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UPPSC-2019

UTTAR PRADESH PUBLIC
SERVICE COMMISSION 2019

Assistant Engineer

Civil Engineering

PAPER-I

Exam held on 13-12-2020

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Questions and Answer Keys

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Q.1 इनमें से दन्त्य ध्वनियाँ हैं
(a) च, छ, ज, झ (b) प, फ, ब, भ
(c) त, थ, द, ध (d) ट, ठ, ड, ढ

Ans. (c)

Q.2 इनमें से व्यंजन सन्धि आधारित शब्द है
(a) अन्वेषण (b) उद्धार
(c) लघूर्मि (d) पुरोहित

Ans. (b)

Q.3 ''चौराहा'' शब्द में समास है
(a) तत्पुरुष (b) बहुव्रीहि
(c) अव्ययीभाव (d) द्विगु

Ans. (d)

Q.4 'निवृत्ति' शब्द का विलोम है
(a) सद्वृत्ति (b) सुवृत्ति
(c) प्रवृत्ति (d) कुवृत्ति

Ans. (b)

Q.5 निम्नलिखित में से 'शारदा' का पर्यायवाची शब्द है
(a) कमला (b) कौमुदी
(c) वारुणी (d) गिरा

Ans. (d)

Q.6 निम्नलिखित में से तद्भव शब्द है
(a) वानर (b) तेल
(c) पीत (d) घोटक

Ans. (b)

Q.7 'मृत्यु के इच्छुक' – इस वाक्यांश के लिए एक शब्द है
(a) मुमुक्षा (b) मुमूर्षु
(c) मुमूर्षा (d) मुमुक्षु

Ans. (b)

Q.8 'चीनांशुक' शब्द का अर्थ है
(a) तंतु (b) रेणु
(c) रेशम (d) चीनी मिट्टी

Ans. (d)

Q.9 'अंदर–अंदर कड़ाही में गुड़ पगना' – इस मुहावरे का सही अर्थ है
(a) ज्ञान होना (b) गुप्त मंत्रणा होना
(c) स्वसीमित होना (d) किसी काम न आना

Ans. (b)

Q.10 अनेकार्थक शब्द 'सारंग' का निम्नलिखित में से एक अर्थ नहीं है
(a) भौंरा (b) कामदेव
(c) तलवार (d) ज्योतिषी

Ans. (c)

Q.11 निम्नलिखित में से शुद्ध वर्तनी का शब्द है
(a) अनाधिकार (b) रचइता
(c) सहस्त्र (d) संग्रहीत

Ans. (c)

Q.12 समास–योजना की दृष्टि से इनमें से एक अशुद्ध युग्म है
(a) सतसई – द्विगु समास
(b) तुलसीकृत – तत्पुरुष समास
(c) मंदोदरी – बहुव्रीहि समास
(d) मरणासन्न – अव्ययीभाव समास

Ans. (c)

Q.13 अलग होने के अर्थ में 'से' कारक–चिह्न का प्रयोग होता है

(a) अपादान कारक में

(b) करण कारक में

(c) करण कारक तथा अपादान कारक दोनों में

(d) सम्बन्ध कारक में

Ans. (c)

Q.14 'पवन' शब्द का सन्धि–विच्छेद है

(a) पौ + अन (b) पो + अन

(c) प + अवन (d) प + वन

Ans. (b)

Q.15 इनमें से शुद्ध वर्तनी का रूप है

(a) निरझरणी (b) निरझरिणी

(c) निर्झरिणी (d) निर्झरणी

Ans. (c)

Q.16 निम्नलिखित में से एक शब्द में उपसर्ग का प्रयोग नहीं हुआ है, वह शब्द है :

(a) सहज (b) अनुभव

(c) संचार (d) नयन

Ans. (d)

Q.17 इनमें से 'अनघ' का विलोम शब्द है

(a) निरघ (b) अघी

(c) कृती (d) सनघ

Ans. (d)

Q.18 इनमें से 'पक्षी' शब्द का पर्यायवाची नहीं है

(a) पिशुन (b) विहंग

(c) शकुनि (d) द्विज

Ans. (a)

Q.19 नीचे दिये गये वाक्यांश और उसके लिए प्रयुक्त होने वाले एक शब्द का एक युग्म गलत है, वह है

(a) उत्तराधिकार में प्राप्त सम्पत्ति – धरोहर

(b) जिसे प्रमाण द्वारा सिद्ध न किया जा सके – अप्रमेय

(c) सीमा का अनुचित रूप से किया गया उल्लंघन – अतिक्रमण

(d) पूरब और उत्तर (दिशा) के बीच का कोना – ईशान

Ans. (a)

Q.20 निम्नलिखित में से 'महीसुर' शब्द का अर्थ है

(a) पृथ्वी का रक्षक (b) महिषासुर

(c) राक्षस (d) ब्राह्मण

Ans. (a)

Q.21 निम्नलिखित में से तत्सम शब्द है

(a) विवाह (b) ईख

(c) खीर (d) गिद्ध

Ans. (a)

Q.22 'ने + अन' = 'नयन' में सन्धि है

(a) यण सन्धि (b) गुण सन्धि

(c) अयादि सन्धि (d) वृद्धि सन्धि

Ans. (c)

Q.23 निम्नलिखित में से शुद्ध वर्तनी का शब्द है

(a) उज्ज्वल (b) उज्जवल

(c) उजवल (d) उज्वल

Ans. (a)

Q.24 'बुद्धिहीन' शब्द व्याकरण की दृष्टि से इनमें से किस संवर्ग में है?

(a) संज्ञा (b) सर्वनाम

(c) विशेषण (d) क्रिया

Ans. (c)

Q.25 इनमें से एक वाक्य शुद्ध है, वह है :

(a) मेरा प्राण संकट में है।

(b) सोमवार को रेलवे के कई कर्मचारी गिरफ्तार हुए।

(c) अपराधी को मृत्युदंड की सजा दी गयी है।

(d) महादेवी वर्मा छायावाद की प्रसिद्ध कवयित्री हैं।

Ans. (d)

Q.26 A propped cantilever beam of span 'L' is carrying a vertical concentrated load acting at mid span. The plastic moment of the section in M_p. The magnitude of collapse load will be

(a) $\frac{8M_p}{L}$ (b) $\frac{6M_p}{L}$

(c) $\frac{4M_p}{L}$ (d) $\frac{2M_p}{L}$

Ans. (b)

Q.27 Match **List-I** and **List-II** and select correct answer using the codes given below the list.

List-I	List-II
(i) Dead load	1. IS : 875 – 2015 (Part-4)
(ii) Imposed load	2. IS : 875 – 2015 (Part-3)
(iii) Wind load	3. IS : 875 – 2015 (Part-2)
(iv) Snow load	4. IS : 875 – 2015 (Part-1)

Codes:

	(i)	(ii)	(iii)	(iv)
(a)	4	3	2	1
(b)	4	3	1	2
(c)	3	4	2	1
(d)	3	4	1	2

Ans. (a)

Q.28 Excavation was being carried out for a foundation on plastic clay with a unit weight of 22.5 kN/m^3. Failure occurred when a depth of 8.10 m was reached. What is the value of cohesion if $\phi = 0°$?

(a) 11.4 kN/m^2 (b) 22.8 kN/m^2

(c) 45.6 kN/m^2 (d) None of these

Ans. (c)

Q.29 Rivets under combined stresses must be subjected to a limit as

Where, τ_v and σ_t = The actual shear and tensile stresses in the rivets, respectively.

τ_{vf} and σ_{tf} = Allowable shear and tensile stresses in the rivets, respectively.

(a) $\frac{\tau_v}{\tau_{vf}} + \frac{\sigma_t}{\sigma_{tf}} \le 2.0$ (b) $\frac{\tau_v}{\tau_{vf}} + \frac{\sigma_t}{\sigma_{tf}} \le 1.5$

(c) $\frac{\tau_v}{\tau_{vf}} + \frac{\sigma_t}{\sigma_{tf}} \le 1.0$ (d) $\frac{\tau_v}{\tau_{vf}} + \frac{\sigma_t}{\sigma_{tf}} \le 1.4$

Ans. (d)

Q.30 In a steel plate with bolted connection the rupture of the net section is a mode of failure under

(a) Tension

(b) Compression

(c) Flexure

(d) Shear

Ans. (a)

Q.31 In the design of steel structure, for the purpose of designing any member, the load generated due to secondary effects include

1. Due to contraction or expansion from the temperature.
2. Due to differential settlement of structure.
3. Due to accidental loads.
4. Due to eccentric connections.

(a) Only 1 and 3 (b) Only 1, 2 and 3

(c) Only 1, 2 and 4 (d) 1, 2, 3 and 4

Ans. (c)

Q.32 For sand of uniform spherical particles, the void ratio in the loosest and densest state, are respectively

(a) 0.91, 0.35 (b) 0.35, 0.91

(c) 0.65, 0.09 (d) 0.09, 0.65

Ans. (a)

Q.33 Prying forces are

(a) Forces due to the friction between connected parts

(b) Bending forces on the bolts because of the joints

(c) Shearing forces on the bolts because of joints

(d) Tensile forces due to the flexibility of connected parts

Ans. (d)

Q.34 The constant of proportionality between seepage velocity and hydraulic gradient is called

(a) Seepage coefficient

(b) Coefficient of transmissibility

(c) Coefficient of percolation

(d) Modified coefficient of permeability

Ans. (c)

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Q.35 The Poisson's ratio for soil sample 1 and 2 are μ_1 and μ_2 respectively. If $\frac{\mu_1}{\mu_2} = 1.5$ and $\frac{1-\mu_1}{1-\mu_2} = 0.875$, then ratio of coefficient of earth pressure at rest for soil sample 1(K_1) to coefficient of earth pressure at rest for soil sample 2(K_2), $\frac{K_1}{K_2}$ will be

(a) 1.3125 (b) 1.7143
(c) 1.9687 (d) 1.8213

Ans. (b)

Q.36 A 300 mm square bearing plate settles by 21 mm in a plate load test on a cohesive soil, when the intensity of loading is 0.2 N/mm^2. The settlement of a prototype shallow footing 1 m square (1 m × 1 m) under the same intensity of loading (considering both plate and footing are placed at same depth) is

(a) 15 mm (b) 70 mm
(c) 50 mm (d) 167 mm

Ans. (b)

Q.37 The flange splice in plate is preferably placed near about

(a) Mid span section
(b) Quarter span section
(c) End section
(d) Any section

Ans. (b)

Q.38 In a drained triaxial compression test conducted on dry sand, failure occurred when the deviator stress was 218 kN/m^2 at a confining pressure of 61 kN/m^2. The effective angle of shearing resistance and the inclination of failure plane to major principal plane will

(a) 34°, 62° (b) 34°, 28°
(c) 40°, 25° (d) 40°, 65°

Ans. (d)

Q.39 A steel section is subjected to a combination of shear and bending actions. The applied shear force is 'V' and shear capacity of the section 'V_s'. For such sections, high shear force (as per IS : 800 - 2007) is defined as

(a) $V > 0.6\ V_s$ (b) $V > 0.7\ V_s$
(c) $V > 0.8\ V_s$ (d) $V > 0.9\ V_s$

Ans. (a)

Q.40 A pile 450 mm is diameter and 15 m long is driven into a soft clay. The undrained strength of soil varies linearly with depth such that Su = 0.22 σ_z. Determine the allowable pile load capacity using total stress analysis. The factor of safety required is 2 and Y_{sat} = 17 kN/m^3. Ground water is at surface.

(a) 286.1 kN (b) 252.0 kN
(c) 95.4 kN (d) 84.0 kN

Ans. (*)

Q.41 Torsion resisting capacity of a given RC section

(a) Decrease with decrease in stirrup spacing.
(b) Decrease with increasing the number of longitudinal bars.
(c) Does not depend upon stirrup and longitudinal steel
(d) Increase with the increase in stirrup and longituidinal steel.

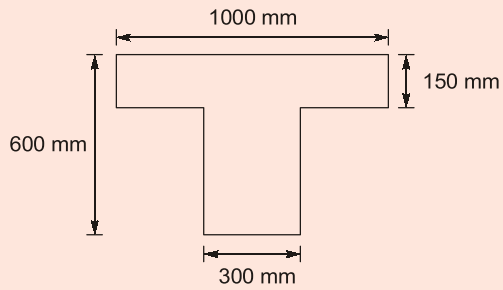
Ans. (d)

Q.42 What will be the natural frequency of a machine foundation which has a base area of 2.20 m × 2.20 m and a weight of 155 kN including the weight of the machine? Take the value of the coefficient of elastic uniform compression as 4.4 × 10^4 kN/m^3.

(a) $\frac{29}{\pi}$ (b) $\frac{58}{\pi}$
(c) $\frac{116}{\pi}$ (d) None of these

Ans. (b)

Q.43 A isolated T-beam is used as a walkway. The beam is simply supported with an effective span of 6 m. The effective width of the flange for the cross-section shown in figure is



(a) 900 mm (b) 1000 mm
(c) 1259 mm (d) 2200 mm

Ans. (a)

Q.44 As per Rankine Analysis, the minimum depth of foundation (D_{min}) will be

where, q = intensity of loading
γ = unit wt. of over-burden
ϕ = angle of internal friction of soil

(a) $\frac{q}{\gamma}\left[\frac{1-\sin\phi}{1+\sin\phi}\right]^2$ (b) $\frac{q}{\gamma}\left[\frac{1-\sin\phi}{1+\sin\phi}\right]$

(c) $\frac{q}{\gamma}\left[\frac{1+\sin\phi}{1-\sin\phi}\right]$ (d) $\frac{q}{\gamma}\left[\frac{1+\sin\phi}{1-\sin\phi}\right]^2$

Ans. (a)

Q.45 Factored shear force of 140 kN is applied on a beam having breadth 250 mm. The beam is also subjected to factored torsional moment of 20 kN-m. The equivalent shear force on the beam is

(a) 298 kN (b) 348 kN
(c) 268 kN (d) 300 kN

Ans. (c)

Q.46 The net ultimate bearing capacity of a Purely cohesive soil

(a) Depends on both, width and depth of footing
(b) Depends on only width of footing
(c) Depends on only depth of footing
(d) Is independent of both, depth and width of footing

Ans. (d)

Q.47 A reinforced concrete wall carrying vertical loads, is generally designed as per recommendations given for columns. The ratio of minimum reinforcement in the vertical and horizontal direction is

(a) 2 : 1 (b) 1 : 1
(c) 5 : 3 (d) 3 : 5

Ans. (d)

Q.48 The test conducted on foundation soil gives SPT value; $N \le 5$ and density index, $I_D < 20$, the foundation will fail in

(a) General shear (b) Local shear
(c) Punching shear (d) Sinking shear

Ans. (b)

Q.49 As per IS : 456 - 2000, the range of standard concrete is

(a) $M_{25} - M_{55}$ (b) $M_{20} - M_{55}$
(c) $M_{25} - M_{50}$ (d) None of these

Ans. (a)

Q.50 The optimum moisture content of a clay soil is 24%, whom compaction test is conducted at 30% moisture content, its structure will be

(a) Flocculated (b) Single grained
(c) Honey comb (d) Dispersed

Ans. (d)

Q.51 As per IS : 1893 - 2016, the storey drift in any storey due to minimum specified, design lateral force, with partial load factor of 1, shall NOT exceed 'X' times the storey height. The value of 'X' is

(a) 0.020 (b) 0.002
(c) 0.040 (d) 0.004

Ans. (d)

Q.52 For any applied stress, zone of influence refers to isobar corresponding to

(a) 20% (b) 15%
(c) 10% (d) 5%

Ans. (c)

Q.53 The ring beam of a Intze tank carries a hoop tension of 120 kN. The beam cross-section is 250 mm wide and 400 mm deep, and it is reinforced with 4 bars of 20 mm dia of Fe - 415 grade. The modular ratio of concrete is 10. The tensile stress (N/mm^2) in the concrete is

(a) 1.02 (b) 1.07
(c) 1.20 (d) 1.32

Ans. (b)

Q.54 In a flow net drown below a sheet pile wall, the number of flow channels and head drops is 4 and 12 respectively. If the difference in the upstream and downstream water level is 3 m, what is the discharge per meter width of a sheet? K = 0.1 m/sec.

(a) 1 $m^3/s/m$
(b) 0.1 $m^3/s/m$
(c) 0.01 $m^3/s/m$
(d) 0.001 $m^3/s/m$

Ans. (b)

Q.55 A concrete beam of rectangular cross-section of 200 mm × 400 mm is presented with a force of 400 kN at an eccentricity 100 mm. The maximum compressive strength in concrete is

(a) 2.5 N/mm^2
(b) 5.0 N/mm^2
(c) 7.5 N/mm^2
(d) 12.5 N/mm^2

Ans. (d)

Q.56 Shrinkage limit of clay whose void ratio in dry state is 0.55 and Sp. gravity is 2.75, will be

(a) 20% (b) 5%
(c) 5.5% (d) 10.0%

Ans. (a)

Q.57 The flexural strength of M-30 concrete as per IS : 456 - 2000 is

(a) 3.83 MPa (b) 5.47 MPa
(c) 21.23 MPa (d) 30.00 MPa

Ans. (a)

Q.58 The most useful geosynthetic physical property which is closely related to engineering performance is

(a) Thickness
(b) Mass per unit area
(c) Strength
(d) Stiffness

Ans. (b)

Q.59 For a singly reinforced balanced section, Mu, lim = Ru, lim.$b.d^2$; for M-20 grade concrete and Fe-415 steel, the value of Ru, lim will be

(a) 1.995 (b) 2.660
(c) 2.761 (d) 2.978

Ans. (c)

Q.60 For the clay with an OCR of greater than 4 in a CD test, the A-factor at failure will be

(a) Zero
(b) Positive (less than 1)
(c) Negative
(d) Positive (more than 1)

Ans. (c)

Q.61 In the design of reinforced concrete beam, the requirement for bond is NOT getting satisfied. The economical option to satisfy the requirement for bond is given by

(a) Bundling of bars
(b) Providing same diameter bars more in number
(c) Providing larger diameter bars less in number
(d) Providing smaller diameter bars more is number

Ans. (d)

Q.62 As per IS : 1892 - 1979; what should be the maximum thickness of cutting edge of sampling tube of 70 mm external diameter which is required for sampling in undisturbed stiff clay soil?

(a) 2.15 mm (b) 3.05 mm
(c) 3.95 mm (d) 6.10 mm

Ans. (d)

Q.63 The lateral ties in reinforced concrete rectangular column under axial tension are used to
(a) Avoid the buckling of the longitudinal steel under compression
(b) Provide adequate shear capacity
(c) Provide adequate confinement to concrete
(d) Reduce the axial deformation of the column

Ans. (a)

Q.64 What is the correct mathematical expression for the assumption 'consolidation is occurring under small changes in effective stress' made in arriving the differential equation for transient flow during one-dimensional consolidation?
All are standard notations.
(a) a_v = constant
(b) $\frac{1}{(1+e_0)} dx.dy.dz$ = constant
(c) γ_w = constant
(d) $h = \frac{u}{\gamma_w}$

Ans. (a)

Q.65 Fire resistance of RCC member depends upon
1. Member size
2. Cover of steel reinforcement
3. Type of aggregate
(a) Only on 2
(b) Only on 1 and 2
(c) Only on 2 and 3
(d) 1, 2 and 3

Ans. (d)

Q.66 A 16-pile group has to be proportioned in a uniform pattern in a soft clay with equal spacing in both directions. Assuming any value of cohesion, taking α = 0.7, neglecting the end bearing effect and assuming pile circular of diameter 'd', the optimum spacing (s) of piles in group will be
(a) 1.6 d (b) 2.6 d
(c) 3.3 d (d) 4 d

Ans. (b)

Q.67 The principle used in finding the recoil velocity of a gun is
(a) Work-energy principle
(b) energy conservation principle
(c) Conservation of linear momentum
(d) Newton's law of collision

Ans. (c)

Q.68 What is the critical height of the slope of infinite extent having a slope angle = 25°, if it is made of clay having C = 30 kN/m^2, ϕ = 20°, e = 0.65 and G_s = 2.7, when the slope is submerged?
(a) 22.25 m (b) 6.51 m
(c) 35.40 m (d) 40.23 m

Ans. (c)

Q.69 A simply supported beam of span 'l' carries a uniformly variable load of intensity $w_0 x$ over its entire span. Maximum bending moment in the beam is
(a) $\frac{w_0 l^3}{27}$ (b) $\frac{w_0 l^3(\sqrt{3})}{27}$
(c) $\frac{w_0 l^2(\sqrt{2})}{9}$ (d) $\frac{w_0 l^3}{9}$

Ans. (b)

Q.70 The principal design criteria for foundations for reciprocating machinery are as follows:
1. The natural frequency should be atleast 40% away from the operating speed of the machine.
2. The amplitude of motion of the foundation should not exceed 0.2 mm.
3. The pressure on soil should be within the respective permissible values.
4. For preliminary design, the maximum pressure on soil due to static load, alone may be taken as 0.4 times the corresponding safe bearing capacity.
(a) 1, 2, 3 and 4 are correct
(b) 1, 3 and 4 are correct
(c) 3 and 4 are correct
(d) 2, 3 and 4 are correct

Ans. (d)

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Q.71 The centroid of semicircular area of radius 'r' is

(a) $\frac{3r}{4\pi}$ (b) $\frac{3r}{5\pi}$

(c) $\frac{4r}{3\pi}$ (d) $\frac{5r}{3\pi}$

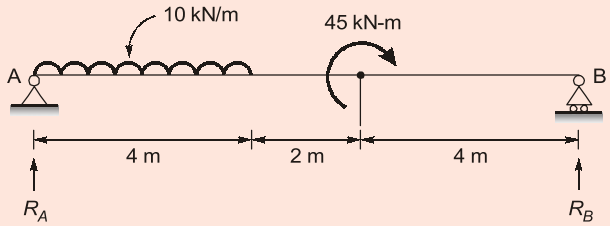
Ans. (c)

Q.72 Due to rise in temperature, the viscosity and unit weight of a fluid percolating through a soil mass, are reduced to 80% and 90% respectively, if other factors remain unaltered, the coefficient of permeability

(a) Increases by 12.5%
(b) Decreases by 12.5%
(c) Increases by 28%
(d) Decreases by 28%

Ans. (a)

Q.73 The vertical support reactions R_A and R_B for the given beam is



(a) R_A = 25 kN, R_B = 15 kN
(b) R_A = 15 kN, R_B = 25 kN
(c) R_A = 12.5 kN, R_B = 27.5 kN
(d) R_A = 27.5 kN, R_B = 12.5 kN

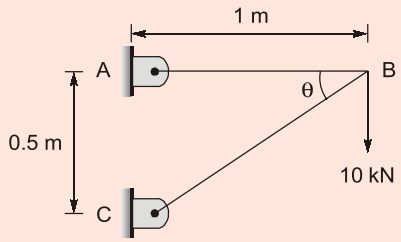
Ans. (d)

Q.74 The grip length for well foundation of railway bridges is taken as _____ of maximum scour depth, generally, while for road bridges _____ of maximum scour depth is considered adequate.

(a) 30% and 30% respectively
(b) 50% and 30% respectively
(c) 30% and 50% respectively
(d) 50% and 50% respectively

Ans. (b)

Q.75 A two members truss ABC as shown in figure. The axial force (in kN) transmitted in member AB is



(a) 40 kN (b) 10 kN
(c) 20 kN (d) 30 kN

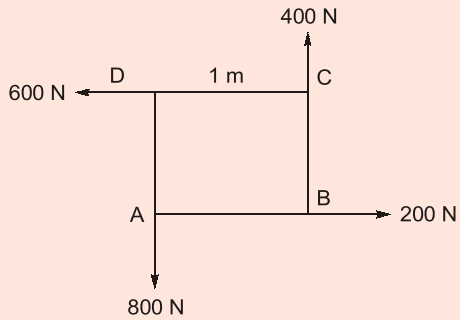
Ans. (c)

Q.76 The total and effective vertical normal stresses at depth of 5 m below the top level of water in a 7 m deep fresh water lake are respectively

(a) Zero and zero
(b) 0.5 kg/cm^2 and 0.5 kg/cm^2
(c) 0.5 kg/cm^2 and zero
(d) 1.0 kg/cm^2 and 0.5 kg/cm^2

Ans. (c)

Q.77 Four forces having magnitudes of 200 N, 400 N, 600 N and 800 N, respectively acting along four sides (1 m each) of a square ABCD as shown in figure. Determine the magnitude and direction of the resultant force from 'A' along the line 'AB'.



(a) $400\sqrt{3}$ N, 3.2 m from A
(b) $400\sqrt{2}$ N, 2.5 m from A
(c) $300\sqrt{2}$ N, 2 m from A
(d) $300\sqrt{3}$ N, 2.5 m from A

Ans. (b)

Q.78 Group of the constituents of cement in decreasing order of their contribution to the strength of cement is
(a) C_3S, C_2S, C_3A and C_4AF
(b) C_2S, C_3S, C_3A and C_4AF
(c) C_2S, C_4AF, C_3A and C_3S
(d) C_3S, C_3A, C_2S and C_4AF

Ans. (a)

Q.79 A bullet of mass 30 gm leaves the barrel of a gun with a velocity of 500 m/s. Suppose, the force lasted, for 0.0018 seconds, the average impulsive force is
(a) 5333.33 N (b) 6333.33 N
(c) 7333.33 N (d) 8333.33 N

Ans. (d)

Q.80 The time which results in the least possible construction cost of an activity is known as
(a) Normal time
(b) Optimum time
(c) Crash time
(d) Standard time

Ans. (b)

Q.81 A particle undergoes a simple harmonic motion, the acceleration of the particle at a distance of 1.5 m from the centre of motion being 6 m/s^2, the time of oscillation in seconds is
(a) 2.00 (b) 4.00
(c) 3.14 (d) 6.28

Ans. (c)

Q.82 Which of the following constituent, present in excess quantity, changes the color of the brick from red to yellow?
(a) Alumina
(b) Silica
(c) Lime stone
(d) Iron Pyrite

Ans. (b)

Q.83 The coefficient of friction is the ratio of
(a) Limiting friction force to the normal reaction
(b) Limiting friction force to the weight of body to be moved
(c) Sliding friction force to the normal reaction
(d) None of the above

Ans. (a)

Q.84 Addition of fibres in concrete results in
(a) Modest increase in compressive strength
(b) Increase in ductility
(c) Enhanced toughness
(d) All of the above

Ans. (d)

Q.85 The D'Alembert principle
(a) is a hypothetical principle
(b) provides no special advantage over Newton's law
(c) is based upon the existence of inertia force
(d) allows a dynamical problem to be considered as a static problem

Ans. (d)

Q.86 A pozzolonic material must be composed mainly of
(a) Microscopic silica
(b) Microscopic and Amorphous silica
(c) Microscopic and Crystalline silica
(d) All of the above

Ans. (b)

Q.87 Lame's equations are applicable for
(a) Thick cylinder
(b) Thin cylinder
(c) Thin spherical vessel
(d) Beams

Ans. (a)

Q.88 Blow holes in concreting are results of
(a) Excess water-cement ratio
(b) Insufficient workability
(c) Improper design of shuttering
(d) None of the above

Ans. (c)

Q.89 In terms of bulk modulus (K) and modulus of rigidity (C), the Poisson's ratio can be expressed as

(a) $\frac{3K-4C}{6K+4C}$ (b) $\frac{3K+4C}{6K-4C}$

(c) $\frac{3K-2C}{6K+2C}$ (d) $\frac{3K+2C}{6K-2C}$

Ans. (c)

Q.90 Probability distribution curve, fit well for PERT analysis, is

(a) Normal distribution curve
(b) Beta distribution curve
(c) Unimodal curve
(d) None of the above

Ans. (a)

Q.91 A cylindrical boiler 1.5 m diameter and made up of 10 mm thick plate is subjected to steam pressure of 2 N/mm^2. The hoop tension and longitudinal stresses will be

(a) 150 N/mm^2 and 75 N/mm^2
(b) 150 N/mm^2 and 150 N/mm^2
(c) 75 N/mm^2 and 75 N/mm^2
(d) 75 N/mm^2 and 150 N/mm^2

Ans. (a)

Q.92 Match **List-I** and **List-II**, and select the correct answer using the codes in given below list.

List-I

(i) Preliminary estimate
(ii) Revised estimate
(iii) Supplementary estimate
(iv) Quantity estimate

List-II

1. Probable variation for quantity rate and amount for each items.
2. Material deviation of a structural nature
3. Complete estimate
4. Approximate cost of the project

Codes:

	(i)	(ii)	(iii)	(iv)
(a)	4	1	2	3
(b)	4	2	1	3
(c)	3	1	2	4
(d)	3	2	1	4

Ans. (a)

Q.93 Two shafts of same length and material are joined in series. If the ratio of their diameters is 2, then the ratio of their angles of twist will be

(a) 2 (b) 4
(c) 8 (d) 16

Ans. (d)

Q.94 The mortar used for masonry construction are classified based on strength in IS : 2950 and IS : 1905 according to their designations L_1, L_2, H_1, H_2, M_1 and M_2. The correct sequence of increasing order of their strength is

(a) L_1, L_2, H_1, H_2, M_1 and M_2
(b) L_2, L_1, M_2, M_1, H_2 and H_1
(c) L_1, L_2, M_1, M_2, H_1 and H_2
(d) M_1, M_2, L_1, L_2, H_1 and H_2

Ans. (b)

Q.95 A prismatic bar in compression has a cross-sectional area A = 1200 mm^2 and carries a load P = 90 kN. Normal and shear stresses acting on a plane cut through the bar at $\theta = 25°$, are respectively

(a) 61.6 MPa and 28.7 MPa
(b) 49.5 MPa and 23.8 MPa
(c) 78.2 MPa and 20.7 MPa
(d) 73.4 MPa and 29.2 MPa

Ans. (a)

Q.96 The total number of grades of ordinary concrete stipulated in IS : 456 - 2000 are

(a) 10 (b) 8
(c) 3 (d) 6

Ans. (c)

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Q.97 A cast iron column of external diameter of 300 mm is 20 mm thick. Find safe compressive load on column with factor of safety of 5, if the crushing strength of material is 550 N/mm^2.

(a) 1925.21 kN (b) 1935.21 kN
(c) 1945.21 kN (d) 1955.21 kN

Ans. (b)

Q.98 The minimum width of tread without nosing for staircase of residential building shall be

(a) 150 mm (b) 190 mm
(c) 200 mm (d) 300 mm

Ans. (c)

Q.99 A simply supported beam of length 6 m carries a point load at the centre of the beam such that the maximum bending moment there is 12 kN-m, if 'EI' is the flexural rigidity of the beam, the deflection at the centre is

(a) $\frac{9}{EI}$ (b) $\frac{18}{EI}$
(c) $\frac{36}{EI}$ (d) $\frac{45}{EI}$

Ans. (c)

Q.100 The water-cement ratio for ferrocement mix should be

(a) Less than 0.35
(b) Between 0.35 to 0.40
(c) Between 0.40 to 0.50
(d) Greater than 0.60

Ans. (b)

Q.101 When a body is subjected to a direct tensile stress (p) in one plane accompanied by a simple shear stress (q), the maximum normal stress is

(a) $\frac{p}{2}+\frac{1}{2}\sqrt{p^2+4q^2}$
(b) $\frac{p}{2}-\frac{1}{2}\sqrt{p^2+4q^2}$
(c) $\frac{p}{2}+\frac{1}{2}\sqrt{p^2-4q^2}$
(d) $\frac{p}{2}-\frac{1}{2}\sqrt{p^2-4q^2}$

Ans. (a)

Q.102 The minimum depth of the reinforced bond provided as strengthing arrangement in masonry building is

(a) 75 mm (b) 60 mm
(c) 50 mm (d) 40 mm

Ans. (a)

Q.103 A ductile structure is defined as one for which the plastic deformation before fracture

(a) is smaller than the elastic deformation
(b) vanishes
(c) is equal to the elastic deformation
(d) is much larger than elastic deformation

Ans. (d)

Q.104 Technical term 'Eaves' is defined as

(a) The apex line of the sloping roof
(b) The lower edge of the inclined roof surface
(c) Sloped triangular surface formed at the end of a roof
(d) The ridge formed by the intersection of two sloping surfaces

Ans. (c)

Q.105 The first moment of area of a rectangular section of which 'b' and depth 'h' about centre of gravity is

(a) $\frac{b\cdot h^2}{2}$ (b) $\frac{b\cdot h^2}{4}$
(c) Zero (d) $b\cdot h^2$

Ans. (c)

Q.106 The method suitable for measuring the workability of dry concrete mix having very low workability is

(a) Slump test
(b) Compaction factor test
(c) Vee-bee consistometer test
(d) Vicat test

Ans. (c)

Q.107 The ratio of the stiffness of the beam at the near and when the far end is hinged, to the stiffness of the beam at the near end when the far end is fixed

(a) $\frac{4}{3}$ (b) $\frac{3}{4}$

(c) 1 (d) $\frac{1}{2}$

Ans. (b)

Q.108 According to National Building Code 2016, the slope of a ramp in the building shall NOT exceed

(a) 1 in 12 (b) 1 in 10

(c) 1 in 8 (d) 1 in 6

Ans. (a)

Q.109 The deflection at the free end of a cantilever beam subjected to a couple 'M' at the free end and having an uniform flexural rigidity 'EI' throughout its length 'L' is equal to

(a) $\frac{ML^2}{2EI}$ (b) $\frac{ML^2}{3EI}$

(c) $\frac{ML^2}{6EI}$ (d) $\frac{ML^2}{8EI}$

Ans. (a)

Q.110 Match **List-I** and **List-II** and select the correct answer using the codes given below the lists.

List-I

(i) Index plan

(ii) Key plan

(iii) Service plan

(iv) Layout plan

List-II

1. Details of plumbing service, water supply and sewage disposal system

2. Relative position of all the different units

3. General layout of a new town showing the position of roads, market, hospital, parks etc.

4. Details of the particular building

Codes:

	(i)	(ii)	(iii)	(iv)
(a)	4	3	2	1
(b)	3	4	1	2
(c)	3	1	2	4
(d)	4	1	2	3

Ans. (b)

Q.111 A three hinged arch ABC has a span of 20 m and central rise of 4 m. The arch has hinges at the end and at the centre. A train of two point loads of 20 kN and 10 kN, 5 m apart crosses this arch from left to right with 20 kN load leading. The maximum thrust induced at the support is

(a) 25 kN (b) 32.81 kN

(c) 28.13 kN (d) 31.25 kN

Ans. (d)

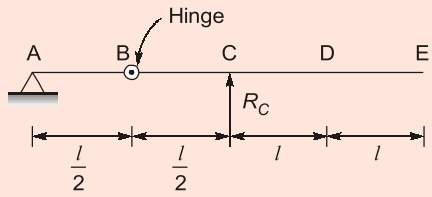
Q.112 A property fetch a net annual income of ₹ 80,000/- after deducting all outgoints. Rate of interest is 6% per annum. What is capitalized value of the property?

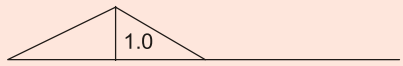
(a) ₹ 13,33,600/- (b) ₹ 9,60,000/-

(c) ₹ 16,63,500/- (d) ₹ 9,33,900/-

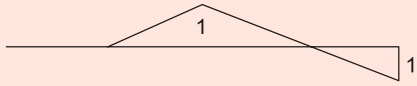
Ans. (a)

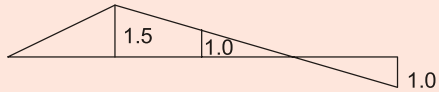
Q.113 The influence line for support reaction R_C for the beam shown in figure will be as



(a)


(b)


(c)


(d)


Ans. (d)

Q.114 Base of a paint is

(a) Linseed oil

(b) Poppy oil

(c) Sulphates of zinc and manganese

(d) White lead

Ans. (d)

Q.115 A single bay portal frame of height 'h' fixed at the base is subjected to a horizontal displacement 'Δ' at the top. The base moment developed is proportional to
All members are prismatic

(a) $\frac{1}{h}$ (b) $\frac{1}{h^2}$

(c) $\frac{1}{h^3}$ (d) None of these

Ans. (b)

Q.116 In steel structures, the thickness of the base plate in a column base is determined from the
(a) Flexural strength of plate
(b) Shear strength of plate
(c) Bearing strength of concrete pedestal
(d) Punching criteria

Ans. (a)

Q.117 Which of the unit matrix or identity matrix in the following?

(a) $\begin{bmatrix} 1.0 & 0.0 & 1.0 \\ 0.0 & 1.0 & 0.0 \\ 1.0 & 0.0 & 1.0 \end{bmatrix}$ (b) $\begin{bmatrix} 1.0 & 0.0 & 0.0 \\ 1.0 & 0.0 & 0.0 \\ 1.0 & 0.0 & 0.0 \end{bmatrix}$

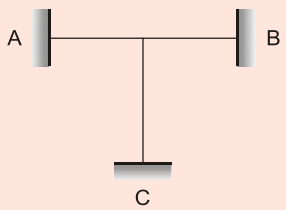
(c) $\begin{bmatrix} 0.0 & 1.0 & 0.0 \\ 0.0 & 1.0 & 0.0 \\ 0.0 & 1.0 & 0.0 \end{bmatrix}$ (d) $\begin{bmatrix} 1.0 & 0.0 & 0.0 \\ 0.0 & 1.0 & 0.0 \\ 0.0 & 0.0 & 1.0 \end{bmatrix}$

Ans. (d)

Q.118 In a 'PERT' analysis, if the probability factor is negative, the chances of completing the project in time is
(a) Less than 50% (b) Fifty-fifty %
(c) More than 50% (d) Zero

Ans. (a)

Q.119 Neglecting axial changes in lengths, determine the kinematic indeterminacy of the following frame 'ABC'.



(a) 3 (b) 2
(c) 1 (d) 9

Ans. (c)

Q.120 Match **List-I** and **List-II** and select correct answer using the codes given below the lists.

List-I

(i) Building lease
(ii) Occupational lease
(iii) Sub-lease
(iv) Life lease

List-II

1. The lease holder does not have right to spend money on construction
2. The lease holder can erect a building
3. Duration of lease is given until death
4. The lease holder may render lease hold property

Codes:

	(i)	(ii)	(iii)	(iv)
(a)	1	2	4	3
(b)	2	1	4	3
(c)	3	1	2	4
(d)	3	2	1	4

Ans. (a)

Q.121 For a linear elastic structural system, minimization of potential energy yields
(a) Compatibility condition
(b) Constitutive relationship
(c) Equilibrium equations
(d) Strain displacement relations

Ans. (a)

Q.122 Part of brick which has half-header face and half-stretcher face is known as
(a) Bevelled closer
(b) King closer
(c) Queen closer
(d) Bat

Ans. (b)

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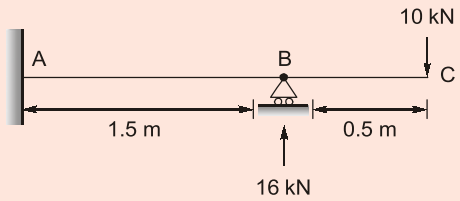
Q.123 A horizontal beam is shown below. The distance of the point of contraflexure from the end 'A' is



(a) 0.333 m (b) 0.666 m
(c) 1.50 m (d) 0.50 m

Ans. (b)

Q.124 The limit state of serviceability includes

1. Deflection
2. Repairable damage or crack due to fatigue
3. Vibration
4. Fire

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

Ans. (d)

Q.125 Influence line for redundant structures can be obtained by

(a) Castigliano's theorem
(b) Unit load theorem
(c) Muller-Breslau principle
(d) Maxwell Betti's reciprocal theorem

Ans. (c)

■■■■