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Booklet Serial No. 019255

Test Booklet Series

TEST BOOKLET - 2021

Assistant Engineer (Civil), Deputy Research Officer/Assistant Research Officer Written Test - 2021E (Civil)

(31)

C

Time Allowed: Two Hours *Maximum Marks: 120*

INSTRUCTIONS

1. IMMEDIATELY AFTER THE COMMENCEMENT OF THE EXAMINATION, YOU SHOULD CHECK THAT THIS TEST BOOKLET ***DOES NOT*** HAVE ANY UNPRINTED OR TORN OR MISSING PAGES OR ITEMS, ETC. IF SO, GET IT REPLACED BY A COMPLETE TEST BOOKLET.
2. **Please note that it is the candidate's responsibility to encode and fill in the Roll Number and Test Booklet Series Code A, B, C or D carefully and without any omission or discrepancy at the appropriate places in the OMR Answer Sheet/Response Sheet. Any omission/ discrepancy will render the Answer Sheet/Response Sheet liable for rejection.**
3. You have to enter your Roll Number on the Test Booklet in the Box provided alongside. ***DO NOT*** write ***anything else*** on the Test Booklet.
4. This Test booklet contains **120** items (questions). Each item comprises of four responses (answers). You will select the response which you want to mark on the Answer Sheet/Response Sheet. In case you feel that there is more than one correct response, mark the response which you consider the best. In any case, choose ***ONLY ONE*** response for each item.
5. You have to mark all your responses ***ONLY*** on the separate Answer Sheet/Response Sheet provided. *See directions in the Answer Sheet/Response Sheet.*
6. ***All*** items carry equal marks.
7. Before you proceed to mark in the Answer Sheet/Response Sheet, the response to various items in the Test Booklet, you have to fill in some particulars in the Answer Sheet/Response Sheet as per instructions sent to you with your Admission Certificate.
8. After you have completed filling in all your responses on the Answer Sheet/Response Sheet and the examination has concluded, you should hand over to the Invigilator ***only the Answer Sheet/Response Sheet***. You are permitted to take away with you the Test Booklet and ***Candidate's Copy of the Answer Sheet/Response Sheet .***
9. Sheets for rough work are appended in the Test Booklet at the end.
10. While writing Centre, Subject and Roll No. on the top of the Answer Sheet/Response Sheet in appropriate boxes use **"ONLY BALL POINT PEN".**
11. There will be **Negative** marking for incorrect answers.

SEAL

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Q.1) A splitting tensile test is performed on a cylinder of diameter D and length L. If the ultimate load is P then the splitting tensile strength of concrete is given by

A) $\frac{P}{\pi DL}$

B) $\frac{2P}{\pi DL}$

C) $\frac{4PL}{\pi D^3}$

D) $\frac{2PD}{\pi L^3}$

Q.2) Match the following List - I with List - II

List - I		List - II	
a)	Blue Strain	i)	Cellulose
b)	Brown Rot	ii)	Sap Wood
c)	White Rot	iii)	Lignin

A) (a - i), (b-ii), (c - iii)

B) (a - ii), (b - i), (c - iii)

C) (a - iii), (b - ii), (c - i)

D) (a - i), (b - iii), (c - ii)

Q.3) CPM is the

A) Time oriented technique

B) Event oriented technique

C) Activity oriented technique

D) Target oriented technique

Q.4) Slump and compaction factors are two different measures of workability of concrete for a slump of 0-20mm what is the equivalent range of compaction factor?

A) 0.50-0.70

B) 0.70-0.80

C) 0.80-0.85

D) 0.85-0.92

Q.5) The Le-Chatlier's apparatus can identify the unsoundness of cement due to presen of

A) Free lime

B) Magnesia only

C) Both free lime and magnesia

D) Alumina

Q.6) Match List - I (Item) with List - II (Characteristics) and select the correct answer us the codes given below the lists:

List - I	List - II
a. Activity	i. Resourceless element
b. Event	ii. Resourceless consuming element
c. Dummy	iii. Spare time
d. Float	iv. Instantaneous stage

Codes:

	a	b	c	d
A)	i	iii	iv	ii
B)	ii	i	iv	iii
C)	ii	iv	i	iii
D)	iii	iv	i	ii

Q.7) Free float is mainly used to

A) Identify the activities which can be delayed without affecting the total floa preceding activity

B) Identify the activities, which can be delayed without affecting the total floa succeeding activity

C) Establish priorities

D) Identify the activities which can be delayed without affecting the total floa either the preceding or succeeding activites.

SEAL

Q.8) Following stone is suitable for damp proofing.

A) Slate
B) Marble
C) Laterite
D) Granite

Q.9) To make one cubic metre of 1:2:4 by volume concreate, the volume of coarse agregates required is

A) $0.98m^3$
B) $0.88m^3$
C) $0.78m^3$
D) $0.68m^3$

Q.10) For complete hydration of cement the w/c ratio needed is

A) Less than 0.25
B) More than 0.25 but less than 0.35
C) More than 0.35 but less than 0.45
D) More than 0.45 but less than 0.60

Q.11) The art and science of map making is called as _____

A) Cartography
B) Geography
C) Cryptography
D) Typography

Q.12) Which of the following can be used as a map substitute?

A) Terrestrial photographs
B) Vertical aerial photograph
C) Oblique aerial photograph
D) Vertical aerial photo - mosaics

Q.13) Consider the following statements:

The general principles of Surveying are

i) To work from part of whole
ii) To locate a new station by measurements from at least two fixed reference points already established and/or identifiable

Which of the above statements are correct?

A) (i) only
B) (ii) only
C) Both (i) and (ii)
D) Neither (i) nor (ii)

Q.14) Which of the following methods of con-touring is most suitable for a hilly terrain?

A) Direct method

B) Square method

C) Cross - sections method

D) Tachometric method

Q.15) Virtual transition is the

A) The change in the direction of the train from a straight line to a curve over the shortest distance between the bogie centre

B) The change in the motion of the train from a straight line to a curve over the shortest distance between the bogie centre.

C) The change in the motion of the train from a curve line to a curve over the shortest distance between the bogie centre.

D) The change in the motion of the train from a straight line to a curve over the shortest distance between the bogie end.

SEAL

Q.16) What is the steepest gradient permissible on a 2° curve for B.G. line having using gradient of 1 in 200?

A) 1 in 250

B) 1 in 238

C) 1 in 209

D) 1 in 198

Q.17) A tongue rail is also called as

A) Stock rail

B) Switch rail

C) Point rail

D) Pull rail

Q.18) In a railway track to reduce the wear and tear as well as lateral stresses the rails are tilted at a slope of

A) 1 in 10

B) 1 in 20

C) 1 in 30

D) 1 in 40

Q.19) While driving at a speed of 30 kmph (f=0.4) down the grade, the driver requires a braking distance twice that required for a stopping the vehicle when travels up the same grade. The grade is

A) 7% B) 10.6%

C) 13.3% D) 33.3%

Q.20) For conditions prevailing in india, at which location in a cement concrete pavement will the combined stresses due to traffic wheel load and temperature have to be critically checked during design?

A) Corner B) Corner and interior

C) Corner and edge D) Corner, edge and interior

Q.21) In highway pavements emulsions are mainly used in

A) Surface dressing

B) Patching and maintenance

C) bitumen macadam

D) Asphaltic concrete

Q.22) In Marshall testing of bituminous mixes, as the bitumen content increases the flow value

A) Remains constant

B) Decrase first and then increases

C) Incrase monotonically

D) Increase first and then decreases

Q.23) Flexible pavements derive stability primarily from:

A) Aggregate interlock, particle friction and cohesion

B) Cohesion alone

C) The binding power of bituminous materials

D) The flexural strength of the surface course

Q.24) Orographic rain occurs when the air is cooled sufficiently as a result of

A) Lifting due to flow over a mountain barrier

B) Relative movement of two large air masses

C) Violent up throw of air arising from localized heating

D) Cyclonic conditions

Q.25) In Muskingum method of flood routing the weighing factor can have a value between

A) -0.5 to 0.5

B) 0 to 0.5

C) 0 to 1

D) -1 to +1

Q.26) A hyetograph is a graph representing

A) Rainfall volume with time

B) Rainfall intensity with time

C) Rainfall volume with duration

D) Rainfall intensity over an area

SEAL

Q.27) The hydrologic risk of a 100 year flood occuring during the 2-year service life of project is

A) 9.8%

B) 9.9%

C) 19.9%

D) 1.99%

Q.28) The rate of rainfall for the successive 30 min periods of a 3-hour storm are: 1.6, 5.0, 2.8, 2.2 and 1.0 cm/hour. The corresponding surface runoff is estimated to be 3.2 Then, the ϕ - index is

A) 1.5 cm/h

B) 1.8 cm/h

C) 2.1 cm/h

D) 2.4 cm/h

Q.29) A culvert is designed for a flood frequency of 100 years and a useful life of 20 y The risk involved inthe design of the culvert (in percentage up to two decimal plac

A) 18.209%

B) 20.78%

C) 34.90%

D) 16.90%

Q.30) Dupuit's assumptions are valid for .

A) Artesian aquifer
B) Confined aquifer
C) Leaky aquifer
D) Unconfined aquifer

Q.31) Penman's evapo-transpiration equation is based on

A) Water budget method
B) Energy balance method
C) Mass transfer method
D) Energy balance and mass transfer approach

Q.32) Forces which are considered for the analysis of elementrary profile of gravity dam under empty reservoir condition are

i) Water pressure
ii) Self-weight
ii) Uplift
iv) Earthquake pressure

Identify correct combination

A) Only (i)
B) (i) (ii) and (iii)
C) (i), (ii) & iv
D) (i), (ii), (iii), & (iv)

Q.33) Trap efficiency of a reservoir is function of

A) Capacity/inflow ratio
B) Capacity/outflow ratio
C) Outflow/inflow ratio
D) Storage/inflow ratio

Q.34) According to the Hydraulic design, the dams are classified as _____

A) Diversion and deterntion dams
B) Storage and diversion dams
C) Overflow and non-overflow dam
D) Arch and buttress dam

Q.35) in a flow-mass curve study, the demand line drawn from a ridge does not interese the mass curve again. This implies that

A) The reservoir is not full at the beginning

B) The storage is not adequate

C) The demand cannot be met by the inflow as the reservoir will not refill

D) The reservoir is wasting water by spill.

Q.36) The ratio of the quantity of water stored in the root zone of the crops to the quant of water actully delivered in the field is known as

A) Water conveyance efficiency

B) Water application effcinecy

C) Water use efficiency

D) Consumptive use

SEAL

Q.37) The delta for a crop having base period 120 days is 70 cm. What is the duty?

A) 2490 hectare/cumec B) 1481 hectare/cumec

C) 148 hectare/cumec D) 1.481 hectare/cumec

Q.38) The intensity of irrigation for the Kharif season is 50% for an irrigation project w culturable command area of 50,000 hectares. The duty for the Kharif season is 1(hectare/cumec. Assuming transmission loss of 10% the required discharge (in cum up to two decimal places) at the head of the canal is _____

A) 35 B) 28

C) 20 D) 16

Q.39) Which type of fall can be generally used for a moderate discharge of 40-50 cum and a low fall heights of 1 to 1.5m?

A) Vertical drop fall B) Ogee fall

C) Glacis fall D) Baffle wall

Q.40) Consider following statements about water logging:

i) Water logging is the rise of ground water table leading to possible increase in salinity resulting in a reduction in the yield of crops

ii) Water logging cannot be eliminated in certain areas but can be controlled only if the quanitty of water percolating into that soil is checked and reduced. Which of the following is/are corect?

A) (i) Only
B) (ii) only
C) Both (i) and (ii)
D) Neither (i) nor (ii)

Q.41) It is required to supply water to a population of 20,000 at a per capital demand of 150 litres per day. The disinfectant used for chlorination is bleaching powder which contains 30% of available chlorine. Determine how much of bleaching powder is required annually at the water works, if 0.3 ppm of chlorine does is required for disinfection?

A) 120 kg
B) 995 kg
C) 1469 kg
D) 1095 kg

Q.42) Match List - I and List II and select the correct answer using the codes given as per chronology of List I

List - I	List - II
a. Grit chamber	i. Zone settling
b. Secondary settling tank	ii. Stoke's law
c. Activated sludge process	iii. Aerobic
d. Trickling filter	iv. Contact stabilization

A) i, ii, iii, iv
B) ii, i, iii, iv
C) i, ii, iv, iii
D) ii, i, iv, iii

Q.43) Suitable method for forecasting population of a young and rapidly growing city

A) Arithmetic Increase method
B) Geometrical increase method
C) Incremental increase method
D) Graphical Method

Q.44) A water supply board is responsible for treating 1500 m^3/day of water. A settling column analysis indicates that an overflow rate of 20 m/day will produce satisfactory removal for a depth of 3.1 m. It is decided to have two circular settling tanks in parallel. The required diameter (expressed in m) of the settling tanks is _____

A) 6.9 B) 9.2

C) 4.5 D) 3

Q.45) Cleaning is done by

A) Scraping and removal in filtersslow sand

B) Back washing in slow sand filters

C) Scraping and removal in filtersrapid sand

D) Back washing in rapid sand filters

SEAL

Q.46) Chlorine demand of water is equal to

A) Applied chlorine B) Sum of applied and residual chlorine

C) Residual chlorine D) Difference of applied and residual chlori

Q.47) Match the items in Group - I with those in Group - II and choose the right combinati

Group - I		**Group - II**	
P.	Activated sludge process	i.	Nitrifiers and denitrifiers
Q.	Rising of sludge	ii.	Autotrophic bacteria
R.	Conventional nitrification	iii.	Heterotrophic bacteria
S.	Biological nitrogen removal	iv.	Denitrifiers

A) P-iii, Q-iv, R-ii, S-i B) P-ii, Q-iii, R-iv, S-i

C) P-iii, Q-ii, R-iv, S-i D) P-i, Q-iv, R-ii, S-iii

Q.48) A coastal city produced municipal solid waste (MSW) with high moisture content, high organic materials, low calorific value and low inorganic materials. The most effective and sustainable option for MSW management in that city is

A) Composting
B) Dumping at sea
C) Incineration
D) Landfill

Q.49) Sewage treatment in an oxidation pond is accomplished primarily by:

A) Alga-bacterial symbiosis
B) Algal photosynthesis only
C) Bacterial oxidation only
D) Chemical oxidation only

Q.50) Assertion [a]; At a manhole, the crown of the outgoing sewer should not be higher than the crown of the incoming sewer.

Reason [r]: Transition from a larger diameter incoming sewer to a smaller diameter outgoing sewer at a manhole should not be made.

The CORRECT option evaluating the above statement is:

A) Both [a] and [r] are true and [r] is the correct reason for [a]
B) Both [a] and [r] are true but [r] is not the correct reason for [a]
C) Both [a] and [r] are false
D) [a] is true but [r] is false

Q.51) A sample of domestic sewage is digested with silver sulphate, sulphuric acid, potassium dichromate and mercuiric sulphate in chemical oxygen demand (COD) test. The digested sample is then titrated with standard ferrous ammonium sulphate (FAS) to determine the un-reacted amount of

A) Mercuric sulphate
B) Potassium dichromate
C) Silver sulphate
D) Suphuric acid

Q.52) A settling velocity of a particle is 0.7 cm/s and the overflow rate of a horizontal clarifier is 0.80 cm/s. What percent of particle are retained in clarifier?

A) 80%
B) 78%
C) 88%
D) 72%

Q.53) Sludge volume index is defined as the ratio of

A) Percentage of sludge by volume to percentage of suspended solids by weight

B) Percentage of sludge by volume to percentage of total solids by weight

C) Percentage of suspended solids by weight to percentage of sludge by volume

D) Percentage of total solids by weight to percentage of sludge by volume

Q.54) If 2% solution of a sewage sample is inclubated for 5 days at 20°C and depletion o oxygen was found to be 5 ppm, B.O.D. of the sewage is

A) 200 ppm

B) 225 ppm

C) 250 ppm

D) None of these

Q.55) Septic tank works on the principles of

i) Anaerobic sludge digestion

ii) Aerobic sludge digestion

iii) Facultative sludge digestion

iv) Sedimentation

Identify correct combination

A) i & iii

B) ii & iii

C) i & iv

D) ii & iv

Q.56) If the Coliform bacteria is present in a water sample, then the coliform test to conducted is

i) Presumptive test

ii) Confirmed Coliform test

iii) Completed coliform test

Identify the correct combination

A) (i) and (ii)

B) (i) and (iii)

C) (ii) and (iii)

D) (i) (ii) and (iii)

Q.57) For a given discharge, the efficiency of sedimentation can be increased by

A) Increasing the depth of the tank

B) Decreasing the depth of the tank

C) Increasing the surface are of the tank

D) Decreasing the surface area of the tank

Q.58) Assertion A: Slow sand filters are more efficient in removal of bacteria than rapid sand filters.

Reason R: The sand used in slow sand filters is finer than that in rapid sand filters.

Select your answer based on the coding system given below:

A) Both A and R are true and R is the correct explanation of A

B) Both A and R are true but R is not the correct explanation of A

C) A is true but R is false

D) A is false but R is true

Q.59) The correct relationship between theoretical oxygen demand (TOD), biochemical oxygen demadn (BOD) and, chemical oxygen demand (COD) is given by

A) TOD>BOD>COD

B) TOD>COD>BOD

C) COD>BOD>TOD

D) BOD>COD>TOD

Q.60) Skimming tanks are

A) Used to remove the grease and oil

B) Those from which sludge is skimmed out

C) Tanks provided with self - cleansing screens

D) Improved version of grit chambers

Q6.1) Consider each floor height of a building is 10m. From approximately what floo that building must a car be dropped from an at-rest position so that it reaches a sp of 80.7 ft/s (24.59 m/s) when it hits the gournd?

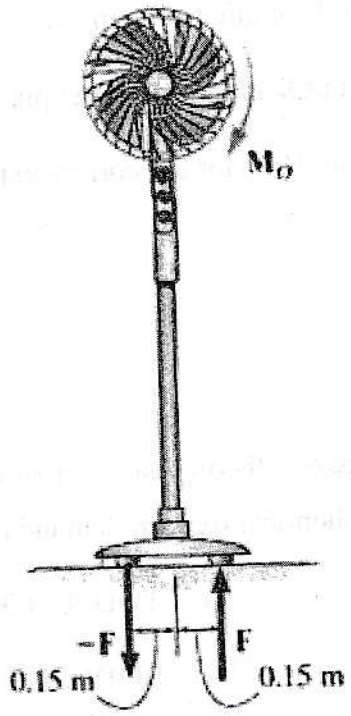
A) The car must be dropped from the 5th floor

B) The car must be dropped from the 2nd floor

C) The car must be dropped from the 3rd floor

D) The car must be dropped from the 10th floor.

Q.62) The frictional effects of the air on the blades of the standing fan creates a couple mor of M_0=6.0N.m on the blades. What would be the magnitude of the couple forces a base of the fan so that the resultant couple moment on the fan is zero?



A) 20 N

B) 6 N

C) 26 N

D) None of the above

Q.63) During an elastic collision, which of the following quantities is conserved?

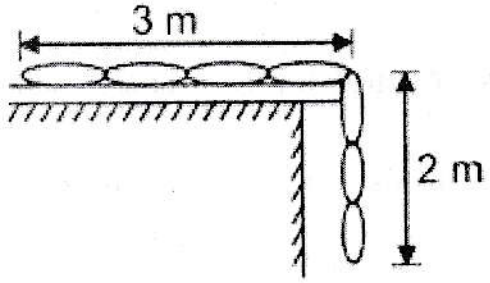
A) Kinetic energy alone

B) Momentum alone.

C) Speed alone

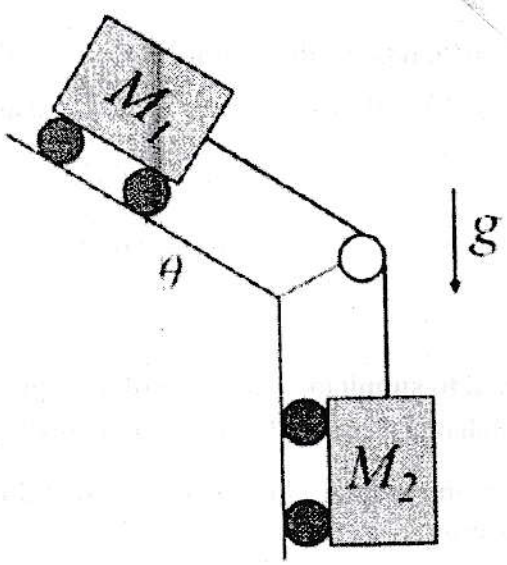
D) Both (a) and (b)

Q.64) A flexible in -extendable chain of length $L = 5$m and weight 10kg is held on a smooth table with an initial overhang $a = 2$m as shown in the following figure. Calculate the velocity v with which the chain will leave the table if released. (Consider acceleration due to gravity. $g = 9.8$ m/s^2)



A) 3.2 m/s
B) 6.4 m/s
C) 2.1 m/s
D) 4.5 m/s

Q.65) Two carts are connected by a massless cable, which does not stretch. For the purposes of this problem the carts may be treated as particles, Gravity is present. Ignore friction. How many independent coordinates are necessary to completely describe the motion of this system?



A) 2
B) 1
C) 5
D) 3

Q.66) Identify the FALSE statement from the following pertaining to the methods of structura analysis.

A) Influence lines for stress resultants in beams can be drawn using Muller Breslau' Principle

B) The Moment Distribution Method is a force method of analysis, not a displacemen method.

C) The Principle of virtual dispalcements can be used to establish a condition o equilibirum.

D) The flexibility matrix Mehod is a force method of analysis, not a displacemer method.

Q.67) A 15m long beam is supported over 10m span with equal overhang on both the sides. carries point loads of 50kN each at its ends and a point load of 90kN at the centre. Fir the distance of point of contraflexure from the left support.

A) 5.28 m

B) 4.75 m

C) 2.78 m

D) 3.58 m

Q.68) According to Indian Standards, the length of portion of the test piece on which ductili may be measured is : (A is the original cross-sectional area)

A) $6.56A^2$

B) $5.65A^{1/2}$

C) $6.56A$

D) $5.65A$

Q.69) A shaft is subjected to simultaneous action of a torque T, bending moment M and axial thrust F. Which one of the following statements is correct for this situation?

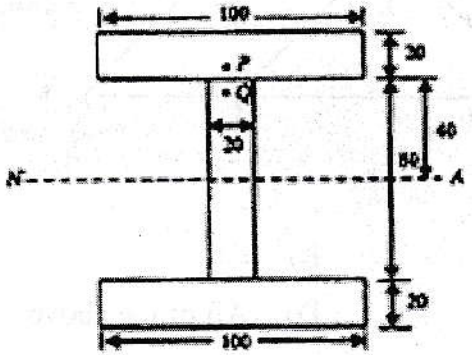
A) One extreme end of the vertical diametric fibre is subjected to maximu compressive stress only

B) The opposite extreme end of the vertical diametric fiber is subjected to tens compressive stress only

C) Every point on the surface of the shaft is subjected to maximum shear stress o

D) Axial longitudinal fibre of the shaft is subjected to compressive stress only

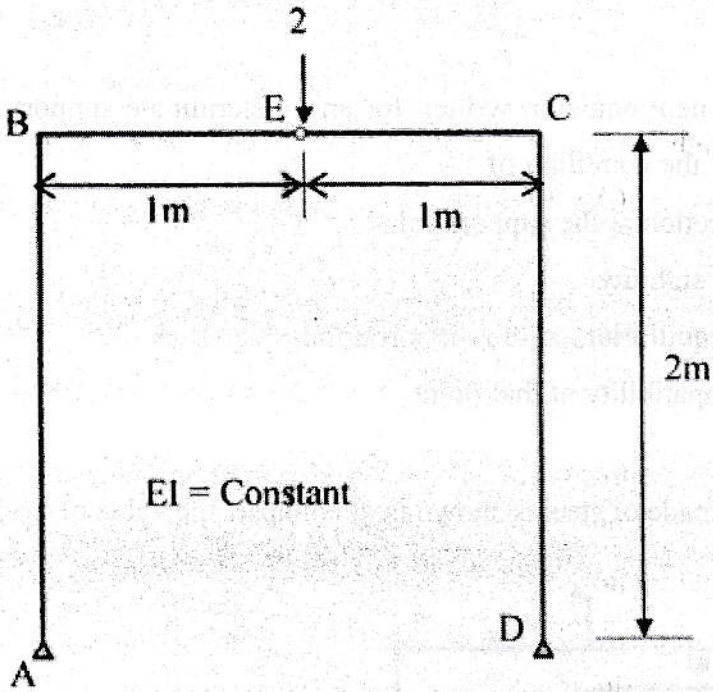
Q.70) The given figure (all dimensionsare in mm) shows an I - Section of the beam. The shear stress at point P (very close to the bottom of the flange) is 12 MPa. The stress at point Q in the web (very close to the flange) is:



A) Indeterminable due to incomplete data B) 60MPa

C) 18 MPa D) 12 MPa

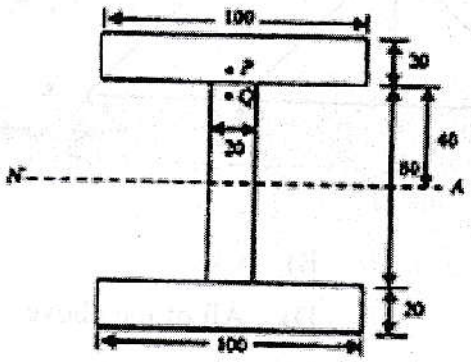
Q.71) The deflection under the load in the symmetric three hinged portal frame shown below is:



A) $\frac{1}{3EI}$ B) $\frac{1}{EI}$

C) $\frac{1}{6EI}$ D) $\frac{1}{8EI}$

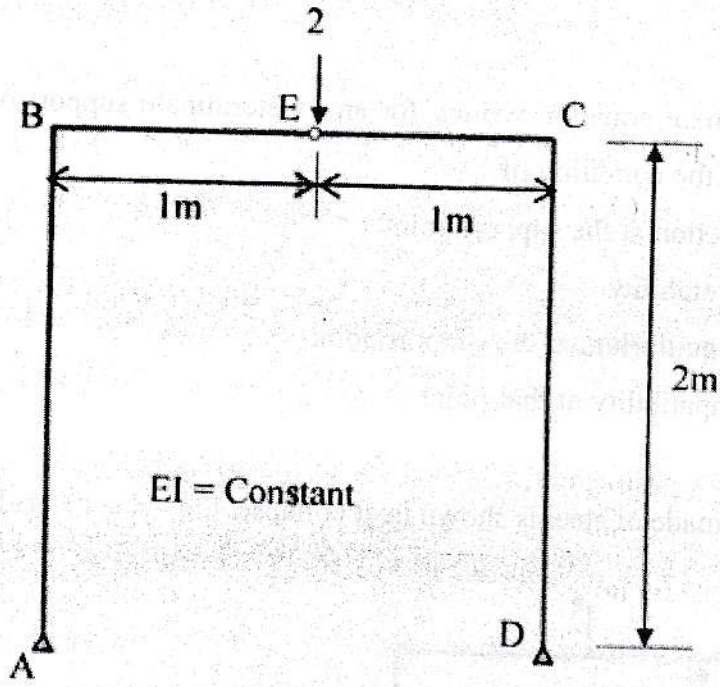
Q.70) The given figure (all dimensionsare in mm) shows an I - Section of the beam. The shear stress at point P (very close to the bottom of the flange) is 12 MPa. The stress at point Q in the web (very close to the flange) is:



A) Indeterminable due to incomplete data B) 60MPa

C) 18 MPa D) 12 MPa

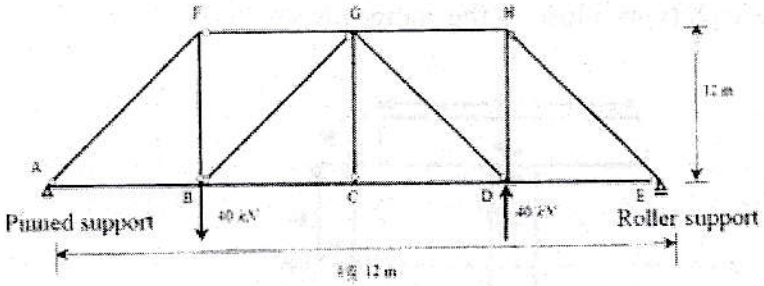
Q.71) The deflection under the load in the symmetric three hinged portal frame shown below is:



A) $\frac{1}{3EI}$ B) $\frac{1}{EI}$

C) $\frac{1}{6EI}$ D) $\frac{1}{8EI}$

Q.72) The zero force members in the truss provided below are:



A) BC
B) CG
C) CD
D) All of the above

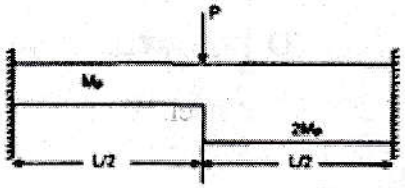
Q.73) The free end of a cantilever beam of length 2m and flexural stiffness *EI* is given a transverse displacement Δ without any rotation. The vertical reaction at the fixed end due to this displacement is:

A) $1.5\,EI\Delta$
B) $0.5\,EI\Delta$
C) $3.5\,EI\Delta$
D) $2\,EI\Delta$

Q.74) The three moment equation written for an indeterminate support of a continuous beam expresses the condition of

A) Zero deflection at the support point
B) Structural stability
C) Moment equilibrium at the support point
D) Slope compatibility at that point

Q.75) A fixed beam made of steel is shown in at collapse, the value of load P will be equa to



A) $10M_p/L$
B) $12M_p/L$
C) $16M_p/L$
D) $20M_p/L$

31(C) **(20)**

Q.76) Through which of the following responses may a steel tubular hinged strut fail?

i. Compression

ii. Bending

iii. Overall buckling

iv. Torsion

v. Skin buckling

A) ii, iv and v

B) i, ii, and iii

C) iii, iv and v

D) i, iii, and v

Q.77) Web buckling occurs in a beam due to excessive _____

A) Direct tensile stress in the web

B) Bending tensile stress in the web

C) Torsional shear stress in the web

D) Compressive stress in the web

Q.78) Gantry girders are designed to resist

A) Lateral loads

B) Longitudinal and vertical loads

C) Lateral, longitudinal, and vertical loads

D) Lateral and longitudinal loads

Q.79) As per IS 800-2007, to reduce the effect of bending stress on bolt the grip length should not exceed.

A) 3d

B) 5d

C) 6d

D) 8d

Q.80) A cantilever beam of size 300mm ×550mm with 3 bars of 12mm diameter in tension zone, has a span of 3m, adopt M20 concrete and Fe500 steel. The depth of neutral axis is (assume clear cover as 25mm)

A) 259.5mm

B) 121.5mm

C) 68.3mm

D) 415mm

Q.81) The main reinforcement of a RC slab consists of 10mm bars at 10cm spacing. If i desired to replace 10mm bars by 12mm bars, then the spacing of 12mm bars should

A) 12.40cm B) 4.40cm

C) 14.40cm D) 16.40cm

Q.82) A hall of 10m × 15m consists of a number of beams with 3m center to center paralle the shorter span of the hall. Width of web is 250mm thickness of slab is 100mm, beams are cast monolithic with columns at their ends. The effective width of flange o end beam is

A) 2.01m B) 1.13m

C) 3.0m D) 1.38m

Q.83) The maximum diameter of the reinforcement bars in RCC slab of 150mm thicknes

A) 18mm B) 16mm

C) 20mm D) 25mm

SEAL

Q.84) At the limit state of collapse, an RCC beam is subject to a shear force of 20KN torque of 9KN-m. The beam is 300mm wide and have 425mm gross depth with an effec cover of 25mm. The equivalent normal shear stress is.

A) 0.166 MPa B) 0.45 MPa

C) 0.466 MPa D) 0.566 MPa

Q.85) Thickened part of a flat slab over its supporting column, is technically known as

A) Drop Panel B) Capital

C) Column head D) None of these

Q.86) A Pitot - Static tube, with a coefficient of 0.98 is used to measure the velocity water in a pipe. The stagnation pressure recorded is 3 m and static pressure is 0. What is the velocity of the flow?

A) 7.2 m/s B) 6.8 m/s

C) 5.9 m/s D) 5.2 m/s

Q.87) As the depth of immersion of a vertical plane surface increases, the location of centre of pressure

A) Falls close to the centre of gravity of the area

B) Moves away from the centre of gravity of the area

C) Ultimately coincides with the centre of gravity of the area

D) Falls much below the centre of gravity of the area

Q.88) Bernoulli's equation is applicable for

A) Viscous and compressible fluid flow

B) Inviscid and compressible fluid flow

C) Inviscid and incompressible fluid flow

D) Viscous and incompressible fluid flow

Q.89) A river whose discharge is 10^5 cumecs is to be studied by a 1: 100 scale model in a laboratory. The discharge required in the model is:

A) 0.5m3/s B) 10 m3/s

C) 1m3/s D) 5 m3/s

Q.90) Match LIST 1 (non - dimensional numbers) with LIST 2 (application) and select the correct answers using the codes given below.

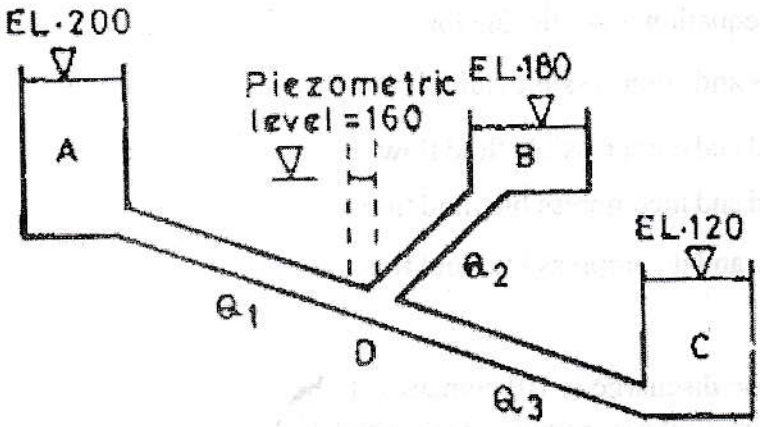
LIST 1	LIST2
i) Mach Number	1. Waves in an ocean
ii) Thomas Number	2. Launching action of apron
iii) Reynolds Number	3. Cavitations phenomenon
iv) Weber Number	4. Capillary flow in soil
	5. Motion of a submarine

	A	B	C	D
A)	1	3	5	2
B)	3	2	4	1
C)	2	3	5	4
D)	2	1	3	4

Q.91) The phenomenon of generation of lift by rotating an object placed in a free strea known as

A) Coanda effect
B) Magnus Effect
C) Scale effect
D) Buoyancy Effect

Q.92) Three reservoirs A, B and C are interconnected by pipes as shown in the given fig Water surface elevations in the reservoirs and the piezometric level at the junction D also indicated in the figure.



Flows Q_1, Q_2 and Q_3 are related as

A) $Q_1+Q_2=Q_3$
B) $Q_1-Q_2=Q_3$
C) $Q_2+Q_1=Q_3$
D) $Q_1+Q_2+Q_3=0$

Q.93) Consider the following statements:

A horizontal pipe reduced from 10 cm to 5 cm in diameter. If the pressure head at 1 section is 10 metres and velocity head is 1 metre, then the

i. Total head at any points is 11 metres.
ii. Pressure head at the 5 cm section is negative
iii. Discharge varies proportionate to the diameter
iv. Datum head at all sections is constant

Identify the correct statements

A) (i), (ii) and (iv)
B) (i) and (iii) are correct
C) Only (iv)
D) All are correct

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Q.94) When wind is blowing over a reservoir, a boundary layer will develop.

A) In both air and water

B) Neither in air nor in water

C) In air but not in water

D) In water but not in air

Q.95) While conducting the flow measurements using a triangular notch is observed. The percentage error in the computed discharge would be

A) +7%

B) -3%

C) +5%

D) -4%

Q.96) The relative thickness (δ/x) of turbulent boundary layer on a flat plate

A) Decreases with distance (x)

B) Increases with distance (x)

C) Remains constant

D) Depends on relative roughness

Q.97) The flow in a horizontal, frictionless rectangualr open channel flow is supercritical. A smooth hump is built on the channel floor. As the height of hump is increased, choked condition is attained. With further increase in the height of hump, the water surface will

A) Rise at a section upstream of the hump

B) Drop at a section upstream of the hump

C) Drop at the hump

D) Rise at the hump

Q.98) Shear Velocity is

A) A non - dimensional quantity

B) The velocity of fluid at the edge of laminar sublayer

C) A fictitious quantity

D) The velocity of fluid at the edge of roughness element

Q.99) For a given discharge in an open channel, there are two depths which have the specific energy. These two depths are known as

A) Alternate depths

B) Critical depths

C) Normal Depths

D) Sequent Depths

SEAL

Q.100) Which of the following component parts for an oil pressure governor in mo turbines?

i. Servomotor, known as relay cylinder

ii. Oil sump

iii. Oil pump which is driven by belt connected to turbine main shaft

iv. Draft Tube

A) (i), (ii) and (iii) only

B) (i), (ii) and (iv) only

C) (i), (iii) and (iv) only

D) (ii), (iii) and (iv) only

Q.101) Two Pelton turbines A and B have the same specific speed and are working un the same head. Turbine A produces 400kW at 1000 rpm. If turbine B produces 100k then its rpm is

A) 4000

B) 2000

C) 1500

D) 3000

Q.102) The installation of sand drains in clayey soil causes the soil adjacent to the sand drains to undergo which one of the following?

A) Increase in porosity

B) Increase in compressibility

C) Decrease in horizontal permeability

D) Decrease in shear strength

Q.103) In case of footing on the surface of shallow depth is very dense sand, which one of the following types of failure is likely to occur?

A) Punching shear failure

B) Local shear failure

C) General shear failure

D) Any of the above three

Q.104) Coulomb's theory of earth pressure is based on

A) The theory of elasticity

B) The theory of plasticity

C) Empirical rules

D) Wedge theory

Q.105) A flow net is drawn to obtain

A) Seepage, coefficient of permeability and uplift pressure

B) Coefficient of permeability uplift pressure and exit gradient

C) Exit gradient, uplift pressure and seepage quantity

D) Exit gradient, seepage and coefficient of permeability

Q.106) As per the Indian Standard soil classification system, a sample of silty clay with liquid limit of 40% and plasticity index of 28% is classified as

A) CH

B) CI

C) CL

D) CL - ML

Q.107) Consider the following statements

i. Permeability of a soil decreases as the effective stress acting on the soil increases.

ii. The presence of organic matter in the soil increases its permeability

iii. Entrapped air decreases the permeability of a soil.

Which of these statements is/are correct?

A) (i) only

B) (i) and (ii)

C) (ii) and (iii)

D) (i) and (iii)

Q.108) What is the intensity of active earth pressure at a depth 10.0 m in dry sand with an angle of shearing resistance of 30° and unit weight of 18kN/m3?

A) 50 kN/m2

B) 60 kN/m2

C) 70 kN/m2

D) 80 kN/m2

Q.109) Sheep-foot rollers are recommended for compacting

A) Granular soils

B) Cohesive soils

C) Hard rock

D) Any type of soil

Q.110) Shear failure of soil takes place when

A) The angle of obliquity is maximum

B) Maximum cohesion is reached in cohesive soils

C) θ reaches its maximum value in cohesionless soils

D) Residual strength of the soil is exhausted

Q.111) Factor of safety against sliding of a slope, is the ratio of

A) Actual cohesion to that required to maintain stability of slope

B) Shear strength to shear stress along the surface

C) Neither (A) or (B)

D) Both (A) and (B)

Q.112) The ultimate consolidation settlement of a structure resting on a soil.

A) Decreases with the increase in the initial voids ratio.

B) Decreases with the decrease in the plastic limit

C) Increases with the increase in the initial voids ratio

D) Increases with the decrease in the porosity of the soil

Q.113) The pile capacity in foundation is controlled by

A) Structural strength of the pile

B) Supporting strength of the soil

C) Driving capacity of the hammer

D) Structural strength of the pile and supporting strength of the soil

Q.114) IF water table raises to ground level of a footing resting on cohesionless soils the bearing capacity approximately _____.

A) Reduces to half

B) Reduced to one third

C) Remains same

D) None of the above

Q.115) To provide safety against piping failure, with a factor of safety of 5, what would be the maximum permissible exit gradient for soil with specific gravity of 2.5 and porosity of 0.35?

A) 0.155

B) 0.167

C) 0.196

D) 0.213

Q.116) The approximate value of cement (in 50kg bags) required for $100m^3$ of 1:2:4 ratio concrete is

A) 533 bags

B) 566 bags

C) 633 bags

D) 666 bags

Q.117) Which of the following below is not an advantage of brick flooring?

A) Fireproof

B) Cost effective

C) Slip resistant

D) Waterproof

Q.118) Pitched and sloping roofs are suitable for

A) Coastal regions

B) Plain regions

C) Desert region

D) All of the above

Q.119) If the scheduled completion time of a project is more than the earliest expected time for completion of the project, then the probability of completion of the project within the scheduled completion time will be.

A) 50%

B) Less than 50%

C) More than 50%

D) 100%

Q.120) Blistering referes to the following characteristic defect on the finished plaster surface

A) Development of one or more fissures not assignable to structural cause

B) Development of one or more local swellings

C) Development of a series of hair cracks

D) Deposit of soluble salts on surface of plaster