मध्यप्रदेश लोक सेवा आयोग
रेसीडेन्सी एरिया
इन्दौर

क्रमांक : 1145/69/2011/प–9 इन्दौर, दिनांक 08.11.2015

राज्य अभियांत्रिकी सेवा प्रारंभिक परीक्षा –2014 उत्तर कुंजी

–:: विज्ञप्ति ::–

आयोग के विज्ञापन क्रमांक–02/परीक्षा/2014 दिनांक 24.12.2014 के अंतर्गत आयोजित राज्य अभियांत्रिकी सेवा प्रारंभिक परीक्षा–2014 दिनांक 08.11.2015 को वस्तुनिष्ठ प्रकार के प्रश्न पत्रों की प्रावधिक उत्तर कुंजी परीक्षा परिणाम बनाने के पूर्व आयोग की वेबसाईट पर प्रकाशित की जा रही है। अभ्यर्थी आयोग की वेबसाईट पर अपना रोल नंबर एवं प्रवेश पत्र पर दिये गये पासवर्ड की सहायता से लॉग–इन कर अपनी रिस्पांस शीट का अवलोकन कर सकते हैं। यदि इस प्रावधिक उत्तर कुंजी के संबंध में किसी परीक्षार्थियों को कोई आपत्ति हो तो वे ऑनलाईन आपत्तियां 07 दिवस के अंदर प्रस्तुत कर सकते हैं। इस हेतु अभ्यर्थी प्रश्न क्रमांक, संदर्भ ग्रंथों का नाम अंकित करें। प्रावधिक उत्तर कुंजी आयोग की वेबसाईट पर अपलोड होने की तिथि से 07 दिवस की समयावधि के पश्चात प्राप्त आपत्तियों पर विचार नहीं किया जायेगा। यह विज्ञप्ति आयोग की वेबसाईट www.mppsc.com & www.mppsc.nic.in, www.mppscdemo.in पर दिनांक 08.11.2015 से उपलब्ध है।

(डॉ. रवीन्द्र कान्हेरे)
परीक्षा नियंत्रक

State Engineering (Prelims) Exam – 2014

Second Paper – First Shift

(Provisional Model Answer Key)

Agricultural Engineering

Q1 : Geologic erosion is also called as-	
A	Normal erosion
B	Natural erosion
C	Chemical erosion
D	None of these is correct
Answer Key: **A**	

Q2 : Source of Soil detachment in splash erosion is -	
A	Run off
B	Rain drop
C	Soil particle size
D	None of these is correct
Answer Key: **B**	

Q3 : The hygrometer measures-	
A	Temperature
B	Isotherms
C	Isohyets
D	Contours
Answer Key: **A**	

Q4 : The lines joining the places having equal rainfall are called-	
A	Isobaths
B	Isotherms

C	Isohyets
D	contours
Answer Key: **C**	

Q5 : The life of reservoir is decided based upon-	
A	Run off volume only
B	Sediment concentration of runoff volume only
C	Both (Run off volume only & Sediment concentration of runoff volume only)
D	None of these is correct
Answer Key: **B**	

Q6 : The furrow irrigation in which furrows are constructed with a little slope on contour is called-	
A	Contour furrow irrigation
B	Flat-planted basin
C	Wild flooding
D	Sloping furrow irrigation
Answer Key: **A**	

Q7 : The average annual rainfall of India is-	
A	120 cm
B	150 cm
C	180 cm
D	210 cm
Answer Key: **A**	

Q8 : The following watershed gives highest peak discharge for the same area-	
A	Fern shaped
B	Fan shaped
C	Square shaped
D	None of these is correct
Answer Key: **B**	

Q9 : The ratio of crop evaportranspiration and reference evaportransperation is called-	
A	Crop coefficient
B	Pan factor
C	Crop factor
D	Stress factor
Answer Key: **A**	

Q10 : The lysimeter measures -	
A	Humidity
B	Temperature
C	Evapotranspiration
D	Wind velocity
Answer Key: **C**	

Q11 : The surveying is basically conducted for preparing a-	
A	Map
B	Cross section
C	Sketch
D	Drawing
Answer Key: **A**	

Q12 : Sprinkler irrigation system performance is considered satisfactory when the minimum value of the uniformity coefficient-	
A	65 percentage
B	75 percentage
C	85 percentage
D	95 percentage
Answer Key: **C**	

Q13 Centrifugal pumps discharge the water from the suction head of-

:	
A	5 to 6m
B	10 to 15m
C	15 to 20m
D	20 to 25m
Answer Key: **A**	

Q14 The following is considered as agronomic measures for soil and water conservation- :	
A	Terracing
B	Bunding
C	Contour Cropping
D	Trenching
Answer Key: **C**	

Q15 The following is not the in-situ water harvesting practice- :	
A	Contour Bunding
B	Farm ponds
C	Nala Plugging
D	Drop Inlet structure
Answer Key: **D**	

Q16 The length of a chain is measured from- :	
A	Center of one handle to centre of other handle
B	Outside of one handle to inside of other
C	Outside of one handle to outside of other handle
D	Inside of one handle to inside of other
Answer Key: **C**	

Q17 A network of gully is called as- :

A	Gullied area
B	Ravine area
C	Hilly area
D	None of these is correct
Answer Key: **B**	

Q18 A Cross staff is an instrument used for-**:**	
A	Setting our right angles
B	Measuring approximate horizontal angles
C	Measuring bearings of the lines
D	None of these is correct
Answer Key: **A**	

Q19 The grassed water way is used to-**:**	
A	Carry irrigation water
B	Safe disposal of excess runoff
C	Grow quality grasses
D	None of these is correct
Answer Key: **B**	

Q20 An imaginary line joining the points of equal elevation on the surface of the earth represents the-**:**	
A	Contour line
B	Contour surface
C	Contour gradient
D	Level line
Answer Key: **A**	

Q21 SCS curve number method is used for estimation of-**:**	
A	Runoff

B	Rainfall amount
C	Rainfall intensity
D	Cumulative infiltration
Answer Key: **A**	

Q22 The accuracy of measurement in chain surveying does not depend upon-**:**	
A	Length of the offset
B	General layout of the chain lines
C	Scale of the plotting
D	Importance of the features
Answer Key: **B**	

Q23 Satellite data contains-**:**	
A	Colour
B	Symbology
C	Patterns
D	Digital numbers
Answer Key: **D**	

Q24 Remote sensing techniques can not be employed for the purpose of-**:**	
A	Improving natural resource management
B	Land use
C	Protection of environment
D	To identify the gender of the population
Answer Key: **D**	

Q25 The method of plane surveying can be used when the extent of area is less than-**:**	
A	250 sq. km
B	500 sq. km

C	2500 sq. km
D	5000 sq. km
Answer Key: **A**	

Q26 Doubling the diameter of screen in the tube well the increase in discharge is about-**:**	
A	0-5%
B	5-10%
C	10-15%
D	15-20%
Answer Key: **B**	

Q27 The curvature of the earth is considered in-**:**	
A	Plane surveying
B	Geodetic surveying
C	Hydrographic survey
D	Aerial survey
Answer Key: **B**	

Q28 The alignments of the canals are generally taken along-**:**	
A	The ridge line
B	Across the contour line
C	Valley line
D	None of these is correct
Answer Key: **A**	

Q29 Engineering measures to control the soil erosion is-**:**	
A	Vegetative barrier
B	Inter cropping
C	Contour and graded bunding

D	None of these is correct
Answer Key: **C**	

Q30 In drip Irrigation design, the design criteria is based on an emitter flow variation of -:	
A	5%
B	10%
C	15%
D	20%
Answer Key: **B**	

Q31 Darcy law is valid when flow is-:	
A	Turbulent
B	Transient
C	Laminar
D	Quasi steady
Answer Key: **C**	

Q32 The discharge rates of drip emitters usually ranges from-:	
A	2-10 litres/day
B	2-10 litres/hr
C	2-10 litres/min
D	2-10 litres/sec.
Answer Key: **B**	

Q33 Almost all natural ground water motion has Reynolds number-:	
A	Less than 1
B	1 – 10
C	10 – 500
D	More than 500

Answer Key: **A**

Q34 Which crop can withstand the highest water table-
:

A	Wheat
B	Lucerne
C	Rice
D	Cotton

Answer Key: **C**

Q35 For given values of top width and water depth of water surface in a channel, in which section seepage will be maximum-
:

A	Triangular
B	Rectangular
C	Trapezoidal
D	None of these is correct

Answer Key: **B**

Q36 Leaching is the process to reduce the salts from-
:

A	Deep aquifer
B	Water course
C	Root zone
D	Canal

Answer Key: **C**

Q37 Drip irrigation system performance is considered satisfactory when the minimum value of the uniformity coefficient is-
:

A	65%
B	75%
C	85%
D	95%

Answer Key: **D**

Q38 Alkaline soils are best reclaimed by- **:**	
A	Leaching
B	Addition of gypsum to soil
C	Providing good drainage
D	Addition of gypsum to soil and leaching
Answer Key: **D**	

Q39 Soil moisture content- **:**	
A	Decreases with soil moisture tension
B	Increases with soil moisture tension
C	Does not change with soil moisture tension
D	None of these is correct
Answer Key: **A**	

Q40 Drainage coefficient is the depth of water drained from the area in - **:**	
A	06 hours
B	12 hours
C	24 hours
D	72 hours
Answer Key: **C**	

Q41 The detachability of which of the following soil is the lowest- **:**	
A	Clay
B	Silt
C	Sand
D	Sandy loam
Answer Key: **A**	

Q42 :	The Transportability of which of the following soil is the lowest-
A	Clay
B	Silt
C	Sand
D	Sandy loam
Answer Key: **C**	

Q43 :	The 2 hour unit hydrograph is having 50 hours base period. To derive constant discharge in the S- curve, following numbers of 2 hour unit hydrograph has to be added by respective lagging -
A	48
B	52
C	25
D	50
Answer Key: **C**	

Q44 :	For the stream gauging following instrument can be useful -
A	Pan evaporimeter
B	Current meter
C	Sediment load sampler
D	None of these is correct
Answer Key: **B**	

Q45 :	Graded terrace is recommended in -
A	High rainfall area
B	Steep hills
C	Low rainfall area
D	Soil having high permeability
Answer Key: **A**	

Q46	Wind erosion is most common in-

:

A	Humid region
B	Semi arid region
C	Arid region
D	None of these is correct

Answer Key: **C**

Q47 Silvi pasture system involves -
:

A	Growing trees only
B	Growing trees and grasses
C	Growing grasses only
D	None of these is correct

Answer Key: **B**

Q48 Salinity in irrigation water is measured by-
:

A	SAR value
B	Electrical conductivity value
C	pH value
D	None of these is correct

Answer Key: **B**

Q49 Which one of the following is supplemental structure for drainage system-
:

A	Pump outlet
B	Lateral drain
C	Water course
D	vertical drainage

Answer Key: **A**

Q50 Mole drains are used in -
:

A	Sub Surface drainage
B	Surface drainage
C	Sub Surface drainage and Surface drainage
D	None of these is correct
Answer Key: **A**	

Q51 Firing sequence of 6 cylinder engine in which no two adjacent cylinder have power stroke - **:**	
A	1-2-3-4-5-6
B	1-5-3-6-2-4
C	1-5-4-6-3-2
D	1-4-2-5-6-3
Answer Key: **B**	

Q52 Implement used to break hard pan of soil is - **:**	
A	M.B. Plough
B	Disc Harrow
C	Rotavator
D	Subsoiler
Answer Key: **D**	

Q53 When piston is at the top of its stroke, it is said to be - **:**	
A	TDC
B	TLC
C	BDC
D	BLC
Answer Key: **A**	

Q54 Compression ratio of diesel engine varies from - **:**	
A	13:1 to 28:1

B	12:1 to 24:1
C	14:1 to 22:1
D	10:1 to 15:1
Answer Key: **C**	

Q55 Raspbar type threshing cylinder are generally used in - **:**	
A	Paddy threshers
B	Wheat threshers
C	Maize threshers
D	None of these is correct
Answer Key: **B**	

Q56 Burning of air-fuel mixture in the combustion chamber before the piston has reached the TDC is called - **:**	
A	Knocking
B	Ignition
C	Pre ignition
D	Calorific Value
Answer Key: **C**	

Q57 Caster angle varies from - **:**	
A	4^0-8^0
B	0^0-4^0
C	10^0-12^0
D	12^0-16^0
Answer Key: **B**	

Q58 In a 4 wheel tractor front tyres, ballast are normally used - **:**	
A	To increase traction
B	To increase stability

C	To decrease front wheel slippage
D	To decrease the noise of the tractor
Answer Key: **B**	

Q59 Weight transfer in a tractor implement system is caused by- :	
A	Weight of operator
B	Traction force
C	Tractor slip
D	Application of pull
Answer Key: **D**	

Q60 In compression ignition system of diesel engine, the temperature is varies from - :	
A	450-550^{0}C
B	600-750^{0}C
C	900-1050^{0}C
D	None of these is correct
Answer Key: **A**	

Q61 A mower knife is said to be in proper registration when - :	
A	The center of the knife section is at the center of the cutter bar guard
B	The center of the knife section is at the left hand side of the cutter bar guard
C	The center of the knife section is at the right hand side of the cutter bar guard
D	None of these is correct
Answer Key: **A**	

Q62 Field efficiency of implement is expressed by - :	
A	$F.E = \frac{\text{Width(m) X Speed(m/hr)}}{10000}$
B	$F.E = \frac{\text{Effective field capacity}}{\text{Theoretical field capacity}} \text{ X } 100$

C	$F.E = \frac{\text{Theoretical field capacity}}{\text{Effective field capacity}} \text{ X } 100$
D	None of these is correct
Answer Key: **B**	

Q63 Farming operation which requires maximum energy is - **:**	
A	Sowing operation
B	Tillage operation
C	Interculture operation
D	Harvesting operation
Answer Key: **B**	

Q64 Safe noise level for human being in db is- **:**	
A	70-80
B	80-90
C	90-100
D	100-110
Answer Key: **B**	

Q65 Pudder is used for- **:**	
A	Harvesting operation
B	Sowing operation
C	Threshing operation
D	For Churning of soil
Answer Key: **D**	

Q66 Maximum noise level from a tractor near operator's ear should not exceed - **:**	
A	85db
B	90db

C	95db
D	100db
Answer Key: **B**	

Q67 In arc welding, the electric arc is produced between the work and the electrode by - **:**	
A	Voltage
B	Flow of current
C	Contact resistance
D	None of these is correct
Answer Key: **C**	

Q68 The cold chisels are normally made with the help of - **:**	
A	Casting
B	Rolling
C	Piercing
D	Forging
Answer Key: **D**	

Q69 Mufflers are provided to control - **:**	
A	Vibration
B	Noise
C	Speed
D	Fuel consumption
Answer Key: **B**	

Q70 During the threshing, if grain gets broken the reason may be due to - **:**	
A	High drum speed
B	Low drum speed
C	More concave clearance

D	Sieve slope is not correct
Answer Key: **A**	

Q71 The first tractor company introduced in India is - **:**	
A	Escort
B	Mahindra
C	Eicher
D	Ford
Answer Key: **C**	

Q72 Center of gravity of a tractor is located - **:**	
A	1/3rd of wheel base ahead of rear axle
B	1/4th of wheel base ahead of rear axle
C	2/3rd of wheal base ahead of rear axle
D	None of these is correct
Answer Key: **A**	

Q73 The IHP of engine indicated on - **:**	
A	Power on piston
B	Power on flywheel
C	Power on drawbar
D	Power on crank shaft
Answer Key: **A**	

Q74 Vertical suction of a plough influences - **:**	
A	Pulverization
B	Width of cut
C	Depth of cut
D	Direction of pull

Answer Key: **C**

Q75 The disc angle of good plough varies between - **:**	
A	20^0 to 25^0
B	30^0 to 41^0
C	42^0 to 45^0
D	60^0 to 72^0
Answer Key: **C**	

Q76 In dry basis m.c. is 25%, what will be m.c. on wet basis - **:**	
A	Less than 25%
B	More than 25%
C	Equal to 25%
D	None of these is correct
Answer Key: **A**	

Q77 The relationship between EMC & Rh for biological materials has been given by - **:**	
A	Perry
B	Janssen
C	Handerson
D	Rankine
Answer Key: **C**	

Q78 Deep bed drying is having layer of - **:**	
A	Below 20cm
B	20cm
C	Above 20cm
D	None of these is correct
Answer Key: **C**	

Q79 Ridge planting is generally not used in the areas of - **:**	
A	Low rain fall
B	High rain fall
C	Sandy soil
D	Clay soil
Answer Key: **C**	

Q80 A popular size of burr mill has 30cm diameter plates, operating between - **:**	
A	400 to 500 rev/min
B	650 to 750 rev/min
C	850 to 950 rev/min
D	1050 to 1150 rev/min
Answer Key: **B**	

Q81 Size of seed drill is determined by the - **:**	
A	No of furrow openers
B	Spacing between two furrow openers X number of furrow openers
C	Size of ground wheel
D	Size of seed and fertilizer box
Answer Key: **B**	

Q82 Orientation of the greenhouse is normally suitable in- **:**	
A	East-West
B	North-West
C	South-East
D	South-West
Answer Key: **A**	

Q83 The degree of soil pulverization can be measured by -
:

A	Bulk density of soil
B	Moisture content of soil
C	Void ratio of soil
D	Draft of implement

Answer Key: **A**

Q84 In batch dryer, the air temperature is seldom exceeds -
:

A	40^0C
B	42^0C
C	45^0C
D	48^0C

Answer Key: **C**

Q85 The floor area (m^2) per head in deep litter poultry house is -
:

A	0.1
B	0.4
C	0.8
D	0.9

Answer Key: **B**

Q86 In attrition mill, the size of the food grains is reduced by -
:

A	Shear and crushing
B	Impact and shear
C	Impact and crushing
D	Only due to impact

Answer Key: **A**

Q87 Aerodynamic properties does not depend on -

:

A	Frontal area
B	Orientation of the particle
C	Thermal conductivity of the material
D	Physical properties of the material

Answer Key: **C**

Q88 Which operation is carried out during dry milling process -
:

A	Grading
B	Pitting
C	Conditioning
D	Polishing

Answer Key: **D**

Q89 In general, the LPDE polyethylene covering material used for green house -
:

A	100 micron
B	200 micron
C	1000 micron
D	2000 micron

Answer Key: **B**

Q90 Moisture vapour transmission rate of aluminum foil is :
:

A	High
B	Medium
C	Low
D	Very high

Answer Key: **C**

Q91 For the designing of a $2m^2$ green house, the maximum live load should be-
:

A	10 kg
B	20 kg
C	30 kg
D	50 kg
Answer Key: **C**	

Q92 Which physical property measures the sharpness of the corners of solid material - **:**	
A	Roundness
B	Sphericity
C	Size
D	None of these is correct
Answer Key: **A**	

Q93 The higher value of angle of internal friction indicates that the material is - **:**	
A	Cohesive
B	Easily flowing
C	Normal flowing
D	None of these is correct
Answer Key: **A**	

Q94 Whenever a plough works round a strip of ploughed land its known to be - **:**	
A	Casting
B	Gathering
C	Deep ploughing
D	Puddling
Answer Key: **B**	

Q95 At wind farms, wind speed is measured - **:**	
A	On the surface of earth

B	At the sea level
C	At 10m height
D	None of these is correct
Answer Key: **C**	

Q96 On an average sunny day, the hot water at about 60^0C from a solar collector of two square meter can provide - :	
A	200 litre
B	250 litre
C	300 litre
D	350 litre
Answer Key: **A**	

Q97 Solar flat plate water heater available in the market is generally designed for the temperature range of water - :	
A	40 to 60^0 C
B	60 to 80^0 C
C	80 to 100^0 C
D	100 to 120^0 C
Answer Key: **B**	

Q98 Solar energy is converted by solar cells into - :	
A	Electrical energy
B	Chemical energy
C	Mechanical energy
D	None of these is correct
Answer Key: **A**	

Q99 Minimum wind speed required for wind mill for proper working is - :	
A	5 kmph
B	10 kmph

C	15 kmph
D	20 kmph
Answer Key: **B**	

Q100 One horse power is equal to - **:**	
A	0.7355 kW
B	0.6355 kW
C	0.5355 kW
D	0.8355 kW
Answer Key: **A**	

State Engineering (Prelims) Exam – 2014

Second Paper – First Shift

(Provisional Model Answer Key)

Civil Engineering

Q1 : Which of the following is not the displacement method?	
A	Equilibrium method
B	Column analogy method
C	Moment distribution method
D	Kani's method
Answer Key: **B**	

Q2 : When a uniformly distributed load, shorter than the span of the girder, moves from left to right, then the conditions for maximum bending moment at a section is that	
A	The head of the load reaches the section.
B	The tail of the load reaches the section.
C	The load position should be such that the section divides it equally on both side.
D	The load position should be such that the section divides the load in the same ratio as it divides the span
Answer Key: **D**	

Q3 : In column analogy method, the area of an analogous column for a fixed beam of span L and flexural rigidity EI is taken as	
A	L/EI
B	L/2EI
C	L/4EI
D	L/8EI
Answer Key: **A**	

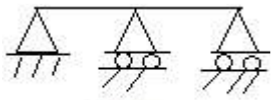
Q4 : 

Fig-1

What is the degree of kinematic indeterminacy of the beam shown in fig.1 above

A	2
B	3
C	5
D	9

Answer Key: **C**

Q5 : A fixed beam AB is subjected to a triangular load varying from zero at end A to W per unit length at end B. the ratio of fix end moments at A to B will be

A	1/2
B	2/3
C	4/9
D	1/4

Answer Key: **B**

Q6 : A symmetrical two-hinged parabolic arch when subjected to a uniformly distributed load on the entire horizontal span, is subject to

A	Radial shear alone
B	Normal thrust alone
C	Normal thrust and bending moment
D	Normal thrust, radial shear and bending moment

Answer Key: **B**

Q7 : A three hinged symmetric parabolic arch of span 20 meters and rise 5 meters is hinged at the crown and springing. It supports a uniformly distributed load of 2 tonnes per meter run of the span. The horizontal thrust in tonnes at each of the springing is

A	8
B	16
C	20
D	Zero

Answer Key: **C**

Q8 : A simply supported beam of length L is subject to two point loads, each of P unit, at A and B equidistant from supports. Select the correct statement	
A	There will be no shear force between A and B and no bending moment between A and B.
B	There will be no shear force between A and B, but there will be uniform bending moment between A and B.
C	There will be uniform shear force between A and B, but bending moment will gradually increase to maximum up to mid point of A and B.
D	There will be uniform shear force between A and B, with maximum bending moment at A and B with gradual decrease to zero at mid point of A and B.
Answer Key: **B**	

Q9 : In an I-section, shear force is shared	
A	Mostly by web
B	Mostly by flanges
C	Uniformly by entire section
D	Proportional to the respective areas of web and flanges.
Answer Key: **A**	

Q10 : A member which is subjected to reversible tensile or compressive stresses may fail at stresses may fail at stresses lower than the ultimate stresses of the material. This property of metal is called	
A	Plasticity of the metal
B	Workability of the metal
C	Fatigue of the metal
D	Creep of the metal
Answer Key: **C**	

Q11 : If all the dimensions of a prismatic bar are increases in the proportion n:1, the proportion with which the maximum stress produced in the bar by its own weight will change by	
A	$1:n^2$
B	1:n
C	$\sqrt{n}:1$
D	n:1

Answer Key: **D**

Q12: In limit state design, under – reinforced section is one in which	
A	Tensile strain in steel reaches yield value while maximum compressive strain in concrete is less than its ultimate crushing strain.
B	Maximum tensile stress in steel reaches its permissible value while maximum compressive stress in concrete is less than its permissible value.
C	Maximum compressive strain in concrete reaches the ultimate crushing value while tensile strain in steel is less than its yield value.
D	Maximum compressive stress in concrete reaches its permissible value while tensile stress in steel is less than its permissible value.
Answer Key: **A**	

Q13: In reinforced concrete, pedestal is defined as a compression member, whose effective length does not exceed its least lateral dimension by	
A	3 times
B	8 times
C	12 times
D	16 times
Answer Key: **A**	

Q14: For RCC bridges, the smallest span beyond which the impact factor is same for class A or B or AA and 70R loading (wheeled vehicles) is	
A	9 m
B	12m
C	36 m
D	45 m
Answer Key: **B**	

Q15: The purpose of lateral ties in short RCC column is to	
A	Increase the load carrying capacity of the columns
B	Facilitate compaction of concrete
C	Maintain plumb while construction

D	Avoid buckling of longitudinal bars

Answer Key: **D**

Q16: The side face reinforcement, if required, in a T-beam will be

A	0.1% of the web area
B	0.15% of the web area
C	0.2% to 0.3% of the web area depending upon the breadth of the web
D	0.1% of the total longitudinal reinforcement

Answer Key: **A**

Q17: Match list A with list B and select the correct answer using the codes given below the list.

	List-A		List-B
A	Minimum cover	1	Ultimate moment capacity
B	Span to depth ratio	2	Durability
C	Limit state design	3	Serviceability
D	Doubly reinforced section	4	Reduction in sectional depth

A	A	B	C	D
	3	2	1	4
B	A	B	C	D
	2	3	4	1
C	A	B	C	D
	3	2	4	1
D	A	B	C	D
	2	3	1	4

Answer Key: **D**

Q18: The loss of prestress due to shrinkage of concrete is the product of

A	Modular ratio and percentage of steel
B	Modulus of elasticity of concrete and shrinkage of concrete
C	Modulus of elasticity of steel and shrinkage of concrete

D	Modular ratio and modulus of elasticity of steel.
Answer Key: **C**	

Q19 Prestressed concrete is more desirable in case of **:**	
A	Cylindrical pipes subjected to internal fluid pressure
B	Cylindrical pipes subjected to external fluid pressure
C	Cylindrical pipes subjected to equal internal and external fluid pressures
D	Cylindrical pipes subjected to end pressures
Answer Key: **A**	

Q20 The applicable IS code for RCC liquid retaining structure is **:**	
A	IS:456
B	IS:800
C	IS:1893
D	IS:3370
Answer Key: **D**	

Q21 Drops in flat slabs are provided to resist **:**	
A	Bending moment
B	Thrust
C	Shear
D	torsion
Answer Key: **C**	

Q22 Increase in the fineness of cement results in **:**	
A	Increase in the rate of heat of hydration without changing the total amount of heat liberated
B	Decrease in the rate of heat of hydration without changing the total amount of heat liberated
C	Increase in the rate of heat of hydration with an increase in the total amount of heat liberated
D	Decrease in the rate of heat of hydration with a reduced amount of heat liberated

Answer Key: **A**

Q23 As per IS:800, the maximum deflection in a beam should not exceed :

A	L/180
B	L/250
C	L/325
D	L/360

Answer Key: **C**

Q24 By providing sufficient edge distance, which of the following failures of riveted joint can be avoided :

A	Tension failure of the plate
B	Shear failure of the rivet
C	Shear failure of the plate
D	Crushing failure of the rivet

Answer Key: **C**

Q25 Gantry girders are designed to resist :

A	Lateral loads
B	Longitudinal and vertical loads
C	Longitudinal, lateral and vertical loads
D	Longitudinal and lateral loads

Answer Key: **C**

Q26 Match list I with list II and select correct answer using the loads given below the list :

	List- I (Types of stress)		List - II (Allowable value of stress)
A	Axial tension	1	0.75 fy
B	Bending tension	2	0.66 fy
C	Maximum shear stress	3	0.60 fy
D	Bearing stress	4	0.40 fy

(f_y=minimum field stress of steel)

A	A	B	C	D
	2	3	1	4
B	A	B	C	D
	3	2	4	1
C	A	B	C	D
	2	3	4	1
D	A	B	C	D
	3	2	1	4

Answer Key: **B**

Q27: For an I beam the shape factor is 1.12 the factor of safety in bending is 1.5. IF the allowable stress is increased by 20% for the wind and earthquake loads, then the load factor is

A	1.10
B	1.25
C	1.35
D	1.40

Answer Key: **D**

Q28: The channels or angles in the compression chords of the steel truss girder bridges are turned outward in order to increase

A	Cross-sectional area
B	Sectional modulus
C	Torsional constant
D	Radius of gyration

Answer Key: **D**

Q29: Match list I (deflection) with list II (expression) for deflection in different types of beams of span 'l' subjected to total load 'w' and select the correct answer using the loads given below the lists:

	List- I		List - II
A	Central deflection is a fixed beam subject to uniformly distributed load	1	$\frac{Wl^3}{3EI}$
B	Central deflection is a simply supported beam subject to uniformly distributed load	2	$\frac{Wl^3}{48EI}$
C	Central deflection is a simply supported beam subject to concentrate load at mid-span	3	$\frac{5Wl^3}{384EI}$
D	Deflection at free end of a cantilever subject to concentrated load at free end	4	$\frac{Wl^3}{384EI}$

A	A	B	C	D
	4	3	1	2
B	A	B	C	D
	3	4	2	1
C	A	B	C	D
	3	4	1	2
D	A	B	C	D
	4	3	2	1

Answer Key: **D**

Q30 In a composite construction :

A	Interface slipping is prevented by using shear connector
B	Differential shrinkage is overcome by using the same grade of concrete for both the components.
C	Precast member is always designed to carry the weight of in-situ concrete without props.
D	The in-situ concrete cannot be prestressed.

Answer Key: **A**

Q31 For a standard 45^o fillet weld, the ratio of size of fillet to throat thickness is :

A	1:1
B	1: $\sqrt{2}$
C	$\sqrt{2}$:1
D	2:1

Answer Key: **C**

Q32: In PERT analysis, the time estimates of activities and probability of their occurrence follow	
A	Normal distribution curve
B	Poisson's distribution curve
C	β – distribution curve
D	Binomial distribution curve
Answer Key: **C**	

Q33: If the optimistic time, most likely time and pessimistic time or activity A are 4, 6 and 8 weeks. Respectively and for activity B are 5, 5.5 and 9 weeks respectively, then	
A	Expected time of activity A is greater than the expected time of activity B
B	Expected time of activity B is greater than the expected time of activity A
C	Expected time of both activities A and B are same
D	Data too inadequate to compute expected times of activities
Answer Key: **C**	

Q34: The reduction in project time normally results in	
A	Decrease in the direct cost and increase in the indirect cost
B	Increase in the direct cost and decrease in the indirect cost
C	Increase in both direct and indirect costs
D	Decrease in both direct and indirect costs
Answer Key: **B**	

Q35: Mobilisation advance up to certain percentage of cost of work is given to a contractor	
A	On commencement of work at site for payment of loan taken by him
B	For the purchase of construction materials
C	For the payment of advances to labour and other staff
D	For all activities required to start the work at site on finalization of the contract documents
Answer Key: **D**	

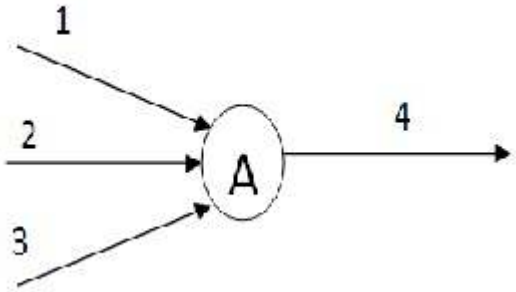
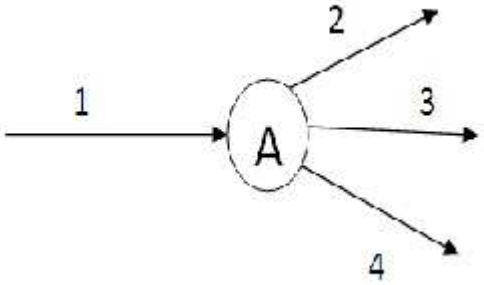
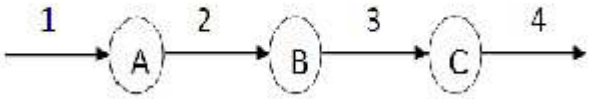
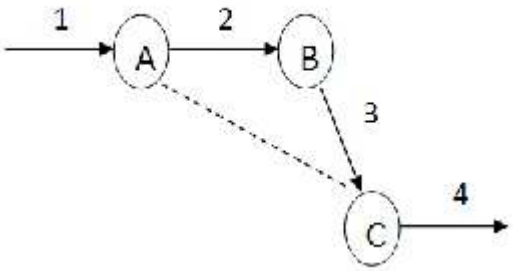
Q36 Cost – benefit studies are essential to

:	
A	Assess the total cost of the work
B	Ascertain the relevant escalation in price
C	Monitor the expenditure
D	Evaluate the viability and worthwhileness of taking up the project
Answer Key: **D**	

Q37 :	If the expected time for completion of a project is 10 days with a standard deviation of 2 days, the anticipated time of completion of the project with 99.9% probability is
A	16 days
B	12 days
C	10 days
D	6 days
Answer Key: **A**	

Q38 :	With the usual notations, capital recovery factor is given by
A	$\left(\frac{i(1+i)^n}{(1+i)^n-1}\right)$
B	$\left(\frac{i}{(1+i)^n-1}\right)$
C	$\frac{i}{(1+i)^n}$
D	$(1+i)^n$
Answer Key: **A**	

Q39 :	A burst event is represented by

A	
B	
C	
D	
Answer Key: **B**	

Q40 Which of the following is not the function of fastner? **:**	
A	To hold rails in proper positions
B	To join rail with sleepers
C	To join adjacent rails
D	To join sleeper with ballast

Answer Key: **D**	

Q41:	Geometric design of highway includes (i) Horizontal alignment, (ii) vertical alignment, (iii) arbouri-culture, (iv) Cross section. Choose the right combination.
A	(i), (ii) and (iii)
B	(i), (ii) and (iv)
C	(ii), (iii) and (iv)
D	(i), (ii), (iii) and (iv)
Answer Key: **B**	

Q42:	On a circular curve, the rate of super elevation is 'e' while negotiating the curve, vehicle comes a stop. It was observed that the stopped vehicle is sliding inwards in radial direction. If the coefficient of friction is 'f' which of the following is true?
A	$e > f$
B	$e < f$
C	$e < 2f$
D	None of these is correct
Answer Key: **A**	

Q43:	Three runways are constructed parallel to each other at an angle of 260^{o} with respect to magnetic north. A pilot is landing from east side while heading west. Which of the following best represents runway designations as seen by pilot (from leftmost to rightmost)
A	26L, 26C, 26R
B	26R, 26C, 26L
C	8L, 8C, 8R
D	8R, 8C, 8L
Answer Key: **A**	

Q44:	Stripping of asphalt pavement is primarily due to
A	Excessive asphalt content in mixture
B	Moisture damage
C	Fatigue damage
D	Use of less tougher aggregate

Answer Key: **B**

Q45: Dowel bars in concrete pavement are placed	
A	Along 45^{o} to direction of traffic
B	Perpendicular to direction of traffic
C	Along direction of traffic
D	Can be placed in any direction
Answer Key: **C**	

Q46: The number of potential conflict points at an intersection of two lane national highway with another two-lane national highway (assuming both are two-way) is	
A	8
B	16
C	24
D	32
Answer Key: **C**	

Q47: The ruling design speed on a national highway in plain terrain as per IRC recommendation is	
A	80 kmph
B	100 kmph
C	120 kmph
D	150 kmph
Answer Key: **B**	

Q48: Rapid curing cutback bitumen is produced by blending bitumen with	
A	Petrol
B	Diesel
C	Benzene
D	Kerosene
Answer Key: **A**	

Q49 : Match list I with list II and select the correct answer using the codes given below the lists

	List- I		List - II
A	Penetration test	1	Overlay design
B	Marshal test	2	Determination of softening point
C	Ring and Ball test	3	Gradation of asphalt cement
D	Benkelman beam test	4	Design of bituminous concrete mix

A	A	B	C	D
	4	3	2	1
B	A	B	C	D
	2	3	1	4
C	A	B	C	D
	3	2	4	1
D	A	B	C	D
	3	4	2	1

Answer Key: **D**

Q50 : Temperature variations affect the

A	Biological activity of bacteria in sewage
B	Viscosity of sewage
C	Solubility of gases in sewage
D	All options are correct

Answer Key: **D**

Q51 : A 25 ml sample was diluted to 250 ml with odourless distilled water so that the odour of the sample no longer perceivable. What was the Threshold odour number ?

A	11
B	10
C	25
D	05

Answer Key: **B**

Q52 : Why is proportional flow weir provided in a grit chamber ?	
A	To reduce the suspended solids entering the grit chamber
B	to maintain constant flow velocity in the grit chamber over a certain depth range
C	To maintain constant flow depth in the grit chamber
D	To allow sewage afresh into the grit chamber
Answer Key: **B**	

Q53 : For a colony of 10,000 persons having sewage flow rate of 200 L/capita/day, BOD of applied sewage of 300 mg/L and organic loading of 300 kg/day/hectare, the area of an oxidation pond required for treating the sewage of the colony is	
A	0.2 hectare
B	1 hectare
C	2 hectares
D	6 hectares
Answer Key: **A**	

Q54 : Chlorine demand of water is equal to	
A	applied chlorine
B	residual chlorine
C	sum of applied and residual chlorine
D	difference of applied and residual chlorine
Answer Key: **D**	

Q55 : Which of these sewers are preferred for combined system of sewage?	
A	Circular Sewer
B	Egg shaped Sewer
C	Rectangular Sewer
D	Trapezoidal Sewer
Answer Key: **B**	

Q56 :	Cleaning is done by (i) scraping and removal of top layer in slow sand filter; (ii) back washing in slow sand filters; (iii) scraping and removal of top layer in rapid sand filter; (iv) back washing in rapid sand filters. The correct answer is
A	(i) and (iv)
B	(ii) and (iii)
C	(ii) and (iv)
D	(i) and (iii)
Answer Key: **A**	

Q57 :	Which one of the following gases plays a decisive role in affecting the climate of the earth ?
A	Carbon dioxide
B	Nitrogen
C	Hydrogen
D	Oxygen
Answer Key: **A**	

Q58 :	Refuse Derived fuel refers to
A	segregated high calorific fraction of processed MSW
B	segregated low calorific fraction of processed MSW
C	Unsegregated processed MSW
D	Unsegregated unprocessed MSW
Answer Key: **A**	

Q59 :	The bactaria which live and multiply with or without oxygen are called as
A	Aerobic Bacteria
B	Anaerobic Bacteria
C	Facultative Bacteria
D	Masophilic Bacteria

Answer Key: **C**

Q60 Disappearance of pink colour of water of a well due to addition of $KMnO_4$ indicates that water contained :

A	Acidity
B	Alkalinity
C	Turbidity
D	Organic matter

Answer Key: **D**

Q61 The ratio of the volume of voids to the total volume of soil is :

A	Void ratio
B	Degree of saturation
C	Air content
D	Porosity

Answer Key: **D**

Q62 Plastic charaeteristics of clays are due to :

A	Adsorbed water
B	Free water
C	Capillary water
D	Excessive water

Answer Key: **A**

Q63 The Pore water pressure in a capillary zone is :

A	Zero
B	Positive
C	Negative
D	very low

Answer Key: **C**

Q64 : The permeability of soil varies	
A	Inversely as square of grain size
B	as square of grain size
C	as grain size
D	inversely as void ratio
Answer Key: **B**	

Q65 : The coefficient of curvature (C_c) of soil is	
A	$\frac{D_{60}}{D_{10}}$
B	$\frac{(D_{60})^2}{D_{10}}$
C	$\frac{(D_{30})^2}{D_{10} X D_{60}}$
D	$\frac{D_{30}}{D_{10} X D_{60}}$
Answer Key: **C**	

Q66 : A clay deposit suffers a total settlement of 5 cm with one-way drainage. With two-way drainage, the total settlement will be	
A	10 cm
B	2.5 cm
C	20 cm
D	5 cm
Answer Key: **D**	

Q67 : The compressibility of a field deposit is	
A	the same as that shown by laboratory sample
B	somewhat greater than that shown by laboratory sample
C	somewhat smaller than that shown by laboratory sample

D	not at all related to that of a laboratory sample
Answer Key: **B**	

Q68 Vibratory roelers are best suited for compacting **:**	
A	coarse sand and gravel
B	silts
C	clays
D	organic soils
Answer Key: **A**	

Q69 For a standard compaction test, the mass of hammer and the drop of hammer are as follows **:**	
A	2.60 kg. and 450 mm
B	2.60 kg. and 310 mm
C	4.89 kg. and 310 mm
D	4.89 kg. and 450 mm
Answer Key: **B**	

Q70 For a saturated soil, skempton's B-parameter is **:**	
A	nearly zero
B	nearly 0.5
C	nearly 1.0
D	very high
Answer Key: **C**	

Q71 The inclination of failure plane behind a vertical wall in the passive pressure case is inclined to the horizontal at **:**	
A	$45^0 - \phi/2$
B	$45^0 - \phi$
C	$45^0 + \phi/2$
D	$45^0 + \phi$

Answer Key: **A**	

Q72 :	Identify the incorrect statement The stability of a slope is decreased by
A	removal of a part of slope by excavation
B	Shock caused by an earthqnake
C	Pore water pressure in the soil
D	Providing a berm at the toe
Answer Key: **D**	

Q73 :	In situ Vane shear test is used to measure shear strength of
A	sandy soil
B	stiff and fissured clays
C	very soft and sensitive clays
D	heterogeneous disintegrated rock
Answer Key: **C**	

Q74 :	The immediate settlement of a rigid footing is about _____ times the maximum settlement of an equal flexible footing
A	0.90
B	0.80
C	0.70
D	0.60
Answer Key: **B**	

Q75 :	The Permissible settlement is the maximum in the case of
A	isolated footing on clay
B	isolated fotting on sand
C	raft on clay
D	raft on sand
Answer Key: **C**	

Q76:	Two footings, one circular and the other square, are founded in a pure clay. The diameter of the circular footing is the same as the side of the square footing. The ratio of their net ultimate bearing capacities
A	is unity
B	is 1.3
C	is 1/1.3
D	cannot be determined with the provided data
Answer Key: **A**	

Q77:	The bearing capacity of soil supporting a footing of size 3m X 3m will not be affected by the presence of water table located at a depth below the base of footing of
A	1.0m
B	1.5m
C	3.0m
D	6.0m
Answer Key: **C**	

Q78:	The most comprehensive of the pile driving formula is
A	Engineering new formula
B	Hiley's formula
C	Static capacity formula
D	Danish formula
Answer Key: **B**	

Q79:	Lime stabilisation of clayey soil generally leads to
A	decrease in shrinkage limit
B	decrease in plastic limit
C	increase in liquid limit
D	flocculation of particles
Answer Key: **D**	

Q80:	If the actual observed value of standard penetration resistance, N is greater than 15 in a fine sand layer below water table, then the equivalent penetration resistance will be
A	$15 + \left(\frac{N-15}{2}\right)$
B	$15 + \left(\frac{N+15}{2}\right)$
C	$15 - \left(\frac{N+15}{2}\right)$
D	cannot be determined with available data
Answer Key: **A**	

Q81:	For a soil, field capacity and permanent wilting coefficient are 30% and 12% respectively. The available water in this case is
A	12%
B	18%
C	30%
D	42%
Answer Key: **B**	

Q82:	A crop requires a total water depth of 90 cm for a base period of 120 days. The discharge required to irrigate the crop in 2880 hectares is
A	0.25 m^3/s
B	1.0 m^3/s
C	2.5 m^3/s
D	10.0 m^3/s
Answer Key: **C**	

Q83:	A plot between rainfall intensity vs time is known as
A	isohyet
B	hyetograph
C	hydrograph
D	mass curve
Answer Key: **B**	

Q84: A raingauge recorded hourly ranifall as 5cm, 2cm, 4cm and 3cm for a four hour storm respectively. If the Φ index was 3cm/hour, the total direct runoff from a catchment for the storm was	
A	14 cm
B	12 cm
C	3 cm
D	2 cm
Answer Key: **C**	

Q85: Hydrograph is a plot of	
A	ranifall intensity vs time
B	cummulative rainfall vs time
C	runoff depth vs time
D	discharge vs time
Answer Key: **D**	

Q86: A unit hydrograph has one unit of	
A	peak discharge
B	rainfall duration
C	direct runoff
D	base time
Answer Key: **C**	

Q87: If two 2-hour unit hydrograph are staggered by 2 hours and added graphically, the resulting hydrograph will be	
A	2- hour unit hydrograph
B	4- hour unit hydrograph
C	2- hour unit hydrograph with 2cm runoff
D	4- hour unit hydrograph with 2cm runoff
Answer Key: **D**	

Q88: The hydrologic flood routing uses	
A	continuity equation only
B	momentum equation only
C	both continuity and momentum equations
D	energy equation only
Answer Key: **A**	

Q89: Steady pumping of a well at 314m^3/hour produces drawdowns 4.0m and 2.0m at radial distances 2.0m and 20.0m respectively in a confined aquifer. The transmissivity of the aquifer is about	
A	25.00m^2/hour
B	57.55m^2/hour
C	28.78m^2/hour
D	50.00m^2/hour
Answer Key: **B**	

Q90: The useful storage is the volume of water stored in the reservoir between	
A	minimum pool level and maximum pool level
B	minimum pool level and normal pool level
C	river bed level and normal pool level
D	river bed level and maximum pool level
Answer Key: **B**	

Q91: trap efficiency of a reservoir is a function of	
A	outflow/inflow ratio
B	capacity/inflow ratio
C	capacity/outflow ratio
D	all of these is correct
Answer Key: **B**	

Q92 for the upstseam face of an earthen dam the most adverse condition for stability of slope is

:	
A	during construction
B	steady seepage
C	sudden drawdown
D	during flood
Answer Key: **C**	

Q93 :	The base width of an elementary profile of a concrete gravity dam with no tension criteria and neglecting the uplift pressure is approximetely
A	65% of dam hight
B	75% of dam hight
C	85% of dam hight
D	95% of dam hight
Answer Key: **A**	

Q94 :	Which one of the following is not correct in reference to weir founded on alluvial soil
A	a downstream pile is necessary to prevent piping
B	in the downstream half of the floor the bligh theory under estimates the uplift pressure
C	launching apron protects the pile and impervious floor
D	the thickness of impervious floor is computed based on the exit gradient
Answer Key: **D**	

Q95 :	Which one of the following is not a function of under sluices in a weir
A	to control silt entry into the canal
B	to pass the normal discharge without operating the shutter gates of the weir
C	to regulate the supply of water entering into the canal
D	to scour the silt deposited in the river bed above the approach channel
Answer Key: **C**	

Q96 :	An aqueduct is provided where

A	canal bed level is above the HFL in river
B	river bed level is above the FSL of canal
C	canal bed level is in between the bed level and HFL of river
D	river bed level is in between the bed level and FSL of canal
Answer Key: **A**	

Q97 : To carry a discharge 100 m^3/s in a regime canal, the perimeter from lacey's theory is about	
A	47.5 m
B	30.0 m
C	17.6 m
D	10.0 m
Answer Key: **A**	

Q98 : The discharge of rigid module depends upon	
A	the water level in the distributary only
B	the water level in the water course only
C	the water levels both in the distributary and water course
D	neither the water level in the distributary nor the water level in the water course
Answer Key: **D**	

Q99 : Which of the following canal structures is used to remove surplus water from a canal into a natural drain	
A	canal regulator
B	canal fall
C	canal outlet
D	canal escape
Answer Key: **D**	

Q100 : A pollulant entered into a confined aquifer of 5 m thick and porosity 25%. If the seepage discharge through the aquifer is 0.25 m^2/s, the travel time of pollutant for 100 m in the aquifer will be (in seconds)	
A	20

B	400
C	500
D	2000
Answer Key: **C**	

State Engineering (Prelims) Exam – 2014

Second Paper – Second Shift

(Provisional Model Answer Key)

Electrical Engineering

Q1 : The unit step sequence u[n] and impulse response δ[n] are related as -	
A	$u[n] = \sum_{p=0}^{n} \delta[p-1]$
B	$u[n] = \sum_{p=0}^{-n} \delta[p]$
C	$u[n] = \sum_{p=0}^{+\infty} \delta[p]$
D	$u[n] = \sum_{p=-\infty}^{n} \delta[p]$
Answer Key: **D**	

Q2 : The system given as y(t)=x(t-8) is invertible then inverse system will be as-	
A	y(t+8)
B	y(t-8)
C	y(2t+8)
D	y(t-2)
Answer Key: **A**	

Q3 : If f(t) is a function, then the Laplace transform of $\frac{df(t)}{dt}$ will be as-

A	F(s)
B	sF(s)–f(0)
C	$s^2F(s)$
D	$s^3F(s)$- f(0)
Answer Key: **B**	

Q4 : The autocorrelation function of a real signal x(t) denoted by $R_x(\tau)$ satisfies the following condition -	
A	$R_x(\tau) = R_x(-\tau)$

B	$R_x(0) < R_x(-\tau)$
C	$R_x(\tau) > R_x(-\tau)$
D	$R_x(\tau) = 1$
Answer Key: **A**	

Q5 : The discrete-time system denoted by $y[n]=x[n^3]$ is-	
A	Linear, time-varying and causal system
B	Nonlinear, time-varying and causal system
C	Linear, time-invariant and non-causal system
D	Linear, time-variant and non-causal system
Answer Key: **D**	

Q6 : If the voltage gain $\lvert V_0/V_i \rvert$ of an amplifier is $1/\sqrt{2}$, its value in dB is -	
A	+10 dB
B	-6.93 dB
C	-3 dB
D	+3 dB
Answer Key: **C**	

Q7 : The trigonometric Fourier series representation of an even signal does not have the following type of functions-	
A	DC
B	Cosine functions
C	Sine functions
D	Odd harmonic functions
Answer Key: **C**	

Q8 : The impulse response of a linear time invariant system is given by $h(t) = \delta(t-2) + \delta(t-3)$. The step response of this system at t=1 will be -	
A	0
B	1
C	2

D	3
Answer Key: **A**	

Q9 : The power spectral density and the autocorrelation function of an periodic signal are related by -	
A	The Fourier transformation
B	The Laplace transformation
C	Both are same
D	None of these is correct
Answer Key: **A**	

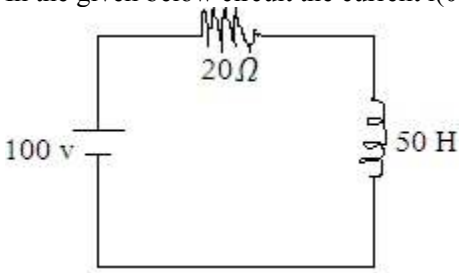
Q10 : The power of a sinusoid signal x(t) = A/2 Cos(ωt) is given by -	
A	$A^2/4$
B	$A^2/2$
C	A^2
D	$A^2/8$
Answer Key: **D**	

Q11 : Assume that F_1 and F_2 denote the lower and upper half power frequencies of a series RLC circuit respectively and F_0 denotes the resonance frequency. The selectivity of this RLC circuit is given by-	
A	$\frac{F_2-F_0}{F_0-F_1}$
B	$\frac{F_0}{F_2-F_1}$
C	$\frac{F_1-F_2}{2F_0}$
D	$\frac{F_2-F_0}{F_1-F_0}$
Answer Key: **B**	

Q12 : If eight resistors of 8 Ohm resistance of each are connected in parallel then the net resistance will be:	
A	1
B	64

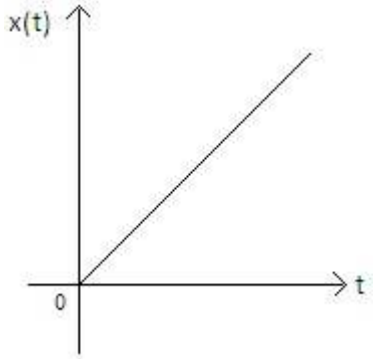
C	4
D	8
Answer Key: **A**	

Q13 : In the given below circuit the current $i(0^+)$ and $\frac{di(0^+)}{dt}$ are given by:



A	0,0
B	0,2
C	5,0
D	0,5
Answer Key: **B**	

Q14 : The plot of the signal x(t) in the below figure represents:

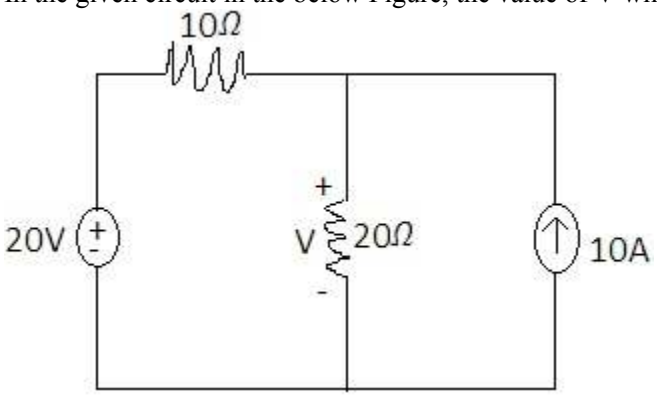


A	Energy signal
B	Power signal
C	Energy signal and Power signal
D	None of these is correct
Answer Key: **D**	

Q15 : Following is the magnitude of the impedance of the series RLC circuit running at angular frequency ω :

A	$[R^2 + \omega^2 L^2 + \frac{1}{\omega^2 C^2}]^{1/2}$
B	$[R^2 + \omega^2 L^2 - \frac{1}{\omega^2 C^2}]^{1/2}$
C	$[R^2 + (\omega L + \frac{1}{\omega C})^2]^{1/2}$
D	$[R^2 + (\omega L - \frac{1}{\omega C})^2]^{1/2}$
Answer Key: **D**	

Q16 In the given circuit in the below Figure, the value of V will be as follows:
:



A	80
B	70
C	20
D	10
Answer Key: **A**	

Q17 The superposition principle can not be applied for:
:

A	voltage computation
B	current computation
C	power computation
D	bilateral components
Answer Key: **C**	

Q18 If unit step current is applied to an initially relaxed capacitor, then the voltage across the capacitor will be-
:

A	Unit step function
B	Ramp function
C	Impulse function
D	None of these is correct
Answer Key: **B**	

Q19 The mathematical expression for the velocity for travelling electromagnetic wave in free-space can be given as: **:**	
A	$(\mu_0 \varepsilon_0)^{1/2}$
B	$(\mu_0 \varepsilon_0)^{-1}$
C	$\mu_0 \varepsilon_0$
D	$(\mu_0 \varepsilon_0)^{-1/2}$
Answer Key: **D**	

Q20 The energy density corresponding to static magnetic field is as- **:**	
A	μH^2
B	$\frac{1}{2}\mu H^2$
C	$1/2\ H^2$
D	$(1/2\mu)\ (H^2)$
Answer Key: **B**	

Q21 The SI unit of electrostatic field strength is **:**	
A	volt-meter
B	$volt^2$/meter
C	volt/meter
D	$volt/meter^2$
Answer Key: **C**	

Q22 : The equation $\nabla^2 = \frac{-\rho}{\varepsilon}$ is	
A	Maxwell's equation
B	Laplace's equation
C	Fourier equation
D	Poisson's equation
Answer Key: **D**	

Q23 : Poynting vector represents:	
A	power density vector which produces electrostatic field
B	current density vector which produces electrostatic field
C	current density vector which produces electromagnetic field
D	power density vector which produces electromagnetic field
Answer Key: **D**	

Q24 : The distance between adjacent maxima and minima in a standing wave of a transmission line is given by	
A	$\lambda/4$
B	$\lambda/2$
C	$\lambda/8$
D	λ
Answer Key: **A**	

Q25 : The intrinsic impedance of free space is given by:	
A	20 Ohm
B	277 Ohm
C	177 Ohm
D	377 Ohm
Answer Key: **D**	

Q26: The divergence of electric flux density $D = e^{-x} \sin y\, \hat{i} - e^{-x} Cos y\, \hat{j} + 2z\, \hat{k}$, at origin is	
A	2
B	4
C	-2
D	0
Answer Key: **A**	

Q27: The input signal for the A.C. bridges is applied from-	
A	Oscillator system
B	Amplifier system
C	Regulated power supply system
D	D.C. battery system
Answer Key: **A**	

Q28: The internal resistance of the ammeter should be very low so that-	
A	It will have high sensitivity
B	It will provide high accuracy
C	It will provide maximum voltage drop across the meter
D	It will provide minimum effect of the current in the circuit
Answer Key: **D**	

Q29: The Wien bridge can be used for the following-	
A	Measurement of resistance
B	Measurement of frequency
C	Measurement of harmonic distortion
D	Measurement of frequency and harmonic distortion
Answer Key: **D**	

Q30 The application of thermocouple transducer is

:

A	Measurement of temperature
B	Measurement of velocity and vibration
C	Measurement of pressure
D	Measurement of gas flow

Answer Key: **A**

Q31 A varactor can be defined as-
:

A	A diode which is used for variable capacitor
B	A diode which is used for high speed switching
C	A diode which is used for variable inductor
D	A diode which is used for variable resistor

Answer Key: **A**

Q32 Measurement of dielectric loss of capacitor can be performed by-
:

A	Using Wein bridge
B	Using Owen bridge
C	Using Schering bridge
D	Using Maxwell bridge

Answer Key: **C**

Q33 Siemens can be used as a unit for-
:

A	Measurement of conductance
B	Measurement of resistance
C	Measurement of flux density
D	Measurement of electric field

Answer Key: **A**

Q34 A cathode ray oscilloscope works based on the following -
:

A	Electrostatic based focusing technique
B	Electromagnetic based focusing technique
C	Electrostatic and Electromagnetic based focusing technique
D	None of these is correct
Answer Key: **A**	

Q35 : Regenerative feedback means the following-	
A	Feedback with step input
B	Feedback with oscillations
C	Feedback with positive sign
D	Feedback with negative sign
Answer Key: **C**	

Q36 : Laplace transform is not useful for analysis of the following control systems-	
A	Linear systems
B	Discrete- time systems
C	Time- invariant systems
D	Unstable continuous –time systems
Answer Key: **B**	

Q37 : The transfer function of the following state model of an LTI system with zero initial condition is $\frac{d^3y(t)}{dt^3} + 6\frac{d^2y(t)}{dt^2} + 11\frac{dy(t)}{dt} + 6y(t) = x(t)$	
A	$\frac{1}{(s+1)(s+2)(s+3)}$
B	$\frac{1}{(s+1)(s+2)(s+2)}$
C	$\frac{1}{(s+1)(s+2)(s+4)}$
D	$\frac{1}{(s+3)(s-1)(s-2)}$
Answer Key: **A**	

Q38: The time period of a square ware of frequency 1kHz is-	
A	1 s
B	10 s
C	10^{-3} s
D	0.1 s
Answer Key: **C**	

Q39: If the state space representation of an LTI system is known then the transfer function of this system-	
A	Can be partially determined
B	Can be completely determined
C	Cannot be completely determined
D	None of these is correct
Answer Key: **B**	

Q40: What number of nybbles can make one byte-	
A	1
B	2
C	4
D	8
Answer Key: **B**	

Q41: In a microprocessor, the data bus has 16 lines and address bus has 12 lines. What will be the number of bytes in the memory-	
A	4k
B	2k
C	8k
D	24k
Answer Key: **A**	

Q42 :	In Intel 8085 microprocessor, the address bus is 16 bit wide. The memory which can be accessed by this address bus will be-
A	64 k bytes
B	2 k bytes
C	8 k bytes
D	12 k bytes
Answer Key: **A**	

Q43 :	The following memory is a permanent memory
A	ROM
B	RAM
C	ROM AND RAM
D	None of these is correct
Answer Key: **A**	

Q44 :	The assumption of ergodic process in communication system means -
A	The random signals have identical time averages
B	The random signals have identical ensemble averages
C	The random signals have the identical time and ensemble averages
D	None of these is correct
Answer Key: **C**	

Q45 :	The power spectral density of the stationary noise whose autocorrelation is $R(\tau)=e^{-3\|\tau\|}$, will be-
A	$\frac{3}{\omega^2+3}$
B	$\frac{3}{3-\omega^2}$
C	$\frac{6}{9-\omega^2}$
D	$\frac{6}{\omega^2+9}$

Answer Key: **D**

Q46 Entropy commonly measures :
:

A	The average informtion
B	The rate of information
C	The probability of information
D	The loss of information

Answer Key: **A**

Q47 The autocorrelation function of a signal at zero -lag will be :
:

A	Mean value of signal
B	Average power of signal
C	Average voltage of signal
D	Zero

Answer Key: **B**

Q48 In DSB-SC system, at the receiver the detection process is expensive because :
:

A	It requires synchronous detection
B	Generation of local carrier is difficult at the receiver
C	Power level of received signal is very low
D	All options are correct

Answer Key: **A**

Q49 In a PCM system, the signal to quantization error ratio for 8-bit words will be :
:

A	54 dB
B	30 dB
C	40 dB
D	64 dB

Answer Key: **A**

Q50: Companding operation is useful because :	
A	It overcomes quantization noise in PCM
B	It protects small signals in PCM from quantizing noise
C	It reduces impulse noise in PWM receivers
D	None of these is correct
Answer Key: **B**	

Q51: Which of the following pulse modulation technique is analog:	
A	Differential PCM
B	PCM
C	PWM
D	Delta
Answer Key: **C**	

Q52: Frequency shift keying can be considered as a method for introducing:	
A	Frequency modulation
B	Amplitude modulation
C	Phase modulation
D	None of these is correct
Answer Key: **A**	

Q53: In a first order passive low-pass fifteen (R-C) circuit, the input voltage square wave is fed. The output voltage, with respect to ground, is measured across :	
A	Supply
B	Resister
C	Capacitor
D	Ground
Answer Key: **C**	

Q54 :	The main disadvantage of CW Doppler radar is :
A	It does not provide the target velocity
B	It does not provide target range
C	It requires a transponder at the target
D	It does not provide the target position
Answer Key: **B**	

Q55 :	In an R-L series circuit, the ratio of inductive impedance to resistance is $1/\sqrt{3}$. The power factor of the A.C. circuit at steady state is:
A	0.87 lag
B	0.87 lead
C	0.5 lag
D	0.5 lead
Answer Key: **A**	

Q56 :	In television, we use interlacing for the following purpose:
A	To provide the illusion of motion
B	To ensure that all lines on the screen are scanned
C	To simplify the vertical sync pulse train
D	To avoid flicker
Answer Key: **D**	

Q57 :	Which statement is not true :
A	The phase array radar has very fast scanning compared to other types of radar
B	The phase array radar has ability to track and scan simultaneously compared to other types of radar
C	The phase array radar has circuit simplicity compared to other types of radar
D	The phased array radar has the ability to track many targets simultaneously as compared to other types of radar
Answer Key: **C**	

Q58	The satellites used for the purpose of intercontinental communications are called as:

:

A	Intelsat
B	Damsat
C	Comsat
D	Marisat

Answer Key: **A**

Q59 A waveguide can be treated as a :
:

A	Low pass filter
B	High pass filter
C	Band pass filter
D	Band stop filter

Answer Key: **B**

Q60 The radiation power of an antenna which has radiation resistance equal to 500 ohm and fed by 20 A current, will be:
:

A	100 kW
B	150 kW
C	200 kW
D	250 kW

Answer Key: **C**

Q61 What is the magnitude of the attractive force (in vacuum) between the charge $Q_1 = 3x10^{-4}$ C at location (1,2,3) and the charge $Q_2 = -10^{-4}$ C at location (2,0,5) ?
:

A	120 N
B	60 N
C	40 N
D	30 N

Answer Key: **D**

Q62 A full- wave diode bridge rectifier circuit has :
:

A	3 diodes
B	2 diodes
C	4 diodes
D	8 diodes
Answer Key: **C**	

Q63 : Which is not an Omni-directional antenna:	
A	Marconi antenna
B	Discone antenna
C	Log-periodic antenna
D	Half-wave dipole antenna
Answer Key: **C**	

Q64 : In order to separate the channels in an TDM receiver, we need to use following :	
A	Band pass filters
B	And gates
C	Differentiator
D	Integrator
Answer Key: **B**	

Q65 : Which statement is not true ?	
A	Losses in optical fibers can caused by impurities
B	Losses in optical fibers can caused by microbending
C	Losses in optical fibers can caused by attenuation in the glass
D	Losses in optical fibers can caused by stepped index operation
Answer Key: **D**	

Q66 : Laser light is:	
A	Coherent emission

B	Stimulated emission
C	Spontaneous emission
D	Coherent and stimulated emissions
Answer Key: **D**	

Q67 The core in optical fiber has following : **:**	
A	Less refractive index than the air
B	Less refractive index than the cladding
C	More refractive index than the cladding
D	Same refractive index like cladding
Answer Key: **C**	

Q68 The electrical torque in terms of supply voltage V in a 3-phase induction motor, is proportional to the following? **:**	
A	V^2
B	V^{-1}
C	$V^{1/2}$
D	V
Answer Key: **A**	

Q69 The following motor is used for the compressors. **:**	
A	Reluctance motor
B	DC series motor
C	Shaded pole motor
D	Capacitor-start capacitor-run motor
Answer Key: **D**	

Q70 Which of the following statement is true ? **:**	
A	Single-phase induction motor requires only one winding
B	Single-phase induction motor can rotate in one direction only

C	Single-phase induction motor is self starting
D	Single-phase induction motor is not self-starting
Answer Key: **D**	

Q71 : Which distortion is least significant for the audio amplifiers?	
A	Frequency
B	Phase
C	Intermodulation
D	Harmonic
Answer Key: **B**	

Q72 : The following relay is used for protection of motors against overload?	
A	Thermal relay
B	Buchholz relay
C	Impedance relay
D	Electromagnetic attraction type
Answer Key: **A**	

Q73 : To charge a feeder cable the following sequence of operation is true :	
A	Make the isolator followed by make the switch gear
B	Make the switch gear followed by make the isolator
C	Simultaneously make the isolator and switch gear
D	Break the isolator followed by make the switch gear
Answer Key: **A**	

Q74 : The fuse rating is given in terms of the following :	
A	kVA
B	VAR
C	Voltage

D	Current
Answer Key: **D**	

Q75 Oil switches are applied : **:**	
A	For low current circuits
B	For low voltage circuits
C	For high voltages and large current circuits
D	For all circuits
Answer Key: **C**	

Q76 Which statement is true : **:**	
A	Reluctance motor can be considered as a variable torque motor
B	Reluctance motor can be considered as low torque variable speed motor
C	Reluctance motor can be considered as self starting type synchronous motor
D	Reluctance motor can be considered as a low noise and slow speed motor
Answer Key: **C**	

Q77 Which motor has series characteristics : **:**	
A	Shaded pole motor
B	Capacitor start motor
C	Repulsion motor
D	None of these is correct
Answer Key: **C**	

Q78 The variable speed operation is desired for the following application : **:**	
A	Water pump
B	Refrigerator
C	Ceiling fan
D	Exhaust fan

Answer Key: **C**

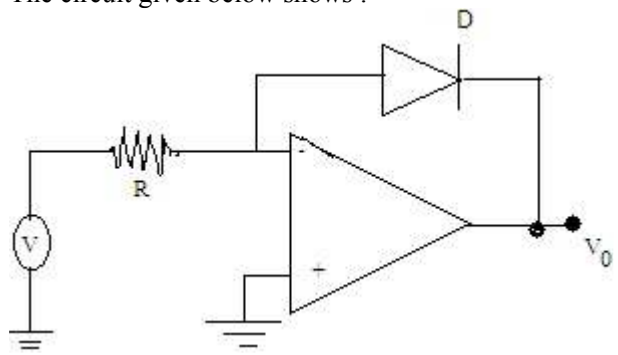
Q79 :	Given that X and Y are two independent Gaussian random variables, each one has average value=0, and variance $=\sigma^2$, then the joint density function can be defined as :
A	f(x,y) = (f(x))/(f(y))
B	f(x,y) = f(x) f (y)
C	f(x,y) = f(x) -f (y)
D	f(x,y) = f(x) +f (y)
Answer Key: **B**	

Q80 :	The material used for insulating in a cable should have the following property :
A	Low cost
B	High dielectric strength
C	High mechanical strength
D	All options are correct
Answer Key: **D**	

Q81 :	If the length of a cable is doubled then its capacitance will be :
A	One-fourth
B	One-half
C	Double
D	Remain unchanged
Answer Key: **C**	

Q82 :	Which transmission system has skin effect absence, less line cost, low corona effect?
A	HVDC
B	EHV-AC
C	UHB-AC
D	HVDC and EHV-AC
Answer Key: **A**	

Q83 The load curve is used for : 	
A	Deciding schedule of generating units
B	Deciding sizes of generating units
C	Deciding total installed capacity of the plant
D	Deciding schedule and sizes of the generating units and capacity of the plant
Answer Key: **D**	

Q84 The circuit given below shows :  	
A	A logarithmic amplifier
B	An integrator
C	A differentiator
D	A clamper
Answer Key: **A**	

Q85 An ideal voltage amplifier has : 	
A	Input resistance = 0, Output resistance = ∞
B	Input resistance = 0, Output resistance = 0
C	Input resistance = ∞, Output resistance = 0
D	Input resistance = ∞, Output resistance = ∞
Answer Key: **C**	

Q86 Which statement is true : 	
A	A clipper circuit may generate harmonics

B	A clipper circuit increases the RMS value of the signal
C	A clipper circuit improves the power factor of the linear passive load
D	A clipper circuit increases the load VA rating of the linear passive load
Answer Key: **A**	

Q87 In order to sustain the oscillations, the Barkhausen criteria states that : **:**	
A	The loop gain of the circuit should be negligible
B	The loop gain of the circuit should be equal to 1 with phase shift 180 degree lagging
C	The phase shift around the circuit should be 90 degree lag
D	None of these is correct
Answer Key: **B**	

Q88 The following experession T = X $\bar{Y}$ Z + X $\bar{Y}\bar{Z}$ + XYZ can be simplied as : **:**	
A	T = XZ+X$\bar{Y}$
B	T=$\bar{X}$Z+XY
C	T=X$\bar{Z}$+XY
D	T=X$\bar{Z}$+X$\bar{Y}$
Answer Key: **A**	

Q89 Which interrupt is unmaskable interrupt ? **:**	
A	INTR
B	RST 7.5
C	TRAP
D	RST 5.5
Answer Key: **C**	

Q90 Gray code for number 4 is given by, **:**	
A	0111
B	0110

C	0101
D	0100
Answer Key: **B**	

Q91 : Which relation is not true in Boolean algebra ?	
A	A(BC) = (AB)C
B	A(B + C) = AB + AC
C	A + AC = A
D	A(A + C) = 1
Answer Key: **D**	

Q92 : The value of $\beta = \frac{Ic}{I_B}$ of a BJT is :	
A	>1
B	about 0.1
C	about 10^{-3}
D	about 10^{-5}
Answer Key: **A**	

Q93 : The enhancement type MOSFET is known as :	
A	N-type MOSFET
B	P-type MOSFET
C	Normally off MOSFET
D	Normally on MOSFET
Answer Key: **C**	

Q94 : The following circuit is a sequential circuit :	
A	AND gate
B	NAND gate
C	Bistable multivibrator

D	EX-OR gate

Answer Key: **C**

Q95 The nature of transconductance curve of a JFET is :

A	Straight line
B	Parabolic
C	Hyperbolic
D	Inverted V-type

Answer Key: **B**

Q96 Which diode works under forward-biased condition :

A	Photo diode
B	Zener diode
C	Light emitting diode
D	Varactor diode

Answer Key: **C**

Q97 Which statement is true ?

A	Hall effect can be used to measure magnetic field intensity
B	Hall effect can be used to measure electric field intensity
C	Hall effect can be used to measure electric and magnetic field intensities
D	Hall effect can be used to measure carrier concentration

Answer Key: **A**

Q98 The most heavily doped region of a transistor is :

A	Base
B	Collector
C	Emitter
D	None of these is correct

Answer Key: **C**

Q99 Which is true statement ?
:

A	A bistable multivibrator is a free-running oscillator
B	A bistable multivibrator is a triggered oscillator
C	A bistable multivibrator is a saw tooth wave generator
D	A bistable multivibrator is a crystal oscillator

Answer Key: **B**

Q100 BJT is considered better than MOSFET when :
:

A	There is a requirement of low cost
B	There is a requirement of low power dissipation
C	There is a requirement of high noise margin
D	None of these is correct

Answer Key: **A**

State Engineering (Prelims) Exam – 2014

Second Paper – Second Shift

(Provisional Model Answer Key)

Mechanical Engineering

Q1 : A steel rod of 2 m long is heated through a temperature of 100^0C . The coefficient of linear expansion is α = 6.5 X 10^{-6} /^{0}C and E= 2 X 10^6 N/cm^2. The stress induced in the bar is	
A	1000 N/cm^2
B	1200 N/cm^2
C	1300 N/cm^2
D	1400 N/cm^2
Answer Key: **C**	

Q2 : The design calculations for members subjected to fluctuating loads with the same factor of safety yield the most conservative estimates when using	
A	Gerber relation
B	Soderberg relation
C	Goodman relation
D	None of these is correct
Answer Key: **B**	

Q3 : A leaf spring 1 m long carries a central point load of 2000 N. The spring is made up of plates each 5 cm wide and 1 cm thick. The bending stress in the plate is limited to 100 N/mm^2. The number of plates required will be	
A	3
B	5
C	6
D	8
Answer Key: **C**	

Q4 : The stress due to suddenly applied load as compared to the stress due to the same load gradually applied to the same rod is	
A	half

B	same
C	double
D	three times
Answer Key: **C**	

Q5 : Choose the wrong statement	
A	The shear force at any section of a beam is equal to the total sum of the forces acting on the beam on any one side of the section,
B	The magnitude of the bending moment at any section of a beam is equal to the vector sum of the moments (about the section) due to the forces acting on the beam on any one side of the section,
C	A diagram which shows the values of shear forces at various sections of structured member is called a shear force diagram,
D	A simply supported beam is one which is supported on more than two supports.
Answer Key: **D**	

Q6 : Two blocks with masses 'M' and 'm' are in contact with each other and are resting on a horizontal frictionless floor. When horizantal force (F) is applied to the heavier body mass 'M', the blocks accelerate to the right i.e. towards the application force. The force between the two blocks is	
A	$\frac{F(M+m)}{m}$
B	$\frac{FM}{m}$
C	$\frac{mF}{M}$
D	$\frac{mF}{M+m}$
Answer Key: **D**	

Q7 : A thick walled pressure vessel is subjected to an internal pressure of 60 MPa. If the hoop stress on the outer surface is 150 MPa, then the hoop stress on the internal surface is	
A	105 MPa
B	180 MPa
C	210 MPa
D	135 MPa
Answer Key: **C**	

Q8 : A Mohr's circle reduces to a point when the body is subjected to

A	pure shear
B	uniaxial stress only
C	equal and opposite axial stresses on two mutually perpendicular planes, the planes being free of shear
D	equal axial stresses on two mutually perpendicular planes, the planes being free of shear.
Answer Key: **D**	

Q9 :	In a close-coiled helical spring subjected to an axial load and other quantities remaining the same, if the wire diameter is doubled, then the stiffness of the spring when compared to the original one will become
A	two times
B	four times
C	eight times
D	sixteen times
Answer Key: **D**	

Q10 :	Considering centrifugal tension, the power transmitted by belt drive is maximum at velocity V equal to Note: - T is total tension on tight side and m is mass per unit length of belt.
A	$V = \left\{\frac{T}{m}\right\}^{\frac{1}{2}}$
B	$V = \left\{\frac{T}{3m}\right\}^{\frac{1}{2}}$
C	$V = \left\{\frac{3T}{m}\right\}^{\frac{1}{2}}$
D	$V = \left\{\frac{2T}{m}\right\}^{\frac{1}{2}}$
Answer Key: **B**	

Q11 :	In a hollow circular shaft of outer and inner diameters of 20 cm and 10 cm respectively, the shear stress is not to exceed 40 N/mm^2. The maximum torque which the shaft can safely transmit is
A	58.9 KN-m
B	57.9 KN-m
C	56.9 KN-m
D	58.7 KN-m
Answer Key: **A**	

Q12 Rope brake dynamometer uses :	
A	oil as lubricant
B	water as lubricant
C	grease as lubricant
D	no lubricant
Answer Key: **D**	

Q13 Whirling speed of a shaft coincide with the natural frequency of the :	
A	longitudinal vibration
B	transverse vibration
C	torsional vibration
D	none of these is correct
Answer Key: **A**	

Q14 In slider crank mechanism, the maximum acceleration of slider is obtained when the crank is :	
A	at the inner dead centre position
B	at the outer dead centre position
C	exactly midway position between the two dead centres
D	slightly in advance of the midway position between the two dead centres.
Answer Key: **A**	

Q15 Tresca theory of failure is applicable for which of the following type of materials ? :	
A	Elastomers
B	Plastic
C	Ductile
D	Brittle
Answer Key: **C**	

Q16:	A solid shaft is to transmit 20 kW at 200 rpm. The ultimate shear stress for the steel may be taken as 360 MPa and a factor of safety as 8. The diameter of solid shaft is
A	45 mm
B	46 mm
C	48 mm
D	50 mm
Answer Key: **C**	

Q17:	A 1.5 m long column has a circular cross-section of 5 cm diameter. One end of the column is fixed and other end is free. Taking factor of safety as 3 and E= 120 GN/m^2, safe load according to Euler's theory is
A	13.00 kN
B	13.27 kN
C	13.47 kN
D	13.87 kN
Answer Key: **C**	

Q18:	An internal gear having 60 teeth is meshing with an external gear having 20 teeth. Module is 6 mm. The centre distance of two gears is
A	120 mm
B	180 mm
C	240 mm
D	300 mm
Answer Key: **C**	

Q19:	In a cam drive, it is essential to off-set the axis of follower to
A	decrease the side thrust between the follower and cam surface
B	decrease the work between the follower and cam surface
C	take care of space limitation
D	reduce the cost
Answer Key: **C**	

Q20	In equilibrium condition, fluids are not able to sustain

:	
A	shear force
B	resistance to viscosity
C	surface tension
D	geometric similitude
Answer Key: **C**	

Q21 :	The fluid forces considered in the Navier-Stoke's equation are
A	gravity, pressure and viscous
B	gravity, pressure and turbulent
C	pressure, viscous and turbulent
D	gravity, viscous and turbulent
Answer Key: **A**	

Q22 :	A Brayton cycle (Air standard) has a pressure ratio of 4 and inlet conditions of one standard atmospheric pressure and 27^0C. Estimated air flow rate for 100 kW power output (when maximum temperature in the cycle is 1000^0C, (γ =1.4, and Cp =1.0 kJ/kg.K) will be
A	0.24 kJ/kg
B	0.32 kJ/kg
C	0.36 kJ/kg
D	0.42 kJ/kg
Answer Key: **C**	

Q23 :	A turbine develops 8000 kW when running at 100 rpm. The head on the turbine is 36 m. If the head is reduced to 9 m, the power developed by the turbine will be
A	16000 kW
B	4000 kW
C	1414 kW
D	1000 kW
Answer Key: **D**	

Q24 Efficiency of steam turbine can be improved by

:

A	reheating of steam
B	regenerative feed heating
C	binary vapour plants
D	all options are correct

Answer Key: **D**

Q25 Free convection flow depends on all of the following except
:

A	density
B	coefficient of viscosity
C	gravitational force
D	velocity

Answer Key: **D**

Q26 Which of the following cycle has maximum efficiency
:

A	Rankine
B	Brayton
C	Carnot
D	Joule

Answer Key: **C**

Q27 The air standard Diesel cycle is less efficient than the Otto cycle for the
:

A	same compression ratio and heat addition
B	same pressure and heat addition
C	same rpm and cylinder dimension
D	same pressure and compression ratio

Answer Key: **A**

Q28 The knock in Diesel engine occurs due to
:

A	instantaneous and rapid burning of the first part of the charge
B	instantaneous auto ignition of last part of charge
C	delayed burning of the first part of the charge
D	reduction of delay period
Answer Key: **A**	

Q29 :	Compensating devices are provided in carburators
A	to charge the quantity of mixture depending upon load
B	to provide always an economy mixture
C	to modify the mixture strength depending upon requirements under various operating conditions
D	to supply extra fuel during acceleration only
Answer Key: **C**	

Q30 :	Which part is not common between the petrol and Diesel engine ?
A	air cleaner
B	exhaust silencer
C	battery
D	fuel injector
Answer Key: **D**	

Q31 :	Which among the NC operations given below are continuous path operations ? Arc welding (AW), Milling (M), Punching in sheet metal (P), Drilling (D), Laser cutting of sheet metal (LC), Spot welding (SW)
A	AW, LC and M
B	AW, D, LC and M
C	D, LC, P and SW
D	D, LC, and SW
Answer Key: **B**	

Q32 :	The loss of available energy associated with the transfer of 1000 kJ of heat from a constant temperature system at 600 K to another at 400 K, when the environmental temperature is 300 K is

A	166.67 kJ
B	250.00 kJ
C	500.00 kJ
D	750.00 kJ
Answer Key: **A**	

Q33 :	If V_N and α are the nozzle exit velocity and nozzle angle in an impulse turbine, the optimum blade velocity is given by
A	$V_N \cos 2\alpha$
B	$V_N \sin 2\alpha$
C	$\frac{V_N \cos \alpha}{2}$
D	$\frac{V_N^2}{2}$
Answer Key: **D**	

Q34 :	The entropy of universe tends to
A	become zero
B	remain constant
C	be maximum
D	attain a certain finite minimum value
Answer Key: **A**	

Q35 :	A counter flow shell and tube heat exchanger is used to heat water with hot exhaust gases. The water (C_p = 4180 J/kg ^{0}C) flows at a rate 2 kg/s while the exhaust gas (C_p = 1030 J/kg ^{0}C) flows at the rate of 5.25 kg/s. If the heat exchanger surface area is 32.5 m^2 and the over all heat transfer coefficient is 200 W/m^2 ^{0}C, what is the NTU for the heat exchanger ?
A	1.2
B	2.4
C	4.5
D	8.6
Answer Key: **A**	

Q36:	A counter flow heat exchanger is used to heat water from 20^0C to 80^0C by using hot gas entering at 140^0C and leaving at 80^0C. The log mean temperature difference for the heat exchanger is
A	80^0C
B	60^0C
C	110^0C
D	not determinable
Answer Key: **B**	

Q37:	The axis of movement of a robot may include
A	elbow rotation
B	wrist rotation
C	X-Y coordinate motion
D	all options are correct
Answer Key: **D**	

Q38:	Automatic loading and unloading of materials can be accomplished by means of
A	power push or pull device
B	power roller, belt and chain
C	automatic couple and uncouple
D	all options are correct
Answer Key: **D**	

Q39:	Steam turbines are classified according to
A	direction of flow
B	principle of action
C	number of cylinder
D	arrangement of pressure drop
Answer Key: **D**	

Q40	In nuclear power plants there are three main sources of radioactive contamination of air. Out of three one of the source is

:

A	step-up transformer
B	liquid metal
C	fission of nuclei of nuclear fuels
D	penstock

Answer Key: **C**

Q41 Which of the following is not considered a method of input control in a CAD system ?
:

A	programmable function box
B	joystick
C	plotter
D	touch material

Answer Key: **C**

Q42 A transmission shaft subjected to bending loads must be designed on the basis of
:

A	maximum normal stress theory
B	maximum shear stress theory
C	maximum normal stress and maximum shear stress theory
D	fatigue strength

Answer Key: **A**

Q43 The flow of fluid through a pipe is laminar, when
:

A	the fluid is ideal
B	the fluid is viscous
C	the Reynold's number is less than 2000
D	the Reynold's number is more than 3000

Answer Key: **C**

Q44 The radiation heat transfer rate per unit area in (W/m^2) between two plane parallel grey surfaces (emissivity = 0.9) maintained at 400 K and 300 K (given Stefan Boltzmann's constant $\sigma = 5.67X10^{-8}$ W/m^2K) is
:

A	992
B	812
C	464
D	567
Answer Key: **B**	

Q45 For forced convection, Nusselt number is a function of **:**	
A	Prandtl and Grashoff number
B	Reynolds and Prandtl number
C	Reynolds and Grashoff number
D	Reynolds number only
Answer Key: **B**	

Q46 The essential physical components of FMS is **:**	
A	potentially independent NC machine tools
B	a conveyance network to more parts and sometimes tools between machines and fixturing stations
C	an overall control network that coordinates the machine tools, the part-moving elements and the workpieces
D	all options are correct
Answer Key: **D**	

Q47 Refrigerant used in domestic refrigerators is **:**	
A	ammonia
B	air
C	SO_2
D	freon-12
Answer Key: **D**	

Q48 The comfort conditions in air conditioning are at **:**	
A	0^0C DBT and 0% RH

B	20^0C DBT and 60% RH
C	30^0C DBT and 80% RH
D	40^0C DBT and 90% RH
Answer Key: **B**	

Q49 :	The use of refrigerant R-22 for temterature below -30^0C is not recommended due to its
A	good miscibility with lubricating oil
B	poor miscibility with lubricating oil
C	low evaporating pressure
D	high compressor discharge temperature
Answer Key: **D**	

Q50 :	Basic law of heat conduction is
A	Fourier's law
B	Newton's law
C	Stefan's law
D	First law of thermodynamics
Answer Key: **A**	

Q51 :	The size of weld in butt welded joint is equal to
A	0.5 times throat of weld
B	Throat of weld
C	$\sqrt{2}$ times throat of weld
D	Two times throat of weld
Answer Key: **B**	

Q52 :	If two pumps identical in all respects and each capable of delivering a discharge Q against a head H are connected in series, the resulting discharge is
A	2Q against a head 2H
B	2Q against a head H

C	Q against a head H
D	$\sqrt{Q}$ against a head $\sqrt{2}H$
Answer Key: **C**	

Q53 In interferometric measurement method, the path difference between one bright band and the next is varied by **:**	
A	Half wavelength
B	Two half wavelength
C	One quarter wavelength
D	Two wavelength
Answer Key: **B**	

Q54 Wear allowance is provided on **:**	
A	Go gauge
B	Not go gauge
C	Both go and not go gauge
D	None of these is correct
Answer Key: **A**	

Q55 In ammonia vapour compression system, the temperature of ammonia after compression will be **:**	
A	0^{o} to $40^{o}C$
B	40^{o} to $50^{o}C$
C	50^{o} to $70^{o}C$
D	70^{o} to $110^{o}C$
Answer Key: **D**	

Q56 C.O.P. of a vapour absorption system can be increased by using **:**	
A	Vapour compression
B	Heat exchanger
C	Both vapour compression and Heat exchanger

D	None of these is correct

Answer Key: **B**

Q57 Availability of a system at any given state is :

A	A properly of the system
B	The maximum work obtained as the system goes to dead state
C	The total energy of the system
D	The maximum useful work obtainable as the system goes to dead state.

Answer Key: **D**

Q58 In ABC analysis, the C items are those which represents :

A	Small percentage of the total annual consumption value
B	High percentage of the total annual consumption value
C	Small percentage of closing inventory value
D	High percentage of closing inventory value

Answer Key: **A**

Q59 The key features of material requirement planning system are :

A	Planned order release
B	Time-phasing of requirement
C	Provisions for rescheduling
D	All options are correct

Answer Key: **D**

Q60 The optimality of a transportation problem is determined by application of :

A	North west corner method
B	Modi method
C	Vegels application method
D	Least cost method

Answer Key: **C**

Q61 Which of the following is an advantage of using an expert system?
:

A	Imposed structure
B	Knowledge engineering resistance
C	Vapid prototyping
D	All options are correct

Answer Key: **D**

Q62 In a M/M/1 queue, with utilization factor of 0.5, the probability of only one person waiting in the queue is
:

A	0
B	1.0
C	0.125
D	1.25

Answer Key: **D**

Q63 The condition for irreversibility of a cycle is
:

A	$\oint \frac{dQ}{T} < 0$
B	$\oint \frac{dQ}{T} > 0$
C	$\oint \frac{dQ}{T} = 0$
D	None of these is correct

Answer Key: **A**

Q64 Production planning consists of
:

A	Preplanning and routing
B	Scheduling and dispatching
C	Expediting
D	All options are correct
Answer Key: **A**	

Q65: In electro chemical machining the material removal is due to	
A	Corrosion
B	Erosion
C	Fusion
D	Ion displacement
Answer Key: **D**	

Q66: CAD/CAM is the inter-relationship between	
A	Marketing and design
B	Manufacturing and marketing
C	Engineering and marketing
D	Engineering and manufacturing
Answer Key: **D**	

Q67: In a linear programming model there are four decision variables and three constraints. During an iteration, by Simplex method, the coefficient of the base variable would form	
A	An identity matrix
B	Slack variables
C	Basic solution
D	None of these is correct
Answer Key: **A**	

Q68: Crater wear occurs mainly due to	
A	Abrasion

B	Diffusion
C	Oxidation
D	Adhesion
Answer Key: **B**	

Q69 Control charts for variables are the examples of **:**	
A	P, np, C, u charts
B	$\bar{X}$, R, σ charts
C	A, B, C, charts
D	None of these is correct
Answer Key: **B**	

Q70 PERT and CPM are **:**	
A	Techniques to determine project status
B	Decision making techniques
C	Aids to determine the cost implication of project
D	None of these is correct
Answer Key: **B**	

Q71 In Carnot cycle, the algebraic sum of the entropy change for the cycle is **:**	
A	Positive
B	Negative
C	Zero
D	None of these is correct
Answer Key: **C**	

Q72 A perfect gas flows through a nozzle where it expands in a reversible adiabatic manner. The inlet conditions are 22 bar, 500^{o}C, 38 m/s. At exit the pressure is 2 bar. Given R=190 J/Kg K and γ =1.35. The exit velocity will be **:**	
A	700 m/s
B	726 m/s

C	801 m/s
D	701 m/s
Answer Key: **B**	

Q73: The turbulent flow has	
A	Streak line motion
B	Parabolic velocity distribution
C	Random orientation of fluid particles
D	Small slope of velocity profile at the wall
Answer Key: **C**	

Q74: In a drilling operation, the tool life was found to decrease from 20 min to 5 min due to increase in drill speed from 200 rpm to 400 rpm. What will be the tool life of that drill under same condition if the drill speed is 300 rpm	
A	7.9 min
B	8.9 min
C	6.4 min
D	9.8 min
Answer Key: **B**	

Q75: In the tolerance specification 25D6, the letter ‘D’ represents	
A	Grade of tolerance
B	Upper deviation
C	Lower deviation
D	Type of fit
Answer Key: **D**	

Q76: 3-2-1 method of location in a jig or fixture would collectively restrict the work-piece in ‘n’ degree of freedom, where the value of ‘n’ is	
A	6
B	8
C	9

D	12

Answer Key: **C**

Q77 Forecasting which assumes a static environment in the future is :

A	Passive forecasting
B	Active forecasting
C	Long term forecasting
D	Short term forecasting

Answer Key: **A**

Q78 What is computer numerical control (CNC)? :

A	CNC is a self contained NC system for a single machine tool using a computer controlled by a part program to perform basic NC functions.
B	CNC is a self contained system for a single operated manual controlled machine.
C	CNC is a self contained NC system for a multi machine tool operated by a conventional technique.
D	None of these is correct

Answer Key: **A**

Q79 The area – velocity relationship for compressible fluid flow is
Note : M is the Mach number and C is the sonic speed. :

A	$\frac{dA}{A} = \frac{dV}{V}(M^2 - 1)$
B	$\frac{dA}{A} = \frac{dV}{V}(C^2 - 1)$
C	$\frac{dA}{A} = \frac{dV}{V}(1 - M^2)$
D	$\frac{dA}{A} = \frac{dV}{V}(1 - V^2)$

Answer Key: **A**

Q80: For a linear distribution of velocity in the boundary layer on a flat plate, the ratio of displacement thickness to nominal thickness is	
A	1/2
B	1/3
C	1/4
D	2/3
Answer Key: **A**	

Q81: In economics of machining, which one of the following costs remains constant?	
A	Machining cost per piece
B	Tool changing cost per piece
C	Tool handling cost per piece
D	Tool cost per piece
Answer Key: **C**	

Q82: The heat production from a normal healthy man when asleep is about	
A	20 Watts
B	40 Watts
C	60 Watts
D	80 Watts
Answer Key: **C**	

Q83: Deep hole drilling of small diameter (say 200 μm) is done with EDM by selecting the tool material as	
A	Copper wire
B	Tungsten wire
C	Brass wire
D	Tungsten carbide wire
Answer Key: **C**	

Q84 In ultra machining process, the material removal rate will be higher for material with :

A	Higher toughness
B	Higher ductility
C	Lower toughness
D	Higher fracture strain

Answer Key: **C**

Q85 Specific speed of an impulse turbine (Pelton wheel) ranges from :

A	10-40
B	50-100
C	60-250
D	300-800

Answer Key: **A**

Q86 Hydrogen can play an important role as an alternative fuel to conventional fuel as :

A	An energy carrier
B	An energy device
C	An energy system
D	None of these is correct

Answer Key: **A**

Q87 When the ordering cost is increased to four times, the EOQ will be increased to :

A	Two times
B	Three times
C	Eight times
D	Ten times

Answer Key: **A**

Q88 In a reaction turbine

:	
A	Flow can be regulated without loss
B	There is only partial conversion of available head to velocity head before entry to runner
C	The outlet must be above the tail race
D	Water may be allowed to enter a part or whole of wheel circumference
Answer Key: **B**	

Q89 :	The constant volume cycle is also called
A	Carnot cycle
B	Joule cycle
C	Diesel cycle
D	Otto cycle
Answer Key: **D**	

Q90 :	The ratio of mass heat flow rate by convection to the flow rate by conduction under a unit temperature gradient and through a characteristic length L is known as
A	Prandtl number
B	Nusselt number
C	Stanton number
D	Peclet number
Answer Key: **D**	

Q91 :	A fixed gear having 10 teeth meshes with another gear having 25 teeth, the centre lines of both the gears being joint by an arm so as to form an epicyclic gear train. The number of rotations made by the smaller gear for one rotation of the arm is
A	Three
B	Four
C	Five
D	Six
Answer Key: **C**	

Q92 A cam is to be designed for a knife edge follower with following data; cam lift 40 mm during 90^{o} of cam rotation with SHM, dwell for the next 30^{o}, during the next 60^{o} of can rotation the follower returns to its original position with SHM,

:	dwell during the remaining 180^o. The acceleration of the follower during its accent and descent are
A	20.6, 11.8 m/s^2
B	20.6, 118 m/s^2
C	50.6, 11.8 m/s^2
D	50.6, 113 m/s^2
Answer Key: **D**	

Q93 :	For a band brake, the width of the band for a drum diameter greater than 1m, should not exceed
A	150 mm
B	200 mm
C	250 mm
D	300 mm
Answer Key: **A**	

Q94 :	Effect of hummer blow in a locomotive can be reduced by
A	Decreasing the speed
B	Using two or three pairs of wheels coupled together
C	Balancing whole of the reciprocating parts
D	Either by decreasing the speed or using two or three pairs of wheels coupled together
Answer Key: **D**	

Q95 :	A solid circular shaft is subjected to a bending moment of 3000 N-m and a torque of 10000 N-m. The shaft is made of 45 C8 steel having ultimate tensile stress of 700 MPa and an ultimate shear stress of 500 MPa. Assume a factor of safety as 6. The diameter of the shaft according to the maximum shear stress theory is
A	84 mm
B	85 mm
C	86 mm
D	87 mm
Answer Key: **C**	

Q96	A hydraulic press exerts a total load of 3.5 MN. This load is carried by two steel rods, supporting the upper head of the

:	press. The safe stress is 85 MPa and E=210 kN/mm^2. The diameter of the rod will be
A	160 mm
B	161 mm
C	162 mm
D	165 mm
Answer Key: **C**	

Q97 :	If the ratio of the diameter of rivet hole to the pitch of rivet is 0.25, then the tearing efficiency of the joint is
A	0.50
B	0.75
C	0.25
D	0.87
Answer Key: **B**	

Q98 :	The diameter of the air cylinder of an air press is 200 mm and the cylinder assembly is held together by six bolts which are of the length of cylinder. The maximum operating air pressure in the cylinder is 0.9 N/mm^2. The fitted gasket must be preloaded with 20kN forces to prevent air leakage. The external load on the bolt is
A	275.6 kN
B	285.2 kN
C	28.52 kN
D	28.82 kN
Answer Key: **C**	

Q99 :	A 50 mm diameter solid shaft is welded to a flat plate by 10 mm fillet weld. The maximum torque that the welded joint can sustain if the maximum shear stress intensity in the weld material is not to exceed 80 MPa is
A	2 kN-m
B	2.1 kN-m
C	2.22 kN-m
D	2.35 kN-m
Answer Key: **C**	

Q100	Oldham coupling is used to connect two shafts

:	
A	Which are perfectly aligned
B	Which are at 90^{o}
C	Which have lateral misalignment
D	Whose axes intersect at a small angle
Answer Key: **C**	