Heidegger
4. B.V. Doshi

100. The "Incremental Concept" of, Housing is aimed at

1. Low cost development
2. High density development
3. Development in stages
4. Development at one stage

101. House loans by Public Sector Agencies in India are given to an Individual based on

1. Size of his family
2. Built up area preferred by him
3. His affordability
4. Only if he belongs to high income group

102. Quality of Housing environment can be improved only if

1. the building regulations are made more rigid
2. there is increased investment by the government
3. the total development is taken over by public sector
4. there is effective participation by the community

103. Informal urban housing development means

1. Houses developed with different sizes and shapes
2. Houses developed outside the legal planning system
3. Low cost housing development
4. Private sector development

104. In sites and services scheme land is sold to EWS at cheaper price because of

1. Internal cross subsidy
2. Progressive development
3. Large scale development
4. Full cost recovery

105. A form of social survey in housing intended to obtain quickly general information on the study areas is

1. Origin and destination survey
2. Scanning survey
3. Detailed survey
4. Aerial survey

106. The most secured form of Land tenure is

1. Leasehold
2. Co-operative
3. Traditional
4. Private freehold

107. **As** per DCR prevailing for CMA 10 % open space reservation is mandatory for a site development that exceeds

1. 500 sq.m.
2. 1200 sq.m.
3. 2000 sq.m.
4. 3000 sq.m.

108. Toilets are not usually constructed in the basement floor mainly due to

1. Problem of ventilation
2. Restricted use
3. Problem of soil water
4. Pumping necessary for waste disposal

109. Deformed steel bars are used in R.C.C. work due to

1. the increased strength
2. better friction with concrete
3. non corrosive nature
4. cheaper than plain bars

110. In Madras terrace roof, the roofing material is

1. Brick Jelly Lime concrete
2. Terrace bricks
3. Plain cement concrete
4. Timber

111. The window shutter in external wall is fixed to open outside mainly

1. to improve appearance
2. to avoid projection inside
3. to prevent seepage of rainwater
4. for easy handling

112. Number of bricks $\left(9'' \times 4\frac{1}{2}'' \times 3''\right)$ required for 100 cft of brick work will be

1. 600
2. 1000
3. 1350
4. 1850

113. Life cannot be sustained in human body if the body temperature drops below

1. 37° C
2. 30° C
3. 21° C
4. 18° C

114. The reflection of Long wave Infrared Radiation depends upon the

1. texture of surface
2. colour of surface
3. size of surface
4. colour and texture of surface

115. The thermal insulation of a brick masonry can be much improved

1. With air cavity
2. Without air cavity
3. Air cavity with a metal foil hung in it
4. Air cavity filled with sand

PART 13 — PHYSICS AND MATERIAL SCIENCE

(Answer ALL questions)

76. Materials exhibiting different properties along different directions are called

1. isotropic
2. amorphous
3. anisotropic
4. crystalline

77. The coordination number of BCC structure is

1. 6
2. 8
3. 12
4. 4

78. Effective number of atoms belonging to the unit cell of FCC structure is

1. 14
2. 8
3. 4
4. 2

79. If 0.28 nm is the interatomic distance of NaCl crystal, the lattice parameter is

1. 0.14 nm
2. 0.42 nm
3. 0.56 nm
4. None of the above

80. In a crystal cell, *a*, b and c represent unit translational vectors along x, y and *z* axes. A plane makes intercepts 2a, 3b along *x* and y axes and runs parallel to *z* axis. Miller indices corresponding to this plane is

1. (2 3 ∞)
2. 2 3 0
3. (3 0 2)
4. (3 2 0)

81. If the lattice parameter of cubic crystal is 1 nm and the distance between two parallel planes is $1/\sqrt{3}$ nm, the Miller indices of the planes are

1. (1 1 0)
2. (1 0 1)
3. (0 0 1)
4. (1 1 1)

82. The plastic deformation of a crystal is due to the presence of

1. Schottky defect
2. Point defects
3. Frenkel defect
4. Dislocations which move

83. A plate carrying charge of 0.5 coulomb is accelerated through a potential of 2000 volts. It attains a kinetic energy equal to

1. 1000 kilowatt hours
2. 1000 Joules
3. 900 ergs
4. 1500 ergs

84. There are two charges +1 coulomb and +5 coulomb interacting among themselves. The ratio of forces acting on them will be

1. 1 : 25
2. 5 : 1
3. 1 : 1
4. 1 : 5

85. There are 10 condensers each of capacity 5 μF. The ratio between maximum and minimum capacity obtained from these condensers will be

1. 100 : 1
2. 60 : 9
3. 1 : 100
4. 1 : 5

86. Two bulbs, one of 50 watts and another of 25 watts are connected in series to the mains. The current

1. through the 25 watt bulb is more
2. through the 50 watt bulb is more
3. is different in different bulbs
4. is the same in both the bulbs

87. A bar magnet is cut exactly at the middle of its length. The pole strength of the resulting magnets

1. reduces to half its original value
2. increases twice to its original value
3. reduces to one fourth of its initial value
4. remains the same

88. The magnetic field at a distance d from a short bar magnet in longitudinal and transverse position are in the ratio

1. 1 : 4
2. 2 : 1
3. 3 : 2
4. 5 : 4

89. If E is the kinetic energy of the material particle of mass m, then the de Broglie wavelength is given by

1. $h/\sqrt{2mE}$
2. $\sqrt{2mE}/h$
3. $h\sqrt{2mE}$
4. $h/2mE$

90. Existence of matter wave was experimentally first demonstrated by

1. Newton
2. Planck
3. Davission and Germer
4. deBroglie

91. When an electron is accelerated, if deBroglie wavelength is 1 Å, then the applied voltage is nearly equal to

1. 15 Volts
2. 12 Volts
3. 500 Volts
4. 150 Volts

92. When the potential difference between the electrodes of an X–ray tube is increased, it results in an increase in

1. intensity
2. frequency
3. wavelength
4. speed of X – rays

93. T. Maiman invented

1. He–Ne laser
2. CO_2 laser
3. Ruby laser
4. Nd: YAG laser

94. We observe colours in thin films only because

1. thick films absorb light
2. reflection is possible only in thin films
3. interference condition is satisfied only in thin films
4. dispersion is possible only in thin films

95. An alpha particle of energy 5 MeV is scattered through 180° by a fixed uranium nucleus. The distance of closest approach is of the order of

1. 10^{-12} cm
2. 10^{-10} cm
3. 10^{-15} cm
4. 10^{-8} cm

96. The ratio of Rydberg constant for helium to the Rydberg constant for hydrogen is

1. 2 . 3
2. 3 . 2
3. 4 : 1
4. 1 : 4

97. What percentage of original radioactive atoms is left five half-lives?

1. 10
2. 20
3. 5
4. 3

The picture tube screens in television sets operate on

1. thermoluminescence
2. cathodeluminescence
3. electroluminescence
4. photoluminescence

99. The rest mass of an electron is m_0 when it moves with a velocity $v = 0.6$ C, then its mass is

1. $\frac{3}{7}m_0$
2. $\frac{3}{5}m_0$
3. $\frac{m_0}{3}$
4. $\frac{5}{4}m_0$

100. The relation between three moduli of elasticity is given by

1. $9E = 3N + K$
2. $\frac{E}{9} = \frac{N}{3} + K$
3. $\frac{1}{E} = \frac{1}{N} + \frac{1}{K}$
4. $\frac{9}{E} = \frac{3}{N} + \frac{1}{K}$

101. Which is more elastic in nature?

1. Ivory
2. Rubber
3. Aluminium
4. Wax

102. Crystals like diamond and silicon are brittle because

1. they contain no dislocations

2. they are non-crystalline

3. the stress required to move a dislocation is high

4. they contain very few dislocations

103. The energy gap in diamond is

1. 5.4 eV

2. 2–3 eV

3. 1.1 eV

4. 0.08 eV

104. Pure silicon at OK is an

1. intrinsic semiconductor

2. extrinsic semiconductor

3. metal

4. insulator

105. GaAs has an energy gap of 1.43 eV. The wavelength of the radiation emitted during an electronic transition in GaAs will be in the

1. visible range

2. ultraviolet range

3. infrared region

4. X-ray range

106. The entropy of mixing of 0.5 mole of Ni atoms and 0.49 mole of Cu atoms on 1 mole of sites in J/mol/K is

1. 5.76

2. 5.79

3. 5.85

4. 6.17

107. The entropy becomes zero at 0°C for a

1. pure element

2. perfect crystal

3. random solid solution

4. none of the above

108. A reaction takes 500 min in 1 min respectively at 10° C and 80° C. The time it would take at 50° C is

1. 25 min

2. 15 min

3. 10 min

4. 6 min

109. In a single component system, the maximum number of phases that can coexist in equilibrium is

1. 2

2. 3

3. 4

4. 5

110. Boltzmann distribution law which governs the distribution of atoms among the various energy levels is given as

1. $n_i = n_0 \exp(-\Delta E / kT)$

2. $n_0 = n_i \exp(-\Delta E / kT)$

3. $n_i = n_0 \exp(\Delta E / kT)$

4. $n_i = n_0 \exp(kT)$

111. Choose the correct statement

1. Thermal conductivity of a metal does not vary with temperature

2. Thermal conductivity of a metal varies as **a** function of temperature

3. Thermal expansion coefficients are isotropic for all materials

4. Thermal vibration of atoms contribute for electronic specific heat

112. The main raw material used for the manufacture of porcelain is

1. Clay

2. Alumina

3. Zirconia

4. Silicon carbide

113. Rotary kiln is used to produce

1. Cement clinker

2. Sanitary ware

3. Ceramic tiles

4. Porcelain ware

114. Which of the following material is inorganic graphite?

1. Aluminium nitride

2. Silicon nitride

3. Boron nitride

4. Silicon carbide

115. Lead oxide is widely used in glass industry to make

1. Photosensitive glass

2. Translucent glass

3. Opaque glass

4. Radiation shield glass

PART 14 — APPLIED PROBABILITY AND STATISTICS

(Answer ALL questions)

76. For any two events A and B, $P(A-B)$ is equal to
1. $P(A)-P(B)$
2. $P(B)-P(A)$
3. $P(B)-P(A \cap B)$
4. $P(A)-P(A \cap B)$

77. Two events A and B such that $P(A)=112$ and $P(A \cap B)=114$, then $P(A \cap \overline{B})$ is
1. 112
2. 314
3. 1
4. 1/3

78. If the events A and B are independent, then $P(\overline{A} \cap B)$ is
1. $P(A)P(\overline{B})$
2. $P(\overline{A})P(\overline{B})$
3. $P(\overline{A})P(B)$
4. None of the above

79. With a pair of dice thrown at a time, the probability of getting a sum more than that of 9 is
1. 5118
2. 7/36
3. 116
4. 7/24

80. If A and B are disjoint and $P(B)>0$, then $P(A/B)$ is
1. 1
2. 0
3. 112
4. 114

81. There are two bags. One bag contains 4 red and 5 black balls and the other one contains 5 red and 4 black balls. One ball is to be drawn from either of the two bags. The probability of drawing a black ball is
1. 113
2. 16181
3. 112
4. 10181

82. The quantity $\sum_{I=1}^{n}(x_i - a)^2$ is minimized, if the value of 'a' is
1. $\sum_{i=1}^{n} x_i$
2. $\sum_{i=1}^{n} \frac{x_i}{n}$
3. 0
4. $\sum_{i=1}^{n} x_i^2$

83. If the 'n' observations in a sample are denoted by x_1, x_2, the sample range r is
1. $min(x_i)-\max(x_i)$
2. $\max(x_i)+min(x_i)$
3. $max(x_i)\min(x_i)$
4. $max(x_i)-min(x_i)$

84. If 3 is subtracted from each observation of a set, then the mean of the observation is reduced by
1. 6
2. 3
3. 312
4. –3

85. The standard deviation of the five observations 6, 6, 6, 6, 6 is
1. 0
2. 5
3. 25
4. 125

86. If a distribution has mean = 7.5, mode = 10 and skewness $a=-0.5$, the variance is
1. 5
2. 10
3. 20
4. 25

87. First and third quartiles of a frequency distribution are 30 and 75. Also its coefficient of skewness is 0.6. The median of the frequency distribution is

1. 40
2. 39
3. 38
4. 41

88. The cumulative distribution function for a random variable X is

$$F(x)=\begin{cases}1-e^{-2x}, & x\geq 0\\ 0, & x<0.\end{cases}$$

The value of $P(-3<X\leq 4)$ is

1. $e^{-6}-e^{-8}$
2. $e^{-3}-e^{-4}$
3. $1-e^{-8}$
4. $1+e^{-3}+e^{-4}$

89. The mean and the variance of a binomial distribution are 8 and 4 respectively. Then $P(X=1)$ is equal to

1. $1/2^{12}$
2. $1/2^{4}$
3. $1/2^{6}$
4. $1/2^{10}$

90. The probability mass function of a random variable X is as follows :

$X=x$	1	2	3	4
$P(X=x)$	1/10	2/10	3/10	4/10

The mean and variance of X are

1. 1, 3
2. 3, 0
3. 3, 2
4. 3, 1

91. The distribution for which the mode does not exist is

1. Normal distribution
2. Gamma distribution
3. Continuous rectangular distribution
4. F-distribution

92. The moment generating function for geometric distribution with parameter $p=1/2$ is

1. $\frac{1}{2}\left(1-\frac{1}{2}e^{t}\right)$
2. $\frac{1/2}{\left(1-\frac{1}{2}e^{t}\right)}$
3. $\frac{1}{2}\left(1-\frac{e^{-t}}{2}\right)$
4. $\frac{1/2}{\left(1-\frac{1}{2}e^{-t}\right)}$

93. If a random variable X has the p.d.f. $f(x)$ as

$$f(x)=\begin{cases}cx, & 1\leq x\leq 2\\ c, & 2\leq x\ 1\ 3\\ 0, & \text{otherwise,}\end{cases}$$

the value of 'c' is

1. 0.4
2. 0.3
3. 0.2
4. 0.1

94. If X and Y are two Poisson variate such that $X \sim P(1)$ and $Y \sim P(2)$, then the probability $P(X+Y=3)$ is

1. $2e^{-3}$
2. $3e^{-3}$
3. $4e^{-3}$
4. $4.5e^{-3}$

95. The cumulative distribution function of a continuous uniform distribution of a random variable X lying in the interval (a,b) is

1. $\frac{1}{b-a}$
2. $\frac{x-a}{b-a}$
3. $\frac{b-a}{x-a}$
4. $\frac{x-b}{b-a}$

96. The random variable X follows Poisson distribution and if $P(X=1)=3$ and $P(X=2)$. Then the variance of X is

1. 1/2
2. 1/3
3. 1
4. 2

97. The moment generating function of the standard normal variate X is

1. $e^{\frac{-1}{2}t^2}$
2. $e^{\frac{1}{2}t^2}$
3. $e^{\frac{1}{3}t^2}$
4. $e^{-\frac{1}{3}t^2}$

98. If the p.d.f. of a random variable X is given by

$$f(x)=\begin{cases}\frac{1}{4}, & \text{if } |x|<2\\ 0, & \text{otherwise,}\end{cases}$$

then $P(|X|>1)$ is

1. 1/2
2. 1/3
3. 114
4. 1

99. For any non negative random variable X and constant $a>0$, the Markov's inequality is

1. $P\{X\le a\}\le\frac{E(x)}{a}$
2. $P\{X\le a\}\le aE(X)$
3. $P\{X\ge a\}\ge aE(X)$
4. $P(X\ge a\}\le\frac{E(X)}{a}$

100. Suppose that X is the number of observed "successes" in a sample of n observations where 'p' is the probability of success on each observation, then $\hat{p}=\frac{X}{n}$ is

1. Biased estimator of p
2. Unbiased estimator of 'n'
3. Unbiased estimator of p
4. None of the above

101. If the observations recorded on five sampled items are 3, 4, 5, 6, 7, the sample variance is

1. 1
2. 1.5
3. 2
4. 2.5

102. The terms prosperity, recession, depression and recovery are in particular attached to

1. Secular trend
2. Seasonal fluctuation
3. Cyclical movements
4. Irregular variation

103. A sample of 16 items from an infinite population having S.D. = 4, yielded total scores as 160. The standard error of sampling distribution of mean is

1. 1
2. 112
3. 114
4. 4

104. By the method of moments one can estimate

1. all constants of a population
2. only mean and variance of a distribution
3. all moments of a population distribution
4. all of the above

105. If X is a Poisson $(x;\lambda)$, the sufficient statistics for λ is

1. ΣX_i^2
2. ΣX_i
3. $\Sigma\frac{X_i}{n}$
4. $\Sigma\frac{X_i^2}{n}$

106. If X and Y have a bivariate normal distribution with $\rho_{XY} = 0$, then X and Y are

1. independent
2. dependent
3. mutually exclusive
4. none of the above

107. If $\rho = \pm 1$, the two lines of regressions are

1. Coincident
2. Parallel
3. Perpendicular to each other
4. None of the above

108. If $X_1, X_2, \cdots X_n$ are n independent identically distributed random variables, the correlation between X_i and $\overline{X} = \frac{\sum_{i=1}^{n} X_i}{n}$ is

1. n
2. $\sqrt{n}$
3. $\frac{1}{\sqrt{n}}$
4. $\frac{1}{n}$

109. If the two lines of regression are coincident, the relation between the two regression coefficients is

1. $b_{XY} = b_{YX}$
2. $b_{XY} b_{YX} = 1$
3. $b_{XY} \leq b_{YX}$
4. $b_{YX} \leq b_{XY}$

110. If X and Y are two independent variables with variances $\text{var}(X) = 25$ and $\text{var}(Y) = 15$, the correlation coefficient between $U = X + Y$ and $V = X - Y$ is

1. 0.25
2. 0.5
3. 0.75
4. 1

111. Value of b in $Y = a + bX$ remains same with the change of

1. origin
2. slope
3. data
4. none of the above

112. The best method for finding out seasonal variation is

1. Sample average method
2. Ratio to moving average method
3. Ratio to trend method
4. None of the above

113. For the given five values 15, 24, 18, 33, 42, the three years moving averages are

1. 19, 22, 33
2. 19, 25, 31
3. 19, 30, 31
4. 19, 22, 25

114. The equation of the parabolic trend is $Y = 46.6 + 2.4X - 1.3X^2$. If the origin is shifted backward by three years the equation of the parabolic trend will be

1. $Y = 27.7 - 5.4X - 1.3X^2$
2. $Y = 51.1 - 5.4X - 1.3X^2$
3. $Y = 27.7 + 10.2X - 1.3X^2$
4. None of the above

115. Method of least square for determining trend is used when

1. trend is known
2. trend is curvilinear only
3. the value of Y is not a function of time *t*
4. none of the above

PART 15 — SOCIAL SCIENCES

(Answer ALL questions)

76. The population of India as on 31st March 2001 is

1. 1,080 million
2. 1,028 million
3. 1,008 million
4. 1,230 million

77. How many places in India are classified as urban?

1. 5,050
2. 4,800
3. 4,500
4. 1,028

78. Settlements with more than 1,00,000 population are classified as

1. State
2. Country
3. City
4. Town

79. As per the 2001 census the population density of India is

1. 1000 per sq.km
2. 324 per sq.km
3. 279 per sq.km
4. 850 per sq.km

80. Firozabad is famous for

1. Granite Industry
2. Steel Industry
3. Glass Industry
4. Diamond Industry

81. The first copper smelting unit in India was started at

1. Maubhandar
2. Khetri
3. Balaghat
4. Taloja

82. Volkswagen decided to locate its green field plant in

1. Tamil Nadu
2. Andhra Pradesh
3. Karnataka
4. Maharashtra

83. Security Paper Mills is located at

1. Remikoot
2. Rupnarainpur
3. Hoshangabad
4. Kovur

84. Most important area in India for diamond is

1. Kolkatta
2. Madhya Pradesh
3. Rajasthan
4. Karnataka

85. Mobile phone subscription as in Feb. 2007 is

1. 205 million
2. 300 million
3. 162.5 million
4. 150 million

86. Contribution of IT and ITES to the GDP expected in the year 2007- 2008 is

1. 20 percent
2. 15 percent
3. 8 percent
4. 7 percent

87. An information system that supports internal business operations and extends to suppliers is

1. Back-office Information System
2. Front-office Information System
3. Operations Information System
4. Supply chain Information System

88. The aim of land reform is to

1. Increase agricultural productivity
2. Increase the land holding by the poor
3. Increase Government control of land
4. Distribute the land to landless labours

89. Poverty is a/an

1. human condition
2. living condition
3. monetary condition
4. economic abstraction

90. Marx's Theory of social change is known as

1. Theory of evolution
2. Theory of elites
3. Theory of economic determination
4. Theory of dominant class

91. Religion is the chief initiator of social change according to

1. Weber and Frazer
2. Sorokin and Davis
3. Marx and Engles
4. Park and Burgess

92. Who was the first sociologist to elaborate the idea of cultural lag?

1. Taylor
2. Spencer
3. Meed
4. Ogburn

93. The Naxalbari Peasant Struggle was launched in

1. 1910
2. 1947
3. 1967
4. 1950

94. Which one of the following factors is negatively correlated with modernization?

1. Religiosity
2. Cosmopolitanism
3. Achievement motivation
4. Empathy

95. Schumpeter attributed much of the capitalist development to the innovative role of the

1. Scientist
2. Technologist
3. Politician
4. Entrepreneur

96. National Policy for Older Persons was announced in the year

1. 1990
2. 1997
3. 1999
4. 2000

97. As per 2002 survey of the National Sample Survey Organization the estimated number of persons with disability is

1. 1.85 crore
2. 3.5 crore
3. 2.85 crore
4. 2.5 crore

98. The number of villages to be electrified in India is

1. 1,75,000
2. 1,54,000
3. 1,99,000
4. 1,11,000

99. The National Rural Employment Scheme aims to provide

1. 100 days of employment in the financial year
2. 150 days of employment in the financial year
3. 230 days of employment in the financial year
4. No limits for the days of employment in the financial year

100. Special Economic Zone Act was passed in the Parliament in

1. Feb 2006
2. May 2005
3. August 2004
4. January2001

101. To speed up the process of disinvestment Government of India had setup a separate Department of Disinvestment in the year

1. 2001
2. 2000
3. 2003
4. 2005

102. As per the Department of Industrial Policy and Promotion the Industrial growth rate for April — December 2006 is

1. 11 percent
2. 25 percent
3. 10.8 percent
4. 8.8 percent

103. The largest provider of employment after agricultural sector is

1. Construction
2. Textiles
3. Information Technology
4. Mining

104. The Environmental Impact Assessment was made mandatory since the year

1. 2000
2. 2006
3. 1994
4. 1999

105. The Central Pollution Control Board was setup in the year

1. 1970
2. 1975
3. 2000
4. 1974

106. In the net irrigated area in India, wells account for more than

1. 60 percent
2. 40 percent
3. 30 percent
4. 10 percent

107. The National Capital Region covers

1. Whole of Delhi
2. Whole of Delhi and parts of Haryana
3. Whole of Delhi and parts of Haryana, Rajasthan and Uttarpradesh
4. Whole of Delhi and parts of Haryana and Uttarpradesh

108. National Slum Development Programme was launched in the year

1. 1974
2. 1979
3. 1996
4. 1994

109. Urban Mapping Scheme was taken up as a pilot project during

1. Fifth Five Year Plan
2. Eighth Five Year Plan
3. Tenth Five Year Plan
4. Seventh Five Year Plan

110. Increase in the age at marriage is a

1. Non-family planning measure
2. Family planning measure
3. life style of poor
4. life style of industrialized world

111. Dais Training Programme is a

1. Family Planning Programme
2. Family welfare Programme
3. Health Care Programme
4. Rural Development Programme

112. Simple linear aggregation of income accruing to the factors of production supplied by the normal residents of the country is

1. Industrial Income
2. Real Income
3. National Income
4. Marginal Income

113. Productive Consumer is a

1. segment of the market
2. division of population
3. segment of society who don't waste products
4. model consumer

114. The basic dimensions of the Human Development Index are

1. Family Welfare and Education
2. Life expectancy, adult education and standard of living
3. Income and standard of living
4. Education and standard of living

115. The Report of Technical Group on Population Projections 1996 has projected the population of India in 2016 as

1. 1179 million
2. 1264 million
3. 1169 million
4. 1646 million