मध्यप्रदेश लोक सेवा आयोग
रेसीडेन्सी एरिया
इन्दौर

क्रमांक–: 656 / 69 / 2011 / प–9 इन्दौर, दिनांक 21.08.2016

राज्य अभियांत्रिकी सेवा प्रारंभिक परीक्षा –2016 उत्तर कुंजी

–:: विज्ञप्ति ::–

आयोग के विज्ञापन क्रमांक–05 / परीक्षा / 2016 दिनांक 14.06.2016 के अंतर्गत आयोजित राज्य अभियांत्रिकी सेवा प्रारंभिक परीक्षा –2016 के द्वितीय प्रश्न पत्र के विषय– सिविल इंजीनियरिंग, मेकेनिकल इंजीनियरिंग, इलेक्ट्रिकल इंजीनियरिंग एवं एग्रीकल्चर इंजीनियरिंग की परीक्षा दिनांक–21.08.2016 के 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 अन्दर 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 21.08.2016 से उपलब्ध है।

(डॉ. आर.आर. कान्हेरे)
परीक्षा नियंत्रक

State Engineering (Prelims) Exam – 2016

(Provisional Model Answer Key)

Civil Engineering

Q1 :	If f_{ck} f is the characteristic strength of concrete then as per the Indian Standard (IS) 456: 2000, the modulus of elasticity of the concrete is
A	$5700\sqrt{f_{ck}}$
B	$5200\sqrt{f_{ck}}$
C	$5000\sqrt{f_{ck}}$
D	None of these are correct
Answer Key: **C**	

Q2 :	The minimum tension reinforcement required in the concrete beam should not be less than (here, width of the beam = b ; depth of the beam = d ; and yield strength of steel= f_y)
A	$0.04\,b \cdot d$
B	$\frac{0.12}{100} b \cdot d$
C	$\frac{0.85\,b \cdot d}{f_y}$
D	$\frac{0.87\,b \cdot d}{f_y}$
Answer Key: **C**	

Q3 :	The one-way simply-supported slab for a room of plan dimensions 9 m x 4 m carries ultimate working load of 9 kN/m. The design moment for the slab should be
A	12.00 kN.m
B	18.00 kN.m
C	9.00 kN.m
D	27.00 kN.m

Answer Key: **B**

Q4 : A reinforced concrete (RC) column with slenderness ratio greater than 12 is classified as

A	short column
B	long column
C	axially loaded column
D	stub column

Answer Key: **B**

Q5 : The critical section for computing maximum bending moment for the design of isolated footing supporting a concrete column is (considering *d* as distance between the column face and the footing edge)

A	at the face of the column
B	at a distance *d* from the column face
C	at the center of the column
D	at a distance *d*/2 from the column face

Answer Key: **A**

Q6 : As per the Indian Standard (IS) 3370 : 2009, the minimum grade of concrete to be used in liquid retaining structures should be

A	M20
B	M25
C	M30
D	M15

Answer Key: **C**

Q7 : A vertical wall of a circular bunker is subjected to horizontal pressure due to coal stored therein. The wall of the bunker is designed for

A	Axial tension
B	Hoop tension and shear force
C	Hoop tension and bending moment
D	All are correct

Answer Key: **C**

Q8 : In a 10 m long simply-supported prestressed concrete beam, if prestressing force = P; eccentricity = e; area of cross-section = A; section modulus = Z; bending moment due to dead load = M_g; bending moment due to live load = M_q, the resultant stress due to dead load and live load at top fiber at mid-span is given by

A	$\left(\frac{P}{A}-\frac{P\cdot e}{Z}\right)+\left(\frac{M_g}{Z}\right)+\left(\frac{M_q}{Z}\right)$
B	$\left(\frac{P}{A}+\frac{P\cdot e}{Z}\right)+\left(\frac{M_g}{Z}\right)+\left(\frac{M_q}{Z}\right)$
C	$\left(\frac{P}{A}-\frac{P\cdot e}{Z}\right)-\left(\frac{M_g}{Z}\right)-\left(\frac{M_q}{Z}\right)$
D	$\left(\frac{P}{A}+\frac{P\cdot e}{Z}\right)-\left(\frac{M_g}{Z}\right)-\left(\frac{M_q}{Z}\right)$

Answer Key: **A**

Q9 : As per the Indian Standard (IS) 800 : 2007, the partial safety factor for material resistance governed by yielding failure of the steel is

A	1.10
B	1.15
C	1.20
D	1.50

Answer Key: **A**

Q10 : A solid steel plate having yield strength of 250 MPa, the design strength in yielding (N/mm^2) is

A	200
B	217
C	227
D	250

Answer Key: **C**

Q11 : A plate of size 100 mm x 10 mm having yield strength of 250 MPa, the design strength of plate in yielding of the cross-section is

A	167 kN
B	200 kN
C	217 kN
D	227 kN
Answer Key: **D**	

Q12 :	The Indian Standard (IS) 800: 2007 divides various compression member cross-sections into how many buckling classes?
A	1
B	2
C	3
D	4
Answer Key: **D**	

Q13 :	As per the Indian Standard (IS) 800 : 2007, with respect to serviceability and when transverse stiffeners are not provided, the d/t_w ratio of the web should be less than or equal to (depth of web = d; thickness of web = t_w; and yield stress ratio of web = ε_w)
A	400 ε_w
B	250 ε_w
C	200 ε_w
D	150 ε_w
Answer Key: **C**	

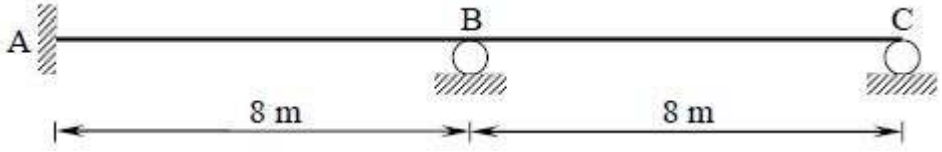
Q14 :	In the design of a base plate, the bearing strength of concrete as per the Indian Standard (IS) 800 : 2007, is taken as (f_{ck} is characteristic strength of concrete)
A	0.4 f_{ck}
B	0.45 f_{ck}
C	0.5 f_{ck}
D	0.60 f_{ck}
Answer Key: **B**	

Q15 :	The Indian Standard (IS) 800 : 2007 recommends, in taking advantage of reduced design forces, that the purlins be designed as

A	continuous beams
B	simply-supported beams
C	cantilever beams
D	tension members
Answer Key: **A**	

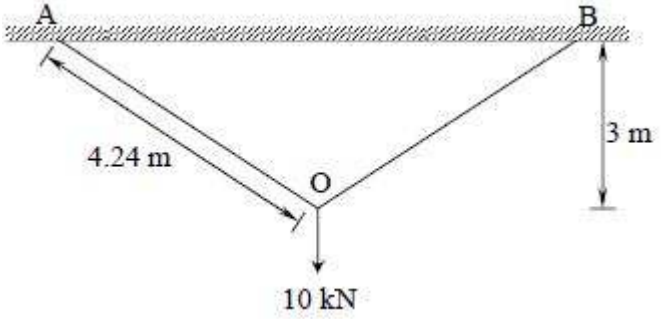
Q16 :	The principal rafter of roof truss is inclined at an angle of 15^{o}. No access is provided except maintenance. The roof is subjected to imposed load of 0.75 kN/m^2, the design imposed load is
A	1.50 kN/m^2
B	0.75 kN/m^2
C	0.65 kN/m^2
D	0.40 kN/m^2
Answer Key: **C**	

Q17 :	The plastic modulus of rectangular beam of width 200 mm and depth 400 mm is
A	2×10^6 mm^3
B	5.33×10^6 mm^3
C	8×10^6 mm^3
D	1.07×10^9 mm^3
Answer Key: **C**	

Q18 :	The stiffness matrix for the beam shown in the following figure is 
A	$\frac{EI}{4}\begin{bmatrix} 4 & 1 \\ 1 & 4 \end{bmatrix}$
B	$\frac{EI}{4}\begin{bmatrix} 4 & 1 \\ 1 & 2 \end{bmatrix}$

C	$\frac{EI}{2}\begin{bmatrix}4 & 1\\ 1 & 2\end{bmatrix}$
D	$\frac{EI}{2}\begin{bmatrix}4 & 1\\ 1 & 4\end{bmatrix}$
Answer Key: **B**	

Q19: Using strain energy method, the vertical deflection at O is (take modulus of elasticity, E = 2 x 10^5 N/mm^2, cross-sectional area of wire, A = 100 mm^2).



A	2.12 mm
B	21.2 mm
C	1.50 mm
D	15.0 mm
Answer Key: **A**	

Q20: If m is number of members; r is reactions; and j is number of joints then in case of a planar structure, $3m + r < 3j$ leads to

A	stable structure
B	determinate structure
C	unstable structure
D	indeterminate structure
Answer Key: **C**	

Q21: The Ryve's formula to determine the design discharge from catchment is given by (constant depending on nature of the catchment and location = C; catchment area in square kilometers = A)

A	$CA^{3/2}$
B	$CA^{2/3}$
C	$AC^{3/2}$

D	$AC^{2/3}$

Answer Key: **B**

Q22:	Maximum shear stress for rectangular section is (total transverse shear at the section = V; entire cross-sectional area = A)
A	$\frac{3V}{A}$
B	$\frac{2V}{3A}$
C	$\frac{3V}{2A}$
D	$\frac{V}{2A}$

Answer Key: **C**

Q23:	Maximum deflection at the mid-span of a simply-supported beam of span l, with uniformly distributed load (w) all over the beam span, and flexural rigidity EI, is (modulus of elasticity = E; moment of inertia of beam = I)
A	$\frac{5wl^4}{48EI}$
B	$\frac{5wl^4}{384EI}$
C	$\frac{wl^3}{48EI}$
D	$\frac{wl^3}{3EI}$

Answer Key: **B**

Q24:	In PERT analysis of a project having large number of activities in its critical path, which of the following assumption is correct?
A	Both activity durations and project completion time follow β - distribution
B	Both activity durations and project completion time follow normal distribution

C	Activity durations follow normal distribution, but project completion time follows β - distribution
D	Activity durations follow β - distribution, but project completion time follows normal distribution
Answer Key: **D**	

Q25: Latest start of an activity is always	
A	greater than or equal to latest event times of all the preceding nodes
B	less than or equal to earliest event times of all the preceding nodes
C	equal to the latest event times of all the preceding nodes
D	equal to the earliest event time of all the preceding nodes
Answer Key: **A**	

Q26: Downtime of an equipment is	
A	the time when equipment shall have to be returned to the owner due to expiry of its lease period
B	the period of time when equipment is idle for want of work
C	the period of time that the equipment fails to provide or perform its primary function
D	the time when contractor has to do the down payment before taking equipment on rent
Answer Key: **C**	

Q27: Among the following excavators, the most suitable excavator for dredging purposes will be	
A	back hoe
B	front shovel
C	scraper
D	dragline
Answer Key: **D**	

Q28: Physical life of an equipment is defined as	
A	age at which the equipment is worn out and it can no longer reliably produce

B	the life over which the equipment can earn a profit
C	time period that maximizes the profit over the equipment life
D	age at which depreciation cost exceeds the purchase cost
Answer Key: **A**	

Q29:	Outriggers are used for
A	crawler mounted mobile cranes to enhance its stability
B	wheel mounted mobile cranes to enhance its stability
C	fixing the lattice boom in a crane
D	fixing the telescopic boom in a crane
Answer Key: **B**	

Q30:	The relationship between the capital recovery factor and sinking fund factor in a uniform series of payments is given by
A	Capital recovery factor = Sinking fund factor - Interest rate
B	Capital recovery factor = Sinking fund factor - $(\text{Interest rate})^2$
C	Capital recovery factor = Sinking fund factor + $(\text{Interest rate})^2$
D	Capital recovery factor = Sinking fund factor + Interest rate
Answer Key: **D**	

Q31:	A recurring deposit of Rs. 5000 per month for 12 installments will grow to _____ at the end of 12 months for the given nominal interest rate of 12 percent, but compounded monthly (consider deposit being done on the last day of the month and also accrual of interest being calculated on the last day of the month).
A	Rs. 60,000
B	Rs. 62,834
C	Rs. 63,413
D	Rs. 64,047
Answer Key: **C**	

Q32:	While comparing alternatives of different lives, most preferred method would be
A	net present worth analysis

B	net future worth analysis
C	net annual worth analysis
D	break even analysis
Answer Key: **C**	

Q33 :	Earnest money is generally asked to be deposited
A	at the time of purchase of tender document
B	at the time of submission of bid
C	by the successful bidder after he gets the letter of acceptance
D	at the time of entering the agreement
Answer Key: **B**	

Q34 :	A contractor agreed to build 30 temporary sheds in 90 days at a price of Rs. 10000/unit. Twenty days later, the contractor has finished 8 sheds with an actual total cost of Rs. 85000. What is the status of the project?
A	The project is time and cost overrun
B	The project is time overrun and cost under run
C	The project is time under run and cost overrun
D	The project is time and cost under run
Answer Key: **C**	

Q35 :	If the excavation of earth is done manually then it costs Rs. 80 per m^3. A Machine can excavate at a fixed cost of Rs. 60000 plus a variable cost of Rs. 20 per m^3. The quantity of earth for which the cost of excavation by machine will be equal to the cost by manual excavation is
A	500 m^3
B	1000 m^3
C	1500 m^3
D	2000 m^3
Answer Key: **B**	

Q36 :	A solution has 100 mg/L NH_3 and 100 mg/L glucose. Calculate theoretical oxygen demand of this solution?
A	483.14 mg/L

B	106.67 mg/L
C	400 mg/L
D	350 mg/L
Answer Key: **A**	

Q37:	Say a raw wastewater sample from AA WWTP has 5-day BOD equals to 2000 mg/L (reaction constant k = 0.23/day at 20^{o}C). Calculate value of ultimate BOD?
A	2826 mg/L
B	2296 mg/L
C	2000 mg/L
D	2926 mg/L
Answer Key: **D**	

Q38:	Calculate pOH of a buffer solution containing 0.02M acetic acid and 0.02M sodium acetate? (given pKa = 4.74)
A	9.0
B	6.0
C	9.26
D	4.0
Answer Key: **C**	

Q39:	Identify coagulant with highest power for coagulating positive colloids: $FeCl_3$; Na_3SO_4; $C_6H_{12}O_6$; Na_3PO_4
A	$FeCl_3$
B	Na_3SO_4
C	$C_6H_{12}O_6$
D	Na_3PO_4
Answer Key: **D**	

Q40:	A treated wastewater (initial contaminant concentration, flow rate = 5C, 0.2Q) enters a stream (initial concentration, flow rate = 0.01C, Q). Calculate contaminant concentration in stream immediately after mixing of wastewater with stream water?
A	0.84C

B	0.04C
C	1.0Q
D	1.2Q
Answer Key: **A**	

Q41:	What is the remaining percentage of pathogens after 1 minute of contact time during chlorination? (Assume K = 0.046/min).
A	90%
B	95.50%
C	99%
D	88%
Answer Key: **B**	

Q42:	Calculate number of moles of oxygen required for reacting with one mole of ammonium ions to convert to nitrate ions?
A	2
B	2.5
C	3
D	4
Answer Key: **A**	

Q43:	An experiment shows that a concentration of 0.1 g/m^3 of free available chlorine yield a 99% kill of bacteria in 8 minutes. Calculate disinfection rate constant (1 /min)? Assume that Chick's Law and Watson's Law hold with n = 1.
A	0.4706 /min
B	0.2056 /min
C	0.7056 /min
D	0.5756 /min
Answer Key: **D**	

Q44: Look at the following relationship between concentration of free residual chlorine and contact time required for 99% kill (Watson's Law: $C^{0.86} t_p = \lambda$ (constant) for different pathogens).

Pathogen type	Adenovirus 3	*E.coli*	Coxsackievirus A2	AA
λ (constant)	0.098	0.24	6.3	0.110

Which pathogen has maximum resistance for chlorination?

A	E.coli
B	Adenovirus
C	Coxsackievirus A2
D	AA

Answer Key: **C**

Q45: Determine maximum adsorption capacity of alumina (Langmuir isotherm: $Q = [22C_t]/[1+35C_t]$ where Q is mol Anthracene/kg alumina; C_t = mol Anthracene/L liquid)?

A	0.02 mol/kg
B	0.629 mol/kg
C	375 L/mol
D	22 mol/kg

Answer Key: **B**

Q46: Look at the following table:

Non carbonate hardness	92 mg/L as $CaCO_3$	Total magnesium	15 mg/L
Alkalinity	68 mg/L as $CaCO_3$	Desired total hardness in water	80 mg/L as $CaCO_3$
Residual carbonate hardness (cannot be removed)	35 mg/L as $CaCO_3$		

Calculate amount of magnesium hardness (in mg/L as $CaCO_3$)?

A	31.25 mg/L as $CaCO_3$
B	3.12 mg/L as $CaCO_3$
C	10 mg/L as $CaCO_3$
D	100 mg/L as $CaCO_3$

Answer Key: **A**

Q47: Calculate contribution of removal of phosphorous in primary settling tank to overall removal in wastewater treatment plant? Plant schematic is: Influent water → Primary settling tank → Biological aeration tank → Secondary settling tank → Effluent water.

Parameter	Influent water	After settling (i.e. influent to aeration tank)	Effluent water
phosphorous	7 mg/L	6 mg/L	5 mg/L

A	40%
B	45%
C	50%
D	52%
Answer Key: **C**	

Q48: A wastewater treatment plant disposes of its effluent in a surface stream. Characteristics of the stream and effluent are shown below.

Parameter	wastewater	Stream water	Wastewater mix stream water
Flow (m^3/s)	0.2	4	
Dissolved oxygen, mg/L	1	7	
BOD5 at 20°C, mg/L	100	2	
Oxygen consumption rate (K1 at 20°C) (1/day)	0.2	0.2	0.23
Oxygen reaeration rate (K2 at 20°C) (1/day)	–	0.3	0.3

For 20°C stream water temperature, equilibrium concentration of oxygen = 9.17 mg/L.
Assuming no temperature correction is required, answer the following:
Calculate ultimate BOD of wastewater and stream water mix water?

A	8.5 mg/L
B	9 mg/L
C	9.5 mg/L
D	9.76 mg/L
Answer Key: **D**	

Q49: An anaerobic reactor, operated at 35°C, treats wastewater with a flow of 200 m^3/d and a biological soluble COD (bsCOD) concentration of 500 g/m^3. At 90% bsCOD removal and a biomass synthesis yield of 0.04 g Volatile Suspended Solids/ g bsCOD used, calculate amount of COD consumed (in kg/d)?

A	90
B	100
C	50
D	110
Answer Key: **A**	

Q50: Lake water contains phosphate ions. Which specie would be formed if ferric ions in form of ferric chloride are added in lake water?

A	Sodium chloride
B	Ferric chloride
C	Ferric phosphate
D	Ferrous hydroxide
Answer Key: **C**	

Q51:	Order 4 solutions in decreasing order of their BOD values?
A	Industrial water > river water > tap water > bottled water
B	Tap water > bottled water > river water > industrial water
C	Bottled water > tap water > river water > industrial water
D	River water > industrial water > tap water > bottled water
Answer Key: **A**	

Q52:	Order 4 disinfectants in increasing order of their disinfection power?
A	Ozone < HOCl < monochloramine < NCl_3
B	Ozone < NCl_3 < Monochloramine < HOCl
C	NCl_3 < HOCl < Monochloramine < Ozone
D	NCl_3 < Monochloramine < HOCl < Ozone
Answer Key: **D**	

Q53:	A soil sample having a void ratio of 1.3, water content of 50% and a specific gravity of 2.60, is in a state of
A	partial saturation
B	full saturation
C	over saturation
D	under saturation
Answer Key: **B**	

Q54:	Given for a sample of a river sand: Void ratio at the densest state = 0.40 Void ratio at the loosest state = 1.20 Which one of the following correctly represents the relative density of a sample prepared

	with a void ratio of 1.0?
A	12.5 %
B	25 %
C	75 %
D	87.5 %
Answer Key: **B**	

Q55:	Which one of the following equations correctly gives the relationship between the specific gravity of soil grains (G) and the hydraulic gradient (i) to initiate 'quick' condition in sand having a void ratio of 0.5?
A	$G = 0.5i + 1$
B	$G = i + 0.5$
C	$G = 1.5i + 1$
D	$G = 1.5i - 1$
Answer Key: **C**	

Q56:	A flownet of a cofferdam foundation has 6 flow channels and 18 equipotential drops. The head loss during seepage is 6 m. If the coefficient of permeability of soil is 4×10^{-5} m/min, then the seepage loss (m^3/day) is
A	72
B	8
C	0.115
D	1.037
Answer Key: **C**	

Q57:	A concentrated load of 50 kN acts vertically at a point on the soil surface. If Boussinesq's equation is applied for computation of stress, then the ratio of vertical stresses at depths of 3 m and 5 m respectively vertically below the point of application of load is
A	0.36
B	0.60
C	1.66
D	2.77
Answer Key: **D**	

Q58:	While increasing the pressure to 150 kPa from 50 kPa, the change in void ratio of soil is observed as 0.12 in a consolidation test. The compression index of soil is
A	0.03
B	0.06
C	0.25
D	0.19
Answer Key: **C**	

Q59:	For a certain loading condition, a saturated clay layer undergoes 40% consolidation in a period of 178 days. What would be the additional time required for further 20% consolidation to occur?
A	89 days
B	222.5 days
C	267 days
D	400.5 days
Answer Key: **B**	

Q60:	A slope is to be constructed at an angle of 30^{o} to the horizontal from a soil having the properties, c = 15 kN/m^2, γ = 19 kN/m^3. Taylor's stability number is 0.046. If a factor of safety (with respect to cohesion) of 1.5 is required, then the safe height of the slope will be
A	25.7 m
B	17.2 m
C	12.8 m
D	11.4 m
Answer Key: **D**	

Q61:	Consider the following statements: 1. A recovery ratio of less than 1 implies that the soil has compressed. 2. A recovery ratio of greater than 1 implies that the soil has swelled. 3. A recovery ratio of less than 1 implies that the soil has swelled. 4. A recovery ratio of greater than 1 implies that the soil has compressed. Which of these statements is/are correct?
A	1 and 2
B	1 only

C	3 and 4
D	4 only
Answer Key: **A**	

Q62:	A soil has an angle of shearing of 30^o and cohesion of 35 kN/m^2. If the specimen of this soil is subjected to a tri-axial compression test, then the value of lateral pressure in the cell for failure to occur at total stress of 300 kN/m^2 will be
A	243.21 kN/m^2
B	44.41 kN/m^2
C	103.21 kN/m^2
D	59.59 kN/m^2
Answer Key: **D**	

Q63:	An earth-retaining structure may be subjected to the following lateral earth pressures: 1. Earth pressure at rest; 2. Passive earth pressure; 3. Active earth pressure. The correct sequence of the increasing order of magnitudes of these pressures is
A	3, 2, 1
B	1, 3, 2
C	1, 2, 3
D	3, 1, 2
Answer Key: **D**	

Q64:	A retaining wall retains a sand strata with $\phi = 30^o$ up to its top. If a uniform surcharge of 12 t/m^2 is subsequently put on the sand strata, then the increase in the lateral earth pressure intensity on the retaining wall will be
A	0 t/m^2
B	4 t/m^2
C	6 t/m^2
D	12 t/m^2
Answer Key: **B**	

Q65	Consider the following statements associated with local shear failure of soils: 1. Failure is sudden with well-defined ultimate load.

:	2. This failure occurs in highly compressible soils. 3. Failure is preceded by large settlement. Which of these statements are correct ?
A	1, 2 and 3
B	1 and 2
C	2 and 3
D	1 and 3
Answer Key: **C**	

Q66 :	For a proposed building, raft foundation, isolated footings and combined footings are being considered. These foundations are to be listed in the decreasing order of preference in terms of performance. Which one of the following is the correct order of listing ?
A	Raft foundation - Combined footings - Isolated footings
B	Isolated footings - Raft foundations - Combined footings
C	Combined footings - Raft foundations - Isolated footings
D	Combined footings - Isolated footings - Raft foundations
Answer Key: **A**	

Q67 :	Consider the following statements regarding negative skin friction in piles: 1. It is developed when the pile is driven through a recently deposited clay layer. 2. It is developed when the pile is driven through a layer of dense sand. 3. It is developed due to a sudden drawdown of the water table. Which of these statements is /are correct ?
A	1 alone
B	2 alone
C	2 and 3
D	1 and 3
Answer Key: **D**	

Q68 :	A square pile of section 30 cm x 30 cm and length 10 m penetrates a deposit of clay having c = 50 kN/m^2 and the adhesion factor = 0.8. The load carried by the pile shaft only is
A	1920 kN
B	750 kN
C	600 kN

D	480 kN
Answer Key: **D**	

Q69 The natural frequency of a system increases with **:**	
A	an increase in the stiffness of the system
B	a decrease in the mass of the system
C	both increase in the stiffness of the system and decrease in the mass of the system
D	neither increase in the stiffness of the system nor decrease in the mass of the system
Answer Key: **C**	

Q70 Which of the following is true in case of railway track maintenance ? **:**	
A	Claw bar is used to correct track alignment while crow bar is used to remove dog spikes
B	Crow bar is used to correct track alignment while claw bar is used to remove dog spikes
C	Only claw bar can be used to correct track alignment and remove dog spikes
D	Only crow bar can be used to correct track alignment and remove dog spikes
Answer Key: **B**	

Q71 Choice of gauge depends on **:**	
A	volume of traffic only
B	speed of train only
C	neither (volume of traffic) nor (speed of train)
D	both (volume of traffic) and (speed of train)
Answer Key: **D**	

Q72 Switch angle depends on **:**	
A	heel divergence only
B	length of tongue rail only
C	neither (heel divergence) nor (length of tongue rail)

D	both (heel divergence) and (length of tongue rail)
Answer Key: **D**	

Q73 The reception signal is **:**	
A	outer signal only
B	starter only
C	neither (outer signal) nor (starter)
D	both (outer signal) and (starter)
Answer Key: **A**	

Q74 As per ICAO, for A, and B type of airports, maximum effective grade is **:**	
A	1.75%
B	1.5%
C	1.25%
D	1%
Answer Key: **D**	

Q75 The capacity of parallel runway system depends primarily on **:**	
A	lateral spacing between two runways
B	distance from terminal
C	slopes of adjacent areas
D	length of runways
Answer Key: **A**	

Q76 The basic runway length should be increased at the rate of X percent per Y m rise in elevation above mean sea level, where. **:**	
A	X = 6; Y = 200
B	X = 7; Y = 300
C	X = 7; Y = 200
D	X = 6; Y = 300

Answer Key: **B**

Q77 Wind rose diagram is used for the purpose of deciding :

A	runway orientation
B	runway capacity
C	runway cross-section
D	location of taxiways

Answer Key: **A**

Q78 Among various stages of survey in highway alignment, the correct sequence is :

A	reconnaissance, map study, and preliminary survey
B	reconnaissance, map study, and detailed survey
C	map study, reconnaissance, preliminary survey and detailed survey
D	none of these are correct

Answer Key: **C**

Q79 Reaction time of driver increases with :

A	increase in vehicle length
B	decrease in vehicle speed
C	increase in vehicle speed
D	decrease in vehicle length

Answer Key: **C**

Q80 Enoscope is used to find :

A	space-mean speed only
B	spot speed only
C	spot speed and space-mean speed
D	flow of vehicles only

Answer Key: **B**

Q81 Desire lines are plotted in **:**	
A	origin and destination studies
B	speed studies
C	axle load studies
D	none of these are correct
Answer Key: **A**	

Q82 The length of transition curve is dependent on **:**	
A	rate of change of superelevation
B	rate of change of centrifugal acceleration
C	both rate of change of superelevation and rate of change of centrifugal acceleration
D	neither rate of change of superelevation nor rate of change of centrifugal acceleration
Answer Key: **C**	

Q83 Which of the following is used in a regular pavement maintenance activity? **:**	
A	Tack coat
B	Prime coat
C	Fog seal
D	None of these are correct
Answer Key: **C**	

Q84 The flow-mass curve is graphical representation of **:**	
A	cumulative discharge and time
B	discharge and percentage probability of flow being equaled or exceeded
C	cumulative discharge, volume and time in chronological order
D	discharge and time in chronological order
Answer Key: **C**	

Q85: Instantaneous unit hydrograph is a hydrograph of	
A	unit duration
B	unit rainfall excess infinitely small duration
C	unit rainfall excess infinitely long duration
D	zero effective rainfall
Answer Key: **B**	

Q86: For a catchment area of 120 km^2, the equilibrium discharge in m^3/hour of an S-curve obtained by the summation of 6 hour unit hydrograph is	
A	0.2×10^6
B	0.6×10^6
C	2.4×10^6
D	7.2×10^6
Answer Key: **A**	

Q87: In India, which of the following is adopted as standard recording raingauge?	
A	Symon's raingauge
B	Tipping bucket type
C	Syphon type
D	Weighing bucket type
Answer Key: **C**	

Q88: The maximum average depth due to one day storm over an area of 100 km^2 is 100 mm. Depth-Area-Duration (DAD) curves indicate that for the same area of 100 km^2 the maximum average depth for a 3 hour storm will be	
A	100 mm
B	more than 100 mm
C	less than 100 mm
D	none of these are correct
Answer Key: **B**	

Q89 The most suitable chemical which can be applied to the water surface for reducing evaporation is

:

A	methyl alcohol
B	ethyl alcohol
C	cetyl alcohol
D	butyl alcohol

Answer Key: **C**

Q90 Seepage through embankments in an earthen dam is controlled by
:

A	drainage filters
B	relief wells
C	drain trenches
D	provision of downstream berms

Answer Key: **C**

Q91 The flow of water after spilling over the weir crest in chute spillway respectively are
:

A	at right angle and parallel to weir crest
B	parallel and at right angle to weir crest
C	parallel to weir crest in both
D	at right angle to weir crest in both

Answer Key: **A**

Q92 Which of the following spillways is least suitable for an earthen dam ?
:

A	Ogee spillway
B	Chute spillway
C	Side channel spillway
D	Shaft spillway

Answer Key: **A**

Q93 The discharge passing over an ogee spillway is given by
(where, L is effective length of spillway crest and H is the total head over the spillway

:	crest including velocity head.)
A	$CLH^{3/2}$
B	$CHL^{3/2}$
C	$CLH^{5/2}$
D	$CLH^{1/2}$
Answer Key: **A**	

Q94 :	Which of the following methods is used to estimate flood discharge based on high water marks left over in the past ?
A	slope-area method
B	area-velocity method
C	moving boat method
D	ultra-sonic method
Answer Key: **A**	

Q95 :	If the Froude number of a hydraulic jump is 5.50, it can be classified as
A	an oscillating jump
B	a weak jump
C	a strong jump
D	a steady jump
Answer Key: **D**	

Q96 :	In a Canal Syphon type Cross Drainage Work
A	canal bed is below the drain
B	canal bed is above the drain
C	canal bed and the drain at the same level
D	canal and the drain crossing at right angles
Answer Key: **B**	

Q97 :	For a discharge of 2.01 m^3/s and silt factor f=0.85 using Lacey's theory, the velocity is

A	0.467 m/s
B	2.567 m/s
C	4.667 m/s
D	6.777 m/s
Answer Key: **A**	

Q98 Water requirement for the crops is equal to **:**	
A	Consumptive use
B	Consumptive use + Application loss
C	Consumptive use + Application loss + Special needs for land preparation, transplantation
D	Consumptive use + Application loss + Surface runoff
Answer Key: **C**	

Q99 Gram crop has a Kor period of 18 days and Kor depth of 12 cm. The duty of the gram is **:**	
A	520 ha/cumec
B	790 ha/cumec
C	960 ha/cumec
D	1296 ha/cumec
Answer Key: **D**	

Q100 The permeability of an aquifer **:**	
A	increases with increase in temperature
B	increases with the decrease in temperature
C	is independent of temperature
D	decreases with the decrease in temperature
Answer Key: **B**	

State Engineering (Prelims) Exam – 2016

(Provisional Model Answer Key)

Mechanical Engineering

Q1: The equivalent bending moment under combined action of bending moment M and torque T is	
A	$\sqrt{M^2 + T^2}$
B	$\frac{1}{2}\sqrt{M^2 + T^2}$
C	$M + \sqrt{M^2 + T^2}$
D	$\frac{1}{2}(M + \sqrt{M^2 + T^2})$
Answer Key: **D**	

Q2: $\frac{PL^3}{3EI}$ is the deflection under the load 'P' of a cantilever beam (Length 'L', Modulus of elasticity 'E' and Moment of inertia 'I'). The strain energy due to bending is	
A	$\frac{P^2L^3}{3EI}$
B	$\frac{P^2L^3}{6EI}$
C	$\frac{P^2L^3}{4EI}$
D	$\frac{P^2L^3}{48EI}$
Answer Key: **B**	

Q3: The outside diameter of a hollow shaft is twice of it's inside diameter. The ratio of its torque carrying capacity of that of a solid shaft of the same material and same outside diameter is	
A	15/16

B	3/4
C	1/2
D	1/16
Answer Key: **A**	

Q4 :	A square bar of side 4 cm and length 100 cm is subjected to axial load P. The same bar is then used as a cantilever beam and subjected to an end load P. The ratio of the strain energies, stored in the bar in the second case to that stored in first case, is
A	16
B	400
C	1000
D	2500
Answer Key: **D**	

Q5 :	Which theory of failure is applicable for copper components under steady load?
A	Principal stress theory
B	Strain energy theory
C	Maximum shear stress theory
D	Principal strain theory
Answer Key: **C**	

Q6 :	The bucking load for a column one end fixed and other end free is 10kN. If both ends of this column is fixed, then what would be the buckling load capacity of this column ?
A	10 kN
B	20 kN
C	80 kN
D	160 kN
Answer Key: **D**	

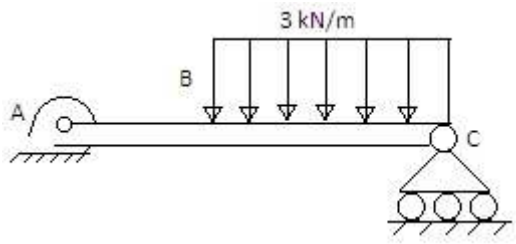
Q7:	In a laminated spring the strips are provided in different lengths for
A	Equal distribution of stress
B	Equal distribution of strain energy
C	Reduction in weight
D	All are correct
Answer Key: **A**	

Q8:	Wire diameter, mean coil diameter and number of turns of a closely-coiled steel spring are d, D and N respectively and stiffness of the spring is K. A second spring is made of same steel but with wire diameter, mean coil diameter and number of turns 2d, 2D and 2N respectively. The stiffness of the new spring is
A	K
B	2K
C	4K
D	8K
Answer Key: **A**	

Q9:	Hoop stress in a thin cylinder of a diameter 'd' and thickness 't' subjected to pressure 'P' will be
A	$\frac{Pd}{4t}$
B	$\frac{Pd}{2t}$
C	$\frac{2Pd}{t}$
D	$\frac{Pd}{t}$
Answer Key: **B**	

Q10	A mass less beam has a loading pattern as shown in Fig. The beam is of rectangular cross-section with a width of 30 mm and height of 100 mm

:



The maximum bending moment occurs at

A	Location B
B	2500 mm to the right of A
C	2675 mm to the right of A
D	3225 mm to the right of A

Answer Key: **B**

Q11 Instantaneous center of a body rolling with sliding on a stationary curved surface lies :

A	At the point of contact
B	On the common tangent at the point of contact
C	On the common normal at the point of contact
D	None of these are correct

Answer Key: **C**

Q12 When a slider moves with a velocity 'v' on a link rotating at an angular speed of 'ω' the coriolis component of acceleration is given by :

A	$\sqrt{2v/\omega}$
B	v ω
C	v ω/2
D	2v ω

Answer Key: **D**

Q13 In spur gears, the circle on which the involute is generated is called

:	
A	Pitch circle
B	Clearance circle
C	Base circle
D	Addendum circle
Answer Key: **A**	

Q14 :	In a simple gear train, if the number of idler gear is odd, then the direction of motion of driven gear will
A	be same as that of the driving gear
B	be opposite to the driving gear
C	depend upon the number of teeth on both gears
D	depend upon the size of the gears
Answer Key: **A**	

Q15 :	The choice of displacement diagram during the rise or return of a follower of a cam-follower mechanism is based on dynamic considerations. For high speed cam, follower will have which one of the following
A	Cycloidal motion
B	Simple harmonic motion
C	Parabolic or uniform acceleration motion
D	Uniform motion or constant velocity motion
Answer Key: **A**	

Q16 :	Which one of the following can completely balance several masses revolving in different planes on a shaft ?
A	A single mass in any one plane
B	A single mass in one of the planes of the revolving masses
C	Two masses in any two planes
D	Two equal masses in any planes

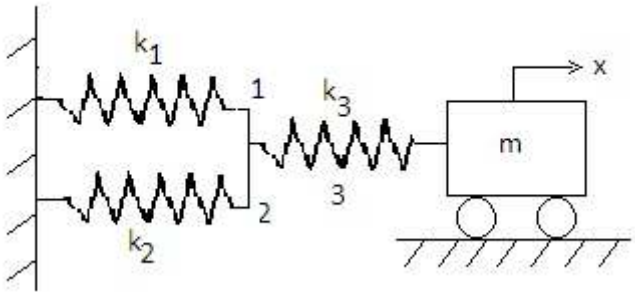
Answer Key: **C**

Q17 : The primary distributing force due to inertia of reciprocating parts of mass 'm' at radius 'r' rotating with an angular velocity 'ω' is given by

A	$m\,\omega^2\,r\sin\theta$
B	$m\,\omega^2\,r\cos\theta$
C	$m\,\omega^2\,r\sin\left(\frac{2\theta}{n}\right)$
D	$m\,\omega^2\,r\cos\left(\frac{2\theta}{n}\right)$

Answer Key: **B**

Q18 :



Which one of the following is the correct value of the natural frequency (ω_n) of the system given above ?

A	$\left[\frac{1}{\left\{\frac{1}{k_1+k_2}+\frac{1}{k_3}\right\}m}\right]^{\frac{1}{2}}$
B	$\left(\frac{3k}{m}\right)^{\frac{1}{2}}$
C	$\left(\frac{k}{2m}\right)^{\frac{1}{2}}$
D	$\left[\frac{k_3+\left[\frac{1}{\frac{1}{k_1}+\frac{1}{k_2}}\right]}{m}\right]^{\frac{1}{2}}$

Answer Key: **A**

Q19 : A shaft carries a weight 'w' at the centre. The CG of the weight is displaced by an amount 'e' from the axis of the rotation. If 'y' is the additional displacement of the CG from the axis of rotation due to the centrifugal force, then the ratio of 'y' to e (where 'ω_c' is the critical speed of shaft and ω is the angular speed of shaft) is given by

A	$\frac{1}{\left[\frac{\omega_c}{\omega}\right]^2+1}$
B	$\frac{1}{\left[\frac{\omega_c}{\omega}\right]^2-1}$
C	$\left[\frac{\omega_c}{\omega}\right]^2+1$
D	$\left[\frac{\omega_c}{\omega}\right]^2-1$

Answer Key: **B**

Q20 : The effect of gyroscopic couple on rolling of ships is

A	Very high
B	Very low
C	No effect
D	Moderate

Answer Key: **C**

Q21 : A transmission shaft subjected to bending loads must be designed on the basis of

A	Maximum shear stress theory
B	Fatigue strength
C	Maximum normal stress and maximum shear stress theories
D	Maximum normal stress theory

Answer Key: **D**

Q22:	The design calculations for members subject 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 are correct
Answer Key: **C**	

Q23:	Stress concentration in a machine component of ductile materials is not so harmful as it is in brittle materials because
A	In ductile materials local yielding may distribute stress concentration
B	Ductile materials have large Young's modulus
C	Poisson's ratio is larger in ductile materials
D	Modulus of rigidity is larger in ductile materials
Answer Key: **A**	

Q24:	The power transmitted by a belt is dependent on the centrifugal effect in the belt . The maximum power can be transmitted when the centrifugal tension is
A	1/3 of the tension (T_1) on the tight side
B	1/3 of the total tension (T_t) on the tight side
C	1/3 of the tension (T_2) on the slack side
D	1/3 of the tension (T_1) and (T_2)
Answer Key: **B**	

Q25:	The permissible stress in fillet weld is 100 N/mm^2 . The fillet weld has equal leg lengths of 15 mm each. The allowable shearing load on per cm length of the weld is
A	22.5 kN
B	15.0 kN
C	10.6 kN

D	7.5 kN
Answer Key: **C**	

Q26: The shearing area of a Key of length 'L' breadth 'b' depth 'h' is equal to	
A	b X h
B	L X h
C	L X b
D	$L \times \frac{h}{2}$
Answer Key: **C**	

Q27: In the calculation of induced shear stress in the helical springs, the wahl's correction factor is used to take of	
A	combined effect of transverse shear stress and bending stress in wire
B	combined effect of bending stress and curvature of wire
C	combined effect of transverse shear stress and curvature of wire
D	combined effect of torsional shear stress & transverse shear stress of wire
Answer Key: **C**	

Q28: Which sunk key is made from a segment of a circular disc of uniform thickness, known as	
A	Feather key
B	Kennedy key
C	Woodruff key
D	Saddle key
Answer Key: **C**	

Q29: How can shock absorbing capacity of a bolt be increased	
A	By tightening it properly

B	By increasing the shank diameter
C	By grinding the shank
D	By making the shank diameter equal to the core diameter of thread
Answer Key: **D**	

Q30 :	In a fillet welded joint, the weakest area of the weld is :
A	toe
B	throat
C	root
D	face
Answer Key: **B**	

Q31 :	The rake angle of a cutting tool is 10^{o},shear angle 35^{o} and cutting velocity 25 m/min. What is the chip velocity along tool face?
A	1.9 m/min
B	3.9 m/min
C	7.9 m/min
D	15.8 m/min
Answer Key: **D**	

Q32 :	In abrasive jet machining as the distance between nozzle tip and the work surface increases, the material removal rate
A	Increases continuously
B	Decreases continuously
C	Decreases, becomes stable & then increases
D	Increases, becomes stable & then decreases
Answer Key: **D**	

Q33:	As tool and work are not in contact in EDM process
A	no relative motion occurs between them
B	no wear of tool occurs
C	no power is consumed during metal cutting
D	no force between tool and work occurs
Answer Key: **D**	

Q34:	A 50 mm diameter disc is to be punched out from a carbon steel sheet 1.0 mm thick. The diameter of the punch should be
A	42.925 mm
B	50.00 mm
C	50.075 mm
D	None of these are correct
Answer Key: **D**	

Q35:	3-2-1 method of location of jig or fixture would collectively restrict the work piece in 'n' degree of freedom, where the value of 'n' is
A	9
B	6
C	8
D	1
Answer Key: **A**	

Q36:	Auto collimeter is used to check
A	Roughness
B	Flatness
C	Angle

D	Automobile balance
Answer Key: **C**	

Q37 On a triple start, thread screw **:**	
A	Lead = pitch
B	Lead = 3 x pitch
C	Lead = (1/2) x pitch
D	Lead = 9 x pitch
Answer Key: **B**	

Q38 The crater wear of a cutting tool is due to **:**	
A	Chemical action of the coolant
B	Excessive heat generated during cutting
C	Rubbing of tool against workplace
D	Abrasive action of the chip
Answer Key: **D**	

Q39 The primary tool force is used in calculating the total power consumption in machining is **:**	
A	radial force
B	tangential force
C	axial force
D	frictional force
Answer Key: **B**	

Q40 Which one of the following processes does not cause tool wear **:**	
A	Ultrasonic machining

B	Electro discharge machining
C	Laser beam machining
D	Anode mechanical machining
Answer Key: **C**	

Q41:	In a tool life test, doubling the cutting speed reduces the tool life to $(1/8)^{th}$ of the original. The Taylor's tool life index is
A	1/3
B	1/2
C	1/4
D	1/8
Answer Key: **A**	

Q42:	The standard time for an operation has been calculated as 10 minutes. The worker was rated at 80%. If the relaxation and other allowances were 25%, then the normal time would be
A	12.5 min
B	10 min
C	80 min
D	08 min
Answer Key: **D**	

Q43:	An inventory control theory, the economic order quantity (EOQ) is
A	Average level of inventory
B	Optimum lot size
C	Lot size corresponding to break-even analysis
D	Capacity of a warehouse
Answer Key: **B**	

Q44 :	Which of the following method can be used for forecasting the sales potential of a new product
A	Direct survey method
B	Time series analysis
C	Jury executive opinion method
D	Sales force composite method
Answer Key: **A**	

Q45 :	Time estimates of an activity in a PERT network are: optimistic time t_o = 9 days, pessimistic time t_p = 21 days and most likely time t_m = 15 days The approximate probability of completion of this activity in 13 days
A	34%
B	50%
C	16%
D	84%
Answer Key: **C**	

Q46 :	In a queuing problem, if the arrivals are completely random, then the probability distribution of number of arrivals in a given time follows :
A	Poisson distribution
B	Normal distribution
C	Binomial distribution
D	Exponential distribution
Answer Key: **A**	

Q47 :	Which of the following is the measure of forecast error
A	Mean absolute deviation
B	Trend value

C	Moving average
D	Price fluctuation
Answer Key: **A**	

Q48 : Which one of the following is not a technique under Predetermined motion time system(PMTS) ?	
A	Work factor
B	Synthetic data
C	Stopwatch time study
D	MTM
Answer Key: **C**	

Q49 : If in a process on the shop floor, the specification are not met, but the charts for variables show control, then which of the following actions should be taken?	
A	change the process
B	change the method of measurement
C	change the worker or provide him training
D	change the specifications or upgrade the process
Answer Key: **C**	

Q50 : An operating characteristic curve (OC curve) is a plot between	
A	Consumer risk and producer risk
B	Probability of acceptance and probability of rejection
C	Percentage of defective and probability of acceptance
D	Average outgoing quality and probability of acceptance
Answer Key: **C**	

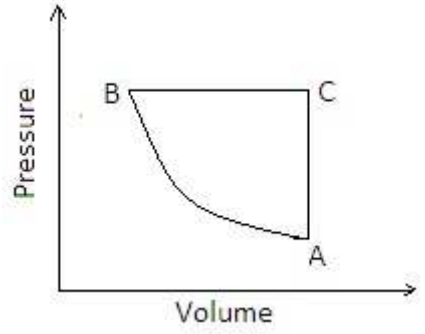
Q51 : Joule-Thomson coefficient is defined as

A	$\left(\frac{\partial T}{\partial P}\right)_h$
B	$\left(\frac{\partial H}{\partial P}\right)_T$
C	$\left(\frac{\partial H}{\partial T}\right)_p$
D	$\left(\frac{\partial P}{\partial T}\right)_h$
Answer Key: **A**	

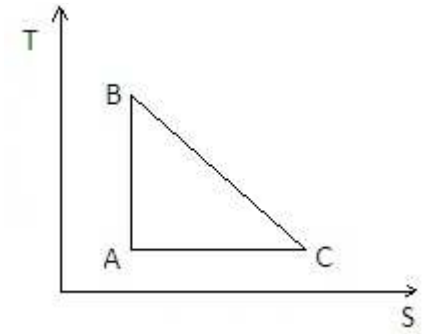
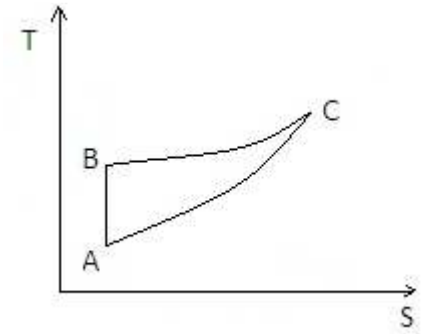
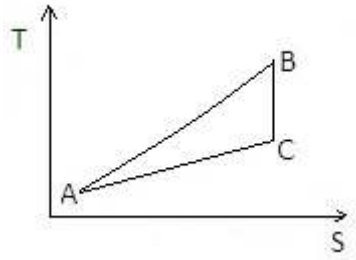
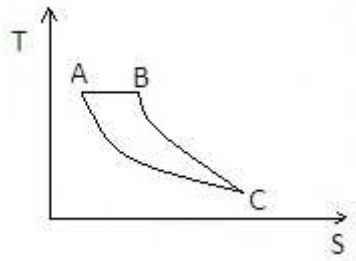
Q52 : The internal energy of a certain system is a function of temperature alone and is given by the formula E = 25+0.25t kJ. If this system executes a process for which the work done by it per degree temperature increases is 0.75 kN-m, $\frac{dE}{dt} = Q\text{-}W$, the heat interaction per degree temperature increase, in kJ, is

A	-1.00
B	1.00
C	-0.50
D	0.50
Answer Key: **B**	

Q53 : A cycle of pressure - volume diagram is shown in the figure



Same cycle on temperature - entropy diagram will be represented by

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

Q54 :	When a system undergoes a process such that $\int \frac{dQ}{T} = 0$ and $\Delta S > 0$, the process is
A	isothermal
B	reversible adiabatic

C	irreversible adiabatic
D	isobaric
Answer Key: **C**	

Q55 :	A heat pump operating on Carnot cycle pumps heat from a reservoir at 300 K to a reservoir at 600 K. The coefficient of performance is
A	1.5
B	0.5
C	2
D	1.0
Answer Key: **C**	

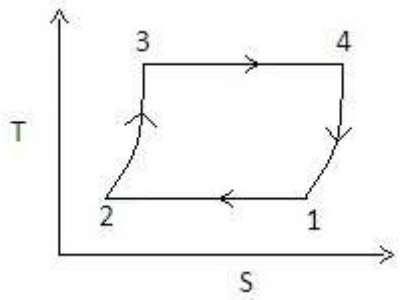
Q56 :	The work done in compromising a gas isothermally is given by:
A	$\frac{\gamma}{\gamma-1}P_1V_1\left[\left(\frac{P_2}{P_1}\right)^{\frac{\gamma-1}{\gamma}}-1\right]$
B	$mRT_1\log_e\frac{P_2}{P_1}$
C	$mC_p(T_2-T_1)$
D	$mRT_1(1-\frac{T_2}{T_1})$
Answer Key: **B**	

Q57 :	Consider the following statements 1)Avaliability is the maximum theoretical work obtainable 2)Clapeyron's equation for dry saturated steam is given by $V_s-V_f=\frac{dT_s}{dP}\left(\frac{h_s-h_f}{T_s}\right)$ 3)A gas can have any temperature at a given pressure unlike a vapour, which has a fixed temperature at a given pressure.

4)Joule Thomson coefficient is expressed as $\mu = \left(\frac{\partial s}{\partial P}\right)_h$ of these statements	
A	1,2,3 are correct
B	1,3 and 4 are correct
C	2 and 3 are correct
D	1,2 and 4 are correct
Answer Key: **C**	

Q58 The heat absorbed or rejected during a polytropic process is equal to **:**	
A	$\left(\frac{\Upsilon - n}{\Upsilon - 1}\right)^{1/2}$ x workdone
B	$\left(\frac{\Upsilon - n}{n - 1}\right)$ x workdone
C	$\left(\frac{\Upsilon - n}{\Upsilon - 1}\right)^{2}$ x workdone
D	$\left(\frac{\Upsilon - n}{\Upsilon - 1}\right)$ x workdone
Answer Key: **D**	

Q59 :



The thermo dynamic cycle shown above on the T-S diagram pertains to which one of the following ?

A	Stirling cycle
B	Ericsson cycle
C	Vapour compression

D	Brayton cycle
Answer Key: **A**	

Q60 :	What is the loss of available energy associated with the transfer of 1000kJ of heat from a constant temperature system at 600K to another at 400K? When the environmental temperature is 300K?
A	140 kJ
B	250 kJ
C	166.67 kJ
D	180 kJ
Answer Key: **B**	

Q61 :	The depth of a fluid is measured in vertical Z-direction; X and Y are the other two directions and are mutually perpendicular. The static pressure variation in the fluid is given by (symbols have the usual meaning).
A	$\frac{dp}{dz} = g$
B	$\frac{dp}{dz} = 0$
C	$\frac{dp}{dz} = \rho g$
D	$\frac{dp}{dz} = -\rho g$
Answer Key: **D**	

Q62 :	Surface tension is due to
A	Cohesion
B	Viscous force
C	Adhesion

D	The difference between adhesive and cohesive force
Answer Key: **A**	

Q63 The density of a fluid is sensitive to changes is pressure. The fluid will be known as **:**	
A	Newtonian fluid
B	Perfect fluid
C	Compressible fluid
D	Real fluid
Answer Key: **C**	

Q64 Is it possible to pump water available at around 100^0C under atmospheric condition using centrifugal **:** pump placed near the tank	
A	No
B	Yes
C	Yes, if pump is selected properly
D	None of these are correct
Answer Key: **A**	

Q65 If the stream function is given by φ=3xy then the velocity at a point (2,3) will be **:**	
A	7.21 unit
B	10.82 unit
C	18 unit
D	54 unit
Answer Key: **B**	

Q66 Why are the surge tanks used in pipe line? **:**	
A	To reduce frictional loss in pipe

B	To ensure uniform flow in pipe
C	To relieve the pressure due to water hammer
D	To reduce cavitalion
Answer Key: **C**	

Q67 : Consider the following statements in respect to Kaplan Turbine: 1) It is a reaction turbine 2) It is an impulse turbine 3) It has adjustable blades	
A	1, 2, and 3
B	2 and 3 only
C	1 and 2 only
D	1 and 3 only
Answer Key: **D**	

Q68 : The degree of reaction of a turbine is defined as a ration of	
A	Static pressure drop to total energy
B	Total energy transfer to static pressure drop
C	Change of velocity energy across the turbine to the total energy transfer
D	Velocity energy to pressure energy
Answer Key: **A**	

Q69 : Eular number is defined as the ratio of inertia force to	
A	Viscous force
B	Elastic force
C	Pressure force
D	Gravity force
Answer Key: **C**	

Q70 : The vanes of a unfrifugal pump are generally	
A	Radial
B	Curved backward
C	Curve forward
D	Twisted
Answer Key: **B**	

Q71 : Heat transfer takes place according to	
A	Zeroth law of thermodynamics
B	First law of thermodynamics
C	Second law of thermodynamics
D	Third law of thermodynamics
Answer Key: **C**	

Q72 : It is desired to increase the heat dissipation rate over the surface of an electronic device of spherical shape of 5mm radius exposed to convection with h=10 W/m^2 K by encasing it in a spherical sheath of conductivity 0.04 W/mK. For maximum heat flow, the diameter of the sheath should be	
A	18 mm
B	16 mm
C	12 mm
D	8 mm
Answer Key: **B**	

Q73 : Heat is lost from a 100 mm diameter steam pipe placed horizontally in ambient at 30^oC. If the Nusselt is 25 and thermal conductivity of air is 0.03 W/mK, then the heat transfer coefficient will be	
A	7.5 W/m^2K
B	16.2 W/m^2K

C	25.2 W/m^2K
D	30 W/m^2K
Answer Key: **A**	

Q74:	What is the expression for the thermal conduction resistance to heat transfer through a hollow sphere of inner radius r_1, and outer radius r_2, and thermal conductivity K?
A	$\frac{(r_2 - r_1) r_1 r_2}{4\pi K}$
B	$\frac{4\pi K (r_2 - r_1)}{r_1 r_2}$
C	$\frac{r_2 - r_1}{4\pi K \; r_1 r_2}$
D	None of these is correct
Answer Key: **C**	

Q75:	For the radiation between two infinite parallel planes of emissivity ε_1 and ε_2 respectively, which one of the following is the expression for emissivity factor?
A	$\varepsilon_1 \, \varepsilon_2$
B	$\frac{1}{\varepsilon_1} + \frac{1}{\varepsilon_2}$
C	$\frac{1}{\frac{1}{\varepsilon_1} + \frac{1}{\varepsilon_2}}$
D	$\frac{1}{\frac{1}{\varepsilon_1} + \frac{1}{\varepsilon_2} - 1}$
Answer Key: **D**	

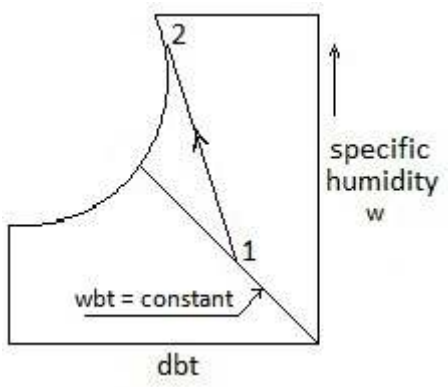
Q76	For simple vapour compression cycle, enthalpy at suction=1600 kJ/kg, enthalpy at discharge from the

:	compressor =1800 kJ/kg, enthalpy at exit from condenser =600 kJ/kg. What is the COP for this refrigeration cycle?
A	3.3
B	5.0
C	4.0
D	4.5
Answer Key: **B**	

Q77 :	The leaks is a refrigeration system using freon are defected by
A	A halide torch, which on detection produces greenish flame lighting
B	Sulphur sticks, which on detection gives white smoke
C	Using reagents
D	Sensing reduction pressure
Answer Key: **A**	

Q78 :	What is the saturation temperature at the partial pressure of water vapour in the air water vapour mixture called?
A	Dry bulb temperature
B	Wet bulb temperature
C	Dew point temperature
D	Saturation temperature
Answer Key: **C**	

Q79 :



Which one of the following statement is correct for a cooling and humidification process 1-2 as shown on the psychometric chart shown in figure?

A	wbt decreases in the process
B	The total enthalpy increases in the process
C	The total enthalpy remains constant in the process
D	It is an adiabatic saturation process

Answer Key: **B**

Q80 : A human body feels comfortable when the heat produced by the metabolism of human body is equal to

A	Heat dissipated to surroundings
B	Heat stored in the human body
C	Sum of Heat dissipated to surroundings and Heat stored in the human body
D	Difference of Heat dissipated to surroundings and Heat stored in the human body

Answer Key: **C**

Q81 : The order of values of thermal efficiency of Otto, Diesel and Dual cycle, when they have equal compression ratio and heat rejection, is given by

A	$\eta_{Otto} > \eta_{Diesel} > \eta_{Dual}$
B	$\eta_{Diesel} > \eta_{Dual} > \eta_{Otto}$
C	$\eta_{Dual} > \eta_{Diesel} > \eta_{Otto}$
D	$\eta_{Otto} > \eta_{Dual} > \eta_{Diesel}$

Answer Key: **D**

Q82 The method of determination of indicated power of multi cylinder SI engine is given by the use of :

A	Morse test
B	Prony break test
C	Prony heat test
D	Heat balance test

Answer Key: **A**

Q83 In spark ignition engines knocking can be reduced by:
:

A	Increasing the compression ration
B	Increasing the cooling water temperature
C	Retarding the spark advance
D	Increasing the inlet air temperature

Answer Key: **C**

Q84 Which of the following set of materials in most commonly used in catalytic converters for CI engines?
:

A	Platinum, Palladium and Rhodium
B	Palladium, Rhodium and Ruthenium
C	Rhodium , Ruthenium and Platinum
D	Ruthenium , Platinum and Palladium

Answer Key: **A**

Q85 The three way catalytic converter cannot control which one of the following?
:

A	HC emission
B	CO emission

C	NO_x emission
D	PM emission
Answer Key: **D**	

Q86 In thermal power plants, the deaerator is used mainly to **:**	
A	Remove air from condenser
B	Increase firewater temperature
C	Reduce steam pressure
D	Remove dissolved gases from feed water
Answer Key: **D**	

Q87 The most commonly used moderator in nuclear power plants is **:**	
A	Heavy water
B	Concrete and bricks
C	Steel
D	Graphite
Answer Key: **A**	

Q88 The efficiency of a simple gas turbine can be improved by using a regenerator, because the **:**	
A	Work of compression is reduced
B	Heat required to be supplied is reduced
C	Work out put of the turbine is increased
D	Heat rejected is increased
Answer Key: **B**	

Q89 Given that **:**	N = speed, P=power, H=heat The specific speed of hydraulic turbine is given by

A	$\frac{N\sqrt{P}}{H^{4/5}}$
B	$\frac{N\sqrt{P}}{H^{5/4}}$
C	$\frac{P\sqrt{N}}{H^{4/5}}$
D	$\frac{P\sqrt{N}}{H^{5/4}}$
Answer Key: **B**	

Q90 : In a two stage compressor with ideal inter cooling, for the work requirement to be minimum, the intermediate pressure Pi in terms of condenser and evaporator pressure Pc and Pe respectively is	
A	$Pi=Pc\ Pe$
B	$Pi=\sqrt{Pc\ Pe}$
C	$Pi=\sqrt{Pc/Pe}$
D	$Pi=Pc/Pe$
Answer Key: **B**	

Q91 : General description of CAD does not consist of	
A	Implementation
B	Synthesis
C	Presentation
D	Optimization
Answer Key: **A**	

| **Q92** Volume of work produced in FMS environment is determined from :
A	Number of machine used in the FMS
B	Kind of material handling equipment used in FMS
C	King of layout used in FMS
D	All are correct
Answer Key: **D**	

| **Q93** The axis movement of a robot may include :
A	Elbow rotation
B	Wrist rotation
C	X-Y coordinate motion
D	Elbow, wrist and X-Y coordinate motion
Answer Key: **D**	

| **Q94** Which is one of the following not the output device? :
A	Printer
B	Stylus
C	Display device
D	Plotter
Answer Key: **B**	

| **Q95** Machining time in NC and CNC machine tools is_____in comparison to conversional machine tool :
A	More
B	Less
C	Unpredictable

D	Equal
Answer Key: **B**	

Q96 What is the purpose of satellite computers in Distributed Numerical Control machines? **:**	
A	To act as stand by systems
B	To share the processing of large size NC
C	To serve a group of NC machines
D	To network with another DNC setup
Answer Key: **C**	

Q97 In which machining system, the highest level of automation is found? **:**	
A	CNC machine tools
B	Automatic transfer machines
C	Machine tools with electro hydraulic positioning and control
D	DNC machining system
Answer Key: **C**	

Q98 Which one of the following has automatic tool changing unit and a component indexing device **:**	
A	Machining center
B	NC system
C	CNC system
D	DNC system
Answer Key: **A**	

Q99 Transfer machines can be defined as : **:**	
A	Material Processing machines

B	Material handling machines
C	Material Processing and Material handling machines
D	Components feeders for automatic assembly
Answer Key: **C**	

Q100 Punched tape is used in? **:**	
A	NC machine
B	CNC machine
C	NC and CNC both
D	DNC machine
Answer Key: **A**	

State Engineering (Prelims) Exam – 2016

(Provisional Model Answer Key)

Electrical Engineering

Q1:	What will be the Fourier Transform of complex exponential signal $x(t)=e^{j\omega t}$?
A	An impulse function
B	A rectangular gate function
C	A train of impulse functions
D	A constant function
Answer Key: **A**	

Q2:	Mathematical relation between unit impulse function $\delta(t)$ and step function $u(t)$ can be given by
A	$u(t) = \int_{-\infty}^{t} u(\tau)d\tau$
B	$u(t) = \int_{-\infty}^{t} \delta(\tau)d\tau$
C	$u(t) = \delta(t)$
D	$u(t) = \frac{d\delta(t)}{dt}$
Answer Key: **B**	

Q3:	If $G(\omega)$ is the Fourier transform of g(t) then according to scaling property of the Fourier transform, the Fourier transform of g(at) is given by :
A	$(1/\|a\|)G((\omega/a))$
B	$\|a\|\ G(\omega a)$
C	$a\ G(\omega a)$
D	$G(\omega/a)$

Answer Key: **A**	

Q4 :	The convolution operation of two signals in time domain can be represented by the following operation in Z-transform domain
A	multiplication
B	Addition
C	Subtraction
D	Division
Answer Key: **A**	

Q5 :	The Nyquist frequency of the signal x(t)=cos(100 πt) + 100 sin(600πt) + cos(200 πt) is
A	100 Hz
B	600 Hz
C	400 Hz
D	200 Hz
Answer Key: **B**	

Q6 :	The nature of the Fourier Series coefficients are periodic then this means signal in time domain is
A	Continuous - time periodic signal
B	Continuous - time aperiodic signal
C	Discrete - time periodic signal
D	Discrete - time aperiodic signal
Answer Key: **C**	

Q7 :	The Fourier transform of a signal $x(t) = \cos(\omega_0 t)$ is given by
A	$\pi[\delta(\omega - \omega_0) + \delta(\omega + \omega_0)]$
B	$\frac{\pi}{2}[\delta(\omega - \omega_0) + \delta(\omega + \omega_0)]$

C	$2\pi[\delta(\omega-\omega_0)+\ \delta(\omega+\omega_0)]$
D	$\pi[\delta(\omega-2\omega_0)+\ \delta(\omega+2\omega_0)]$
Answer Key: **A**	

Q8 : Inverse Fourier transform of a Sinc - function will be a	
A	Rectangular Function
B	Signum Function
C	Impulse Function
D	Gaussian Function
Answer Key: **A**	

Q9 : Which one of the following statement is true?	
A	Transistor can be modelled as current controlled current source
B	Transistor can be modelled as current controlled voltage source
C	Transistor can be modelled as voltage controlled voltage source
D	Transistor can be modelled as voltage controlled current source
Answer Key: **A**	

Q10 : The Poynting Vector ($\vec{P}$) in terms of electric field vector ($\vec{E}$) and magnetic field vector ($\vec{H}$) is given by	
A	$\vec{P}=\vec{E}.\vec{H}$
B	$\vec{P}=\frac{\vec{E}}{\vec{H}}$
C	$\vec{P}=\frac{\vec{H}}{\vec{E}}$
D	$\vec{P}=\vec{E}\times\vec{H}$

Answer Key: **D**

Q11 The transistor which is used for designing the digital circuits generally has to operate in :	
A	Active region
B	Breakdown region
C	Cutoff & Saturation region
D	All are correct
Answer Key: **C**	

Q12 At room temperature, the band gap of a silicon is as follows :	
A	1.6 eV
B	1.1 eV
C	0.5 eV
D	1.3 eV
Answer Key: **B**	

Q13 The oscillator which uses a tapped coil in the LC circuit is known as :	
A	Colpitts Oscillator
B	Hartley Oscillator
C	Armstrong Oscillator
D	Pierce Oscillator
Answer Key: **B**	

Q14 The relation between electric field vector ($\vec{E}$) and magnetic field vector ($\vec{H}$) is given by :	
A	$\frac{\vec{E}}{\vec{H}} = \sqrt{\frac{\mu_0}{\varepsilon_0}}$

B	$\frac{\vec{E}}{\vec{H}} = \sqrt{\mu_0 \varepsilon_0}$
C	$\frac{\vec{H}}{\vec{E}} = \sqrt{\mu_0 \varepsilon_0}$
D	$\frac{\vec{H}}{\vec{E}} = \sqrt{\frac{\mu_0}{\varepsilon_0}}$
Answer Key: **B**	

Q15: The ratio of the velocity of a wave in free space with the velocity of the wave in the conduction medium is known as	
A	Space Function
B	Refractive Index
C	Attenuation Factor
D	Poynting Vector
Answer Key: **B**	

Q16: NAND gate will have low output if two inputs are following	
A	00
B	01
C	10
D	11
Answer Key: **D**	

Q17: A Schmitt trigger generates one of the following type of output waveform	
A	Triangular
B	Rectangular
C	Trapezoidal

D	Sinusoidal
Answer Key: **B**	

Q18 For the conversation of parallel to series data, following device can be used: **:**	
A	Demultiplexer
B	Multiplexer
C	Decoder
D	Counter
Answer Key: **B**	

Q19 EX-OR gate can work as NOT gate for the following condition **:**	
A	If one input can be made equal to one
B	If one input can be made equal to zero
C	By connecting both inputs together
D	None of these are correct
Answer Key: **A**	

Q20 The length of instruction in 8085 micro processor is **:**	
A	32 bits
B	24 bits
C	8 bits
D	16 bits
Answer Key: **C**	

Q21 Pirani gauge can be used to measure **:**	
A	Very high temperature

B	Very low pressure
C	Low fluid flow
D	High fluid flow
Answer Key: **B**	

Q22: Which one of the following statement is true?	
A	In a capacitor, dielectric material between two plates reduces its capacitance
B	In a capacitor, dielectric material between two plates increases its capacitance
C	In a capacitor, dielectric material between two plates does not affect its capacitance
D	None of these are correct
Answer Key: **B**	

Q23: Varactor can be defined as	
A	A diode which is used as a variable capacitor
B	A diode which is useful for high speed switching
C	A diode which is used as a variable inductor
D	A diode which is used as a variable resistor
Answer Key: **A**	

Q24: A PMMC based instrument can be used to measure	
A	DC (Average) value
B	Maximum value
C	RMS(root mean square) value
D	All are correct
Answer Key: **A**	

Q25: The Boolean expression given by $\bar{X}Y + X\bar{Y} + XY$ is equivalent to	
A	$X + Y$
B	$\bar{X} + Y$
C	XY
D	$\overline{X + Y}$
Answer Key: **A**	

Q26: If in a amplitude modulation (AM) based communication system P_c denotes the power of carrier and P_t denotes the total power of AM wave then for modulation index = 1, the relation between P_c and P_t will be	
A	$P_c=P_t$
B	$P_c=P_t/2$
C	$P_t=P_c/4$
D	$P_t=3P_c/2$
Answer Key: **D**	

Q27: In communication system, the ergodic process concept for many random signal means	
A	They have similar ensemble averages
B	They have similar time averages
C	They have similar time and ensemble averages
D	They do not have similar time and ensemble averages
Answer Key: **C**	

Q28: The frequency modulation (FM) based communication system has the following disadvantages over the amplitude modulation (AM) communication system:	
A	requirement of more output power
B	requirement of more bandwidth

C	requirement of more modulating power
D	presence of noise in high frequency regions
Answer Key: **B**	

Q29 Sampling theorem is useful in following communication system **:**	
A	Pulse code Modulation (PCM)
B	Amplitude Modulation (AM)
C	Frequency Modulation (FM)
D	Phase Modulation (PM)
Answer Key: **A**	

Q30 Noise generally affects the following part of the communication system **:**	
A	Transmitter
B	Receiver
C	channel
D	None of these are correct
Answer Key: **C**	

Q31 : The inverse Laplace transform of $\frac{8}{s(s+2)}$ is	
A	$4(1 - e^{-2t})$
B	$4(1 + e^{-2t})$
C	$4(1 - e^{2t})$
D	$4(1 + e^{2t})$
Answer Key: **A**	

Q32 In control system, in order to represent multiple input and multiple output systems which technique is more suitable **:**

A	Bode plots
B	State space models
C	Root locus methods
D	Nyquist plot
Answer Key: **B**	

Q33 The Laplace transform of a doublet can be given as **:**	
A	1/s
B	s
C	s^2
D	$1/s^2$
Answer Key: **B**	

Q34 Which one of the following statement is true **:**	
A	By introducing a negative feedback, both system stability and system gain increases
B	By introducing a negative feedback, system stability increases and system gain decreases
C	By introducing a negative feedback, system stability decreases and system gain increases
D	By introducing a negative feedback, system stability and system gain both decreases
Answer Key: **B**	

Q35 : The transfer function of a system is given as $\frac{3s+1}{s^2+s+1}$ this system is	
A	Unstable system
B	Stable system
C	Marginally stable system
D	None of these are correct
Answer Key: **B**	

Q36:	Suppose a communication channel in the presence of additive white Gaussian noise has bandwidth 8KHz, and signal to noise ratio (SNR) = 7 then the channel capacity will be
A	32 Kbps
B	8 Kbps
C	24 Kbps
D	64 Kbps
Answer Key: **C**	

Q37:	The pulse width Modulation process can be achieved by
A	Using free-running multivibrator
B	Performing integration on the signal
C	Using a mono-stable multivibrator
D	Performing a differentiation on pulse position modulation
Answer Key: **C**	

Q38:	In frequency division multiplexing (FDM) receiver, in order to separate the channels, following is used.
A	Integrator
B	Differentiator
C	Band pass filters
D	AND gates
Answer Key: **C**	

Q39:	A communication circuit resonates at frequency of 1 KHz and this circuit has Q factor Q = 10. What will be the bandwidth corresponding to half power points
A	100 Hz
B	10 Hz
C	1000 Hz

D	1 Hz
Answer Key: **A**	

Q40:	Thermal noise power P in a resistor R is related as follows:
A	$P \propto R$
B	$P \propto 1/R$
C	$P \propto R^2$
D	P is independent of R
Answer Key: **D**	

Q41:	The resistance for a conductor will be least for the following
A	DC
B	60 Hz
C	10 KHz
D	10 MHz
Answer Key: **A**	

Q42:	The angle modulated signal given as $x(t) = 20 \cos(\omega_c t - 0.5 \cos(100t))$ has power
A	100
B	200
C	50
D	300
Answer Key: **B**	

Q43:	Suppose P_K denotes the probability of a message then the amount of information denoted by I_K in bits can be given by
A	$I_K = -2 \log_2 P_K$

B	$I_K = - \log_2 P_K$
C	$I_K = -10 \log_2 P_K$
D	$I_K = 10 \log_2 P_K$
Answer Key: **B**	

Q44 The Z-transform of $\delta(n-p)$ is given by **:**	
A	Z^{-P}
B	Z^{P}
C	$Z^{-P/2}$
D	$Z^{-1/P}$
Answer Key: **A**	

Q45 Power spectral density of a signal x(t) is $S_x(f)$,then the power spectral density of it's Hilbert transformed **:** signal will be	
A	$-S_x(f)$
B	$S_x(f)$
C	$\pi S_x(f)/2$
D	$2\pi S_x(f)$
Answer Key: **B**	

Q46 Which one of the following statement is true: For modeling of ideal operational amplifier **:**	
A	Voltage controlled Current source
B	Voltage controlled Voltage source
C	Current controlled Current source
D	Current controlled Voltage source
Answer Key: **D**	

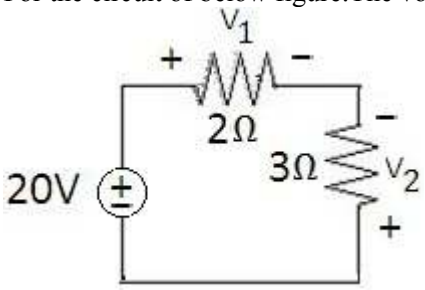
Q47 Quantization noise is generated in the following: **:**	
A	Frequency division multiplexing
B	Time division multiplexing
C	Pulse code modulation
D	Amplitude modulation
Answer Key: **C**	

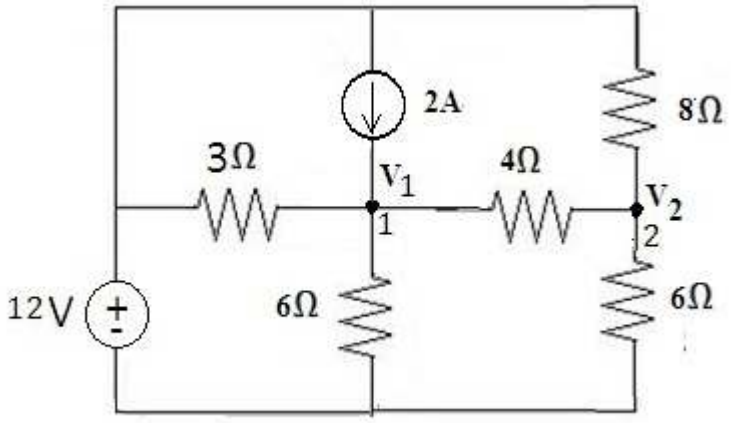
Q48 Which is a circular polarized antenna? **:**	
A	Yagi-Uda
B	Parabolic reflector
C	Small circular loop
D	Helical
Answer Key: **D**	

Q49 In a waveguide, the wavelength of a wave is **:**	
A	Directly proportional to the group velocity
B	Greater than its value in free space
C	Dependent on the waveguide dimensions
D	Inversely proportional to the phase velocity
Answer Key: **B**	

Q50 Virtual ground is a ground for **:**	
A	Current and not for Voltage
B	Neither Current nor Voltage
C	Voltage and Current both

D	Voltage and not for Current
Answer Key: **D**	

Q51 For the circuit of below figure.The voltages V_1 & V_2 are : 	
A	$V_1 = 8V, V_2 = 12V$
B	$V_1 = 8V, V_2 = -12V$
C	$V_1 = -8V, V_2 = -12V$
D	$V_1 = -8V, V_2 = 12V$
Answer Key: **B**	

Q52 In below figure, applying KCL at node 2 gives : 	
A	$\frac{V_2 - V_1}{4} + \frac{V_2}{8} = \frac{V_2}{6}$
B	$\frac{V_1 - V_2}{4} + \frac{V_2}{8} = \frac{V_2}{6}$
C	$\frac{V_1 - V_2}{4} + \frac{12 - V_2}{8} = \frac{V_2}{6}$

D	$\frac{V_2-V_1}{4}+\frac{V_2-12}{8}=\frac{V_2}{6}$

Answer Key: **C**

Q53 Switch S_1 in figure below is closed at t=0 and switch S_2 is closed at t=4s. The current i(t) at t= ∞ is :

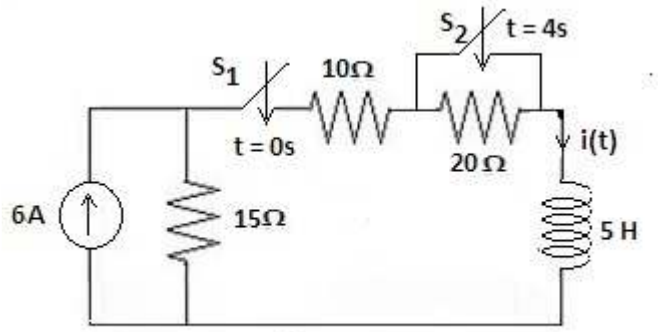


Figure.

A	2.4 A
B	3.6 A
C	2.4 A
D	4.2 A

Answer Key: **B**

Q54 For the series RLC circuit of below figure, the current i(t) will show :

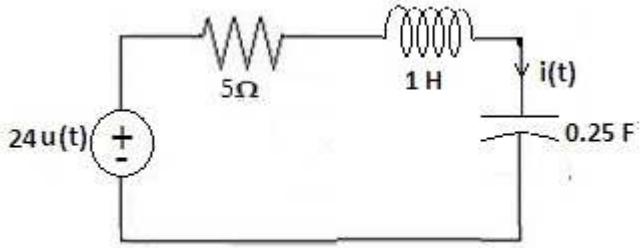
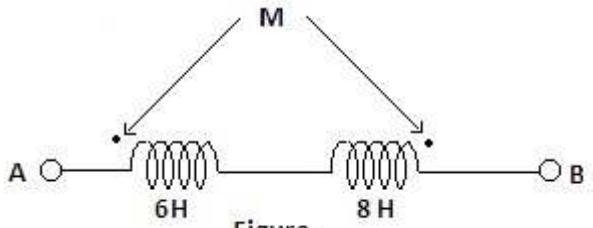


Figure.

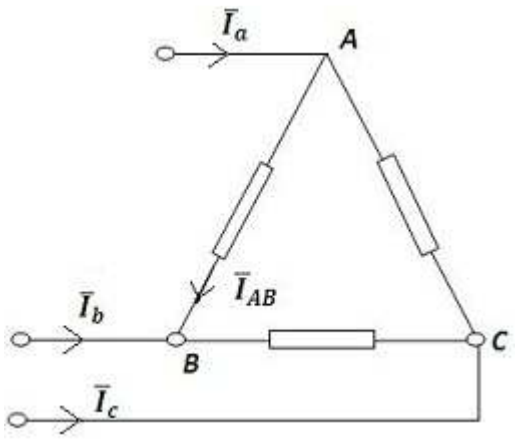
A	Under damped response
B	Critically damped response
C	Over damped response
D	Un damped response

Answer Key: **C**

Q55 :	If in a single phase AC circuit, v(t) = 120 sin(314 t + 45^o) V & i(t) = 10 sin (314 t - 10^o) A. The average power absorbed in the circuit is
A	300.5 W
B	491.4 W
C	344.2 W
D	982.9 W
Answer Key: **C**	

Q56 :	For the two coupled coils of figure below, the total inductance is 6H.The mutual inductance M between two coils is  Figure.
A	8 H
B	3 H
C	6 H
D	4 H
Answer Key: **D**	

Q57 : $\bar{I}_{AB} = 13.2 \angle 36.87^o$ A. Then the line current $\bar{I}_b$ is



A	$\bar{I}_b = 22.86 \angle 6.87$ A
B	$\bar{I}_b = 22.86 \angle 126.87^0$ A
C	$\bar{I}_b = 22.86 \angle -113.13^0$ A
D	$\bar{I}_b = 22.86 \angle -83.13^0$ A

Answer Key: **C**

Q58 Given Y parameter of a two port network as :

$$[Y] = \begin{bmatrix} 0.3 & -0.2 \\ -0.2 & 0.3 \end{bmatrix}$$

The Z-parameter of the network Z_{22} is

A	5 Ω
B	6 Ω
C	4 Ω
D	1.5 Ω

Answer Key: **D**

Q59 Curie temperature is the temperature above which a ferromagnetic material becomes :

A	Paramagnetic
B	Diamagnetic

C	Remains ferromagnetic
D	None of these are correct
Answer Key: **A**	

Q60 :	The dielectric losses occur in all solid and liquid dielectric due to
A	Conduction current
B	Hysteresis
C	Both Conduction current & Hysteresis
D	None of these are correct
Answer Key: **C**	

Q61 :	A 230V, 5A energy meter on full load unity power factor test makes 60 revolutions in 360 seconds. If the designed speed of the disc is 520 revolutions per KWh,the energy recorded by the meter is
A	115.10^{-3} KWh
B	115.185×10^{-3} KWh
C	115.385×10^{-3} KWh
D	115.68×10^{-3} KWh
Answer Key: **C**	

Q62 :	Two Watt meters can be used to measure power in a
A	Three phase four wire balanced load
B	Three phase four wire unbalanced load
C	Three phase three wire unbalanced load
D	All are correct
Answer Key: **D**	

Q63 :	Under balanced condition of a bridge for measuring unknown impendence, if the detector is suddenly taken out

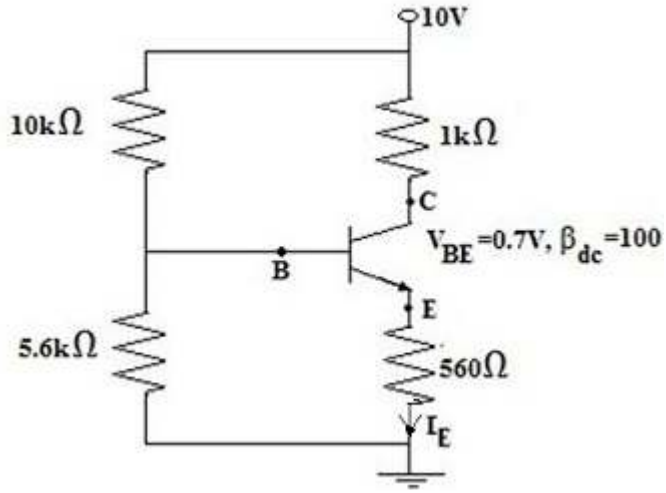
A	Measured value of impendence will be lower
B	Measured value of impendence will be higher
C	Measured value of impendence will not change
D	The impendence can not be measured
Answer Key: **C**	

Q64 In a spring-controlled moving iron instruments, the scale is **:**	
A	Uniform
B	Cramped at the lower end and expanded at the upper end
C	Expanded at the lower end and cramped at the upper end
D	Cramped both at the lower and the upper ends
Answer Key: **B**	

Q65 Which A/D converter has highest conversion time? **:**	
A	Flash type
B	Duel Slope integration
C	Successive approximation
D	Ramp/Counting
Answer Key: **B**	

Q66 The dynamic resistance can be important when a diode is **:**	
A	Reverse-biased
B	Forward-biased
C	In reverse breakdown
D	Unbiased
Answer Key: **B**	

Q67 : A diode that has a negative resistance characteristic is the	
A	Schottky diode
B	Tunnel diode
C	Laser diode
D	Hot-carrier diode
Answer Key: **B**	

Q68 : For the circuit of figure below, which is a stiff voltage divider based transistor circuit, the emitter current I_E is 	
A	5.16 mA
B	5 mA
C	4.9 mA
D	4.96 mA
Answer Key: **A**	

Q69 : A certain common emitter amplifier has a voltage gain of 100. If the emitter bypass capacitor is removed,	
A	The circuit will become unstable
B	The voltage gain will decrease

C	The voltage gain will increase
D	The Q point will shift
Answer Key: **B**	

Q70: In the certain common mode operation of the differential amplifier,	
A	Both inputs are grounded
B	The outputs are connected together
C	An identical signal appears on both inputs
D	The output signals are in phase
Answer Key: **C**	

Q71: A depletion MOSFET operates in	
A	The depletion mode only
B	The enhancement mode only
C	The ohmic region only
D	Both the depletion and enhancement modes
Answer Key: **D**	

Q72: A certain inverting amplifier has a closed loop gain of 25. The op-amp has an open loop gain of 1,00,000. If another op-amp with an open loop gain of 2,00,000 is substituted in the configuration, the closed loop again	
A	Doubles
B	Drops to 12.5
C	Remains at 25
D	Increases slightly
Answer Key: **C**	

Q73 The damping factor of an active filter is set by

:	
A	The negative feedback circuit
B	The positive feedback circuit
C	The frequency selective circuit
D	The gain of the op-amp
Answer Key: **A**	

Q74 The 2's compliment of 11001000 is :	
A	00110111
B	00110001
C	01001000
D	00111000
Answer Key: **D**	

Q75 A 3-variable karnaugh map has :	
A	Eight cells
B	Three cells
C	Sixteen cells
D	Four cells
Answer Key: **A**	

Q76 To implement the expression $\overline{A}BCD + A\overline{B}CD + AB\overline{C}\overline{D}$, it takes one OR gate and :	
A	One AND gate
B	Three AND gate
C	Three AND gates and four inverters
D	Three AND gates and three inverters

Answer Key: **C**

Q77 In general, a multiplexer has **:**	
A	One data input, several data outputs and selection inputs
B	One data input, one data output and one selection input
C	Several data inputs, several data outputs and selection inputs
D	Several data inputs, one data output and selection inputs
Answer Key: **D**	

Q78 Like the latch, the Flip-Flop belongs to a category of logic circuits known as **:**	
A	Monostable multivibrators
B	Bistable multivibrators
C	Astable multivibrators
D	One shots
Answer Key: **B**	

Q79 A modulus 12 counter must have **:**	
A	12-Flip-Flops
B	3-Flip-Flops
C	4-Flip-Flops
D	Synchronous clocking
Answer Key: **C**	

Q80 The bit capacity of a memory that has 1024 addresses and can store 8 bits at each address is **:**	
A	1024
B	8192

C	8
D	4096
Answer Key: **B**	

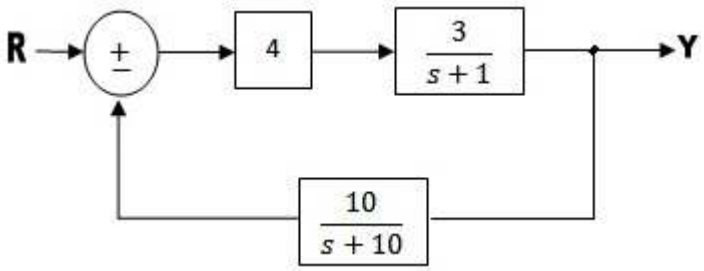
Q81: In a 3-phase fully controlled bridge rectifier the firing pulse frequency is	
A	3 times the line frequency
B	6 times the line frequency
C	9 times the line frequency
D	Same as line frequency
Answer Key: **B**	

Q82: In a step-down converter using pulse width modulation, $T_{on} = 3 \times 10^{-3}$s and $T_{off} = 1 \times 10^{-3}$s. The chopping frequency is	
A	333 Hz
B	250 Hz
C	500 Hz
D	1000Hz
Answer Key: **B**	

Q83: A thyristor has internal power dissipation of 40W and is operated at an ambient temperature of 20^{o}C. If thermal resistance is 1.6 ^{o}C/W, the junction temperature is	
A	114 ^{o}C
B	64 ^{o}C
C	94 ^{o}C
D	84 ^{o}C
Answer Key: **D**	

Q84 The characteristic equation of the closed loop system of figure below is

:



A	$s^2+11s+10=0$
B	$s^2+11s+130=0$
C	$s^2+11s+120=0$
D	$s^2+10s+12=0$

Answer Key: **B**

Q85
:

The error function of a feedback system is $E(s) = \frac{(S+0.1)(S+0.5)}{S(S+0.1)(S+0.5)+0.5(S+1)}$. The steady state value of e(t) is

A	0.001
B	0.1
C	0.01
D	None of these are correct

Answer Key: **D**

Q86 Closed loop transfer function of a unity feedback system is given by
:

$$\frac{Y(s)}{R(s)} = \frac{\omega_n^2}{s^2+2\xi\omega_n s+\omega_n^2}$$

System k_v (velocity error constant) is

A	$\frac{\omega_n}{2_\xi}$
B	1
C	∞

D	$\frac{2\xi}{\omega_n}$
Answer Key: **A**	

Q87 :	The transfer function of a lag compensator is $D(s) = \frac{1+\alpha\tau s}{1+\tau s}$; $\tau > 0$. The value of α is given by
A	$\alpha = 1$
B	$\alpha > 1$
C	$\alpha < 1$
D	α is any constant
Answer Key: **B**	

Q88 :	A state variable formulation of a system is given by the equations $\begin{bmatrix}\dot{x_1}\\ \dot{x_2}\end{bmatrix} = \begin{bmatrix}-1 & 0\\ 0 & -3\end{bmatrix}\begin{bmatrix}x_1\\ x_2\end{bmatrix} + \begin{bmatrix}1\\ 1\end{bmatrix}4$ $y=\begin{bmatrix}1 & 0\end{bmatrix}\begin{bmatrix}x_1\\ x_2\end{bmatrix}$ The transfer function of the system is
A	$\frac{1}{(s+1)(s+3)}$
B	$\frac{1}{s+1}$
C	$\frac{1}{s+3}$
D	None of these are correct
Answer Key: **B**	

Q89 :	Let P_i = core loss and P_c = copper loss. A transformer has maximum efficiency when
A	$P_i = 2P_c$
B	$P_i = 1.5P_c$

C	$P_i = P_c$
D	$P_i = 0.5P_c$
Answer Key: **C**	

Q90 Pulsation loss in rotating machines occurs in **:**	
A	Pole body
B	Pole shoes
C	Yoke
D	Stator and rotor cores
Answer Key: **B**	

Q91 The armature reaction mmf in a DC machine is **:**	
A	Sinusoidal
B	Trapezoidal in shape
C	Rectangular in shape
D	Triangular in shape
Answer Key: **D**	

Q92 For a given torque, reducing the field turns of a DC series motor **:**	
A	Increases its speed demanding more armature current
B	Increases its speed but armature current remains the same
C	Decreases its speed demanding less armature current
D	Decreases its speed but armature current remains the same
Answer Key: **A**	

Q93 Synchronous motor speed is controlled by varying **:**

A	Field execution
B	Supply voltage
C	Supply frequency only
D	Both (Supply voltage) and (Frequency)
Answer Key: **D**	

Q94 : In a 3-phase induction machine at low slip, the torque slip characteristic is	
A	$T \propto \frac{1}{s^2}$
B	$T \propto s^2$
C	$T \propto \frac{1}{s}$
D	$T \propto s$
Answer Key: **D**	

Q95 : The power input to an induction motor is 40 kW when it is running at 5% slip. The stator resistance and core loss are assumed negligible. The torque developed is synchronous watts is	
A	42 kW
B	40 kW
C	38 kW
D	2 kW
Answer Key: **B**	

Q96 : The converter which can feed power in any one of the four quadrants is	
A	Semi converter
B	Full converter
C	Dual converter
D	A combination of semi and full converter

Answer Key: **C**

Q97 Circuit breakers usually operate under **:**	
A	Transient state of short circuit current
B	Sub-transient state of short circuit current
C	Steady state of short circuit current
D	After dc component has ceased
Answer Key: **A**	

Q98 Current in the primary writing of CT depends on **:**	
A	Burden in the secondary winding of a transformer
B	Load connected to the system in which CT is being used for measurement
C	Both burden on the secondary and load connected to a system
D	None of these are correct
Answer Key: **B**	

Q99 A synchronous condenser is **:**	
A	An induction motor
B	Under excited synchronous motor
C	Over excited synchronous motor
D	DC generator
Answer Key: **C**	

Q100 Power generation cost reduces as **:**	
A	Diversity factor increases and load factor decreases
B	Diversity factor decreases and load factor increases

C	Both diversity as well as load factor decreases
D	Both diversity as well as load factor increases
Answer Key: **D**	

State Engineering (Prelims) Exam – 2016

(Provisional Model Answer Key)

Agricultural Engineering

Q1:	The firing order of a 4 stroke 4 cylinder S.I.engine is _____ .
A	1 2 4 3
B	1 3 4 2
C	1 4 3 2
D	1 2 3 4
Answer Key: **B**	

Q2:	In a combine harvester the ratio of reel peripheral speed of forward speed(reel speed index) should normally be in the range of
A	1.25 to 1.50
B	1.50 to 1.75
C	1.75 to 2.0
D	None of these are correct
Answer Key: **A**	

Q3:	The size of a seed drill is expressed by
A	The amount of seed shown per unit time
B	Length x Width of the machine
C	Area covered per unit time
D	The number of furrow openers x Distance between two furrow openers
Answer Key: **D**	

Q4: What is the natural frequency of driver seat suspension?	
A	0.5 to 2.0 Hz
B	2.1 to 4.0 Hz
C	4.1 to 6.0 Hz
D	6.1 to 10.0 Hz
Answer Key: **A**	

Q5: Calorific value of rice husk is approximately	
A	3000 Kcal/kg
B	5600 Kcal/kg
C	7000 Kcal/kg
D	11000 Kcal/kg
Answer Key: **A**	

Q6: The moisture content of paddy at the time of milling should be in the range of	
A	9 to 10%
B	11 to 12%
C	13 to 14%
D	16 to 18%
Answer Key: **C**	

Q7: Moving the center of gravity of a tractor towards its front wheel creates the problem of	
A	Instability
B	Steering
C	Over turning

D	None of these are correct
Answer Key: **B**	

Q8: In reciprocating type mowers, the knife clip of knife section restricts	
A	Horizontal displacement of knife
B	Side displacement of knife
C	Vertical displacement of knife
D	Horizontal and side displacement of knife
Answer Key: **C**	

Q9: Recommended peripheral velocity of spike tooth threshing cylinder for wheat crop is	
A	Less than 20 m/s
B	20 to 30 m/s
C	31 to 40 m/s
D	More than 40 m/s
Answer Key: **B**	

Q10: The difference between the values of initial and equilibrium moisture content of food is known as	
A	Unbound moisture content
B	Bound moisture content
C	Free moisture content
D	Critical moisture content
Answer Key: **C**	

Q11: Shortening of top link length of a tractor	
A	Increases weight transfer on rear wheel

B	Decreases weight transfer an rear wheel
C	Increases penetration of implement
D	Decreases penetration of implement
Answer Key: **D**	

Q12: Drying of fruit pulp can be accomplished by a	
A	Tray dryer
B	Fluidized bed dryer
C	Drum dryer
D	Spray dryer
Answer Key: **C**	

Q13: An animal drawn seed drill has K number of furrow openers at 180mm apart. If the speed of operation is 2.0 Kmph. The area covered (ha) in 8-h day is given by	
A	1.85/1000 K
B	28.8×10^{-2} K
C	K/6.56
D	1.762 K
Answer Key: **B**	

Q14: The main difference between fly wheel & governor is	
A	Govenner is heavier than flywheel
B	Flywheel is fixed to the crankshaft while govenner is not
C	Flywheel store energy & govenner controls engine speed
D	None of these are correct
Answer Key: **C**	

Q15 The most used and least efficient power outlet of a tractor is **:**	
A	Power take off & halt in the front
B	Power take off & halt in the rear
C	Drawbar in the rear
D	None of these are correct
Answer Key: **C**	

Q16 The inflation pressure in front tyres of tractor is **:**	
A	1.2 - 2.0 kg/cm^2
B	2.0 - 2.5 kg/cm^2
C	2.5 - 3.0 kg/cm^2
D	3.0 - 4.0 kg/cm^2
Answer Key: **B**	

Q17 Unit for measurement of vaccum is **:**	
A	Kgf/cm^2
B	Torr
C	BTU
D	None of these are correct
Answer Key: **A**	

Q18 Conduction of heat transfer is quantified by **:**	
A	Fourier's law
B	Laplace law
C	Bueke-plummer equation

D	Black-Kizrey equation
Answer Key: **A**	

Q19 Freeze drying time is directly proportional to the _____ of the material being dried **:**	
A	Thickness
B	Square of the thickness
C	Cube of thickness
D	Fourth order of thickness
Answer Key: **B**	

Q20 Butter must contain_____% fat **:**	
A	60
B	70
C	80
D	90
Answer Key: **C**	

Q21 In a stall barn, the floor space required for each cow is between **:**	
A	3.50 to 5.50 m^2
B	5.6 to 7.5 m^2
C	7.6 to 9.5 m^2
D	9.6 to 11.6 m^2
Answer Key: **D**	

Q22 Paddy is normally stored at **:**	
A	12 per cent moisture content on dry basis

B	12 per cent moisture content on wet basis
C	15 per cent moisture content on wet basis
D	15 per cent moisture content on dry basis
Answer Key: **B**	

Q23 The orange color tomato is due to **:**	
A	Chlorophyll A
B	Anthocyanims
C	Xanthans
D	Lycopene
Answer Key: **D**	

Q24 Solar energy available outside earth's atmosphere per square meter is equal to about **:**	
A	350 W
B	200 W
C	1050 W
D	1350 W
Answer Key: **D**	

Q25 Energy required to break a drop of liquid into small droplets will be depend mainly on **:**	
A	The surface tension of the liquid
B	The viscosity of the liquid
C	The density of the liquid
D	The heat capacity of the liquid
Answer Key: **A**	

Q26 The major protein in wheat flour is **:**	
A	Zein
B	Gluten
C	Orzgenin
D	Hordenin
Answer Key: **B**	

Q27 Jenssen equation is related to **:**	
A	Storage silo design
B	Size reduction of particles
C	Grain transportation system
D	Size separation of grains
Answer Key: **A**	

Q28 Under falling rate period, the drying rate is proportional to the difference between **:**	
A	Critical and equilibrium moisture content
B	Initial and equilibrium moisture content
C	Initial and critical moisture content
D	Moisture content below critical and equilibrium moisture content
Answer Key: **D**	

Q29 The percentage of polish recommended for rice is **:**	
A	5 %
B	10 %
C	20 %

D	30 %
Answer Key: **A**	

Q30: When a thresher is giving more brocken grains, the reason for that is	
A	Higher threshing cylinder speed
B	Lower cylinder speed
C	More cylinder concave clearance
D	None of these options are correct
Answer Key: **A**	

Q31: When a plough works round the strip of ploughed land, then its said to be	
A	Gathering
B	Crowning
C	Casting
D	Ridging
Answer Key: **A**	

Q32: Bacterial population in milk increases 200 times in 18 hours of storage at $20^{o}C$ .The increase in population in 3 hours of storage at the same temperature is	
A	1.34 times
B	2.42 times
C	7.02 times
D	14.14 times
Answer Key: **B**	

Q33: The fundamental principle of preserving food by heat is known as:	
A	Pasteurization

B	Chemical preservation
C	Freezing
D	Sublimation
Answer Key: **A**	

Q34 If moisture content on wet basis is 25% then what would be the moisture content on dry basis **:**	
A	33 %
B	30 %
C	45 %
D	20 %
Answer Key: **A**	

Q35 The relation between RH (Relative humidity) and EMC (Equilibrium moisture content) is given by **:**	
A	Janssen
B	Rankine
C	Henderson
D	Newton
Answer Key: **C**	

Q36 Camber angle varies from **:**	
A	0.25^{o} to 4^{o}
B	10^{o} to 12^{o}
C	13^{o} to 15^{o}
D	16^{o} to 20^{o}
Answer Key: **A**	

Q37 Which of the following constituents of steel is softest and least strong :	
A	Austenite
B	Pearlite
C	Ferrite
D	Cementite
Answer Key: **C**	

Q38 The percentage of carbon in pig iron various from :	
A	0.1 to 1.2 %
B	1.5 to 2.5 %
C	2.5 to 4.0 %
D	4.0 to 4.5 %
Answer Key: **D**	

Q39 The material used for coating the electrode is called :	
A	Protective layer
B	Binder
C	Slag
D	Flux
Answer Key: **D**	

Q40 The metallic structure of mild steel is :	
A	Body centered cubic
B	Face centered close cubic
C	Hexagonal close packed

D	Cubic structure
Answer Key: **A**	

Q41 When welding is going on, arc voltage is of the order of **:**	
A	18 - 40 volts
B	40 - 95 volts
C	100 - 125 volts
D	130 - 170 volts
Answer Key: **A**	

Q42 Copper is **:**	
A	Easily spot welded
B	Very difficult to be spot welded
C	Cannot spot welded
D	None of these are correct
Answer Key: **B**	

Q43 The most commonly used flame in gas welding is **:**	
A	Neutral
B	Oxidising
C	Carburising
D	All the options are correct
Answer Key: **A**	

Q44 In machine tools, chatter is due to **:**	
A	Free vibrations

B	Random vibrations
C	Forced vibrations
D	Self-exicited vibrations
Answer Key: **D**	

Q45 Which test _____ is not related with fuel **:**	
A	Octane number
B	Reynolds number
C	Cetane number
D	None of these are correct
Answer Key: **B**	

Q46 To separate the mustered from wheat the recommended separator is **:**	
A	Indented cylinder separator
B	Specific gravity separator
C	Spiral separator
D	Air screen separator
Answer Key: **C**	

Q47 LSU dryer was developed at **:**	
A	Louisiana State University
B	IIT kharagpur
C	CIAE Bhopal
D	CFTRI Mysore
Answer Key: **A**	

Q48 Psychometric charts represents _____ properties of air : 	
A	Chemical
B	Aerodynamic
C	Physico thermal
D	Hydroscopic
Answer Key: **C**	

Q49 The oil to be used in engine for lubrication purpose : 	
A	SAE 90
B	SAE 50
C	SAE 30
D	None of these are correct
Answer Key: **C**	

Q50 Bore is : 	
A	Diameter of an engine cylinder
B	Length of an engine cylinder
C	Area of an engine cylinder
D	None of these are correct
Answer Key: **A**	

Q51 Double mass analysis is used for testing the _____ of rainfall records at concerned station : 	
A	adequacy
B	accuracy
C	consistency

D	degeneracy
Answer Key: **C**	

Q52 :	As the rainfall duration increases the rainfall intensity _____ .
A	decreases
B	increases
C	remains same
D	cannot be said
Answer Key: **A**	

Q53 :	_____ is referred as movement of sediment particles in a series of bounces over a channel bed surface.
A	Surface creep
B	Saltation
C	Suspension
D	None of these are correct
Answer Key: **B**	

Q54 :	_____ gullies develop in the areas where the sub soil is resistant erosion.
A	V shaped
B	U shaped
C	W shaped
D	None of these are correct
Answer Key: **A**	

Q55 :	Universal soil loss equation was proposed by _____ .
A	Musgrave and Zingg

B	Williams and Smith
C	Wishmeier and Smith
D	Wishmeier and Musgrave
Answer Key: **C**	

Q56 :	_____ is also known as channel - type terrace.
A	Broad base terrace
B	Narrow base terrace
C	Bench terrace
D	Staggered trenches
Answer Key: **A**	

Q57 :	The inequilibrium stage is also called as _____, which reveals that watershed is under development process.
A	Mature stage
B	Monadknock stage
C	Young stage
D	None of these are correct
Answer Key: **C**	

Q58 :	Function of emergency spillway in storage structure is to _____ .
A	Prevent overtopping
B	Prevent seepage
C	Prevent sloughing
D	None of these are correct
Answer Key: **A**	

Q59 The ratio of the area of watershed to the square of length of watershed is known as _____ . **:**	
A	Shape index
B	Form factor
C	Area ratio
D	Area length ratio
Answer Key: **B**	

Q60 Hydrologic response of the large watersheds is dominated by _____ . **:**	
A	Overland flow
B	Critical flow
C	Channel storage
D	Channel precipitation
Answer Key: **C**	

Q61 Unit hydrograph represents unit _____ . **:**	
A	Precipitation
B	Duration
C	Effective rainfall
D	Area of watershed
Answer Key: **C**	

Q62 The elevation difference in two consecutive terraces is known as _____ . **:**	
A	Contour interval
B	Horizontal interval
C	Vertical interval

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

Q63 :	_____ is used to determine the area of irregular shaped plan.
A	Clinometers
B	Odometer
C	Planimeter
D	Pentagraph
Answer Key: **C**	

Q64 :	_____ is any arbitrarily assumed level surface from which vertical distances are measured.
A	Bench mark
B	Datum surface
C	Horizontal plane
D	Collimation plane
Answer Key: **B**	

Q65 :	The resultant of all the forces acting on dam should be within the _____ of base to avoid any tension in the dam.
A	Initial third
B	Middle third
C	Final third
D	Limits
Answer Key: **B**	

Q66 :	World meteorological organization recommends that in flat regions one rain gauge station should be for _____ .
A	100 to 300 sq.km

B	300 to 600 sq.km
C	900 to 1200 sq.km
D	600 to 900 sq.km
Answer Key: **D**	

Q67 :	_____ trenches are shorter in length and are arranged along the contour with inter space between them.
A	Contour
B	Staggered
C	Continuous
D	None of these are correct
Answer Key: **B**	

Q68 :	The distance measured by 20m chain is 8 chain and 25 links, which will be equal to _____ .
A	241.5m
B	165.0m
C	544.5m
D	None of these are correct
Answer Key: **B**	

Q69 :	The contour interval on the toposheets, prepared by Survey of India, having the scale of 1:50000 is _____ m.
A	5
B	10
C	20
D	30
Answer Key: **C**	

Q70 A stream which receive groundwater flow is called _____ **:**	
A	Influent stream
B	Ephemeral stream
C	Effluent stream
D	None of the these options are correct
Answer Key: **C**	

Q71 Most important cause of wind erosion is _____ . **:**	
A	Storms of high intensity
B	Clay size particles in soil
C	Mismanagement of land resources
D	Alkalinity of soil surface
Answer Key: **C**	

Q72 The factors 'L' and 'S' in USLE are combinedly called as _____ factor. **:**	
A	Topic
B	Topologic
C	Topographic
D	Physiologic
Answer Key: **C**	

Q73 Batter slope in bench terraces is mainly given for providing _____ to the fill material or embankment. **:**	
A	Support
B	Stability
C	Strength

D	None of these are correct
Answer Key: **B**	

Q74 : Land use recommended for land capability class VIII is _____ .	
A	Agriculture
B	Horticulture
C	Recreation
D	Agro-forestry
Answer Key: **C**	

Q75 : The three sides of a triangular field are 24,45 and 51m respectively. Then the area of field is _____ m^2	
A	540
B	612
C	1080
D	1147.5
Answer Key: **A**	

Q76 : The number of hectares of the crop successfully raised with irrigation by constant flow of one cumec of water throughout the growth period is _____	
A	Base
B	Delta
C	Duty
D	None of these are correct
Answer Key: **C**	

Q77 : Suction lift exists when the source of water supply is _____ .	
A	Above the center line of pump

B	At the center line of pump
C	Below the center line of pump
D	None of these are correct
Answer Key: **C**	

Q78 : An aquifer found between two impervious layers is said to be _____ .	
A	Leaky aquifer
B	Non artesian aquifer
C	Artesian aquifer
D	Semi confined aquifer
Answer Key: **C**	

Q79 : Break horse power of centrifugal pump increases as the discharge _____ .	
A	Decreases
B	Remains unchanged
C	Increases
D	None of these are correct
Answer Key: **C**	

Q80 : I. The application rate of sprinkler depends on the size of sprinkler nozzle. II. The application rate of sprinkler depends on operating pressure and spacing between the sprinklers. Which of the following statements is correct	
A	Statement I is correct and II is incorrect
B	Statement II is correct and I is incorrect
C	Both statements I and II are correct
D	Both statements II and I are incorrect

Answer Key: **C**

Q81 As compared to conventional irrigation, _____ saving of water can be achieved by drip irrigation. **:**	
A	5 to 10%
B	10 to 15 %
C	15 to 30 %
D	40 to 60 %
Answer Key: **D**	

Q82 Drip irrigation can achieve the efficiency of about _____%. **:**	
A	90 to 95
B	70 to 85
C	60 to 70
D	40 to 60
Answer Key: **A**	

Q83 The electrical conductivity of alkali soils is usually _____ . **:**	
A	10 to 12 ds m^{-1}
B	6 to 8 ds m^{-1}
C	4 to 6 ds m^{-1}
D	Less than 4 ds m^{-1}
Answer Key: **D**	

Q84 Gypsum is commonly used for reclamation of _____ type of soil. **:**	
A	Vertisol
B	Sodic

C	Saline
D	Inceptisol
Answer Key: **B**	

Q85 The drainable porosity at saturation is _____ . **:**	
A	100
B	50
C	0
D	None of these are correct
Answer Key: **C**	

Q86 Drainage coefficient is the depth of water (cm) to be removed from an area in a period of **:**	
A	12 hours
B	24 hours
C	6 hours
D	10 hours
Answer Key: **B**	

Q87 The speed of sprinkler head should be about _____ for maximum coverage. **:**	
A	4-6 rpm
B	3-4 rpm
C	2-3 rpm
D	Less than 1 rpm
Answer Key: **D**	

Q88 A sheet of water, which overflows a weir, is called as _____ . **:**

A	Nappe
B	Head
C	Either (Nappe) OR (Head)
D	None of these are correct
Answer Key: **A**	

Q89 : _____ is the soil moisture content at which the wilting is complete and the plants die.	
A	Permanent wilting point
B	Temporary wilting point
C	Ultimate wilting point
D	Wilting range
Answer Key: **C**	

Q90 :	The downward movement of water through saturated or nearly saturated soil in response to the gravity is called as _____ .
A	Infiltration
B	Interflow
C	Percolation
D	Seepage
Answer Key: **C**	

Q91 :	The validity of Darcy's law is limited by the condition that the flow through the porous medium must be _____ .
A	Laminar
B	Transient
C	Turbulent
D	None of these are correct
Answer Key: **A**	

Q92 :	The quantity of water that can be extracted by the gravity from unit volume of the unconfined aquifer is called as _____ .
A	Specific capacity
B	Specific storage
C	Specific yield
D	Specific gravity
Answer Key: **C**	

Q93 :	Water application efficiency in sprinkler irrigation is the ratio of water stored in the root zone to the _____ .
A	Water needed in the root zone
B	Water diverted from source
C	Water delivered to the field
D	Water pumped from source
Answer Key: **C**	

Q94 :	Quantity of water discharged in tile drain increases due to I. Increase in drain spacing and increase in depth of drain II. Reduction in drain spacing and reduction in depth of drain Which of the following is correct?
A	Statement I is true and statement II is false
B	Statement II is true and statement I is false
C	Both statements I and II are true
D	Both statements I and II are false
Answer Key: **D**	

Q95 :	Evapotranspiration is measured by _____ .
A	Blaney - criddle method

B	Lysimeter
C	Penman method
D	All are correct
Answer Key: **B**	

Q96 :	What would be delta for a crop when its duty is 864 hectare /cumec on a field, if the base period of the crop is 120 days?
A	72
B	120
C	6220.8
D	None of these are correct
Answer Key: **B**	

Q97 :	_____ is used as crop for determination of reference crop evapotranspiration.
A	Sunflower
B	Stylo grass
C	Alfalfa grass
D	Sugar cane
Answer Key: **C**	

Q98 :	In hard rock terrains _____ wells are recommended.
A	Open wells
B	Bore wells
C	Both 'Open wells' and 'Bore wells'
D	None of these are correct
Answer Key: **A**	

Q99:	Wheat crop require 45 cm irrigation water during 120 days of base period. How much area can be irrigated with a flow of 20 liter per second for 22 hours per day?
A	41.24 ha.
B	42.24 ha.
C	43.24 ha.
D	45.24 ha.
Answer Key: **B**	

Q100:	The discharge of a centrifugal pump is 6000 liter/min against a head of 15m. The pump efficiency is 60 per cent. What would be the size of motor required?
A	31.3 hp
B	33.3 hp
C	35.3 hp
D	None of these are correct
Answer Key: **B**	