

OBJECTIVE CIVIL ENGINEERING

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PREFACE

Since time immemorial, human beings have been busy in constructing something. From mud huts, in the course of time, human beings have moved on to erect houses, palaces, canals, dams, highways, and so on. From huts made of wood and mud to the World's top wonder Taj Mahal of Agra, we have achieved a lot in civil engineering.

Amongst all branches of engineering, the variety and scope of civil engineering is the wide and larger. It is one of the oldest engineering disciplines. It deals with the built environment and can be dated to the first time someone placed a roof over his or her head or laid a tree trunk across a river to make it easier to get across. The credit of creating entire infrastructural framework of a modern nation goes to civil engineers.

Civil Engineering is perhaps the most resourceful branch among all the engineering branches. It is the branch with a lot of multiplicity. It can be considered as a single largest branch among all the engineering branches. Hence in this book entitled Objective Civil Engineering an attempt is made to cover all areas related to it and hundreds of multiple choice questions are given with four options and a correct answer key. The book consists of 16 chapters related to the field of civil engineering which includes: Engg. Mechanics, Building Construction, Surveying and Levelling, Strength of Materials, Theory of Structures, Concrete Structures, Steel Structures, Fluid Mechanics, Geotechnical Engg, Environmental Engg, Transportation Engg, Airport Engg, Docks and Harbor Engg, Tunnel Engg, Water Resources Engg and Construction Management. Each chapter and MCQ questions are neatly arranged and questions are selected keeping in view the emerging need of the students and teachers. This book is useful for UPSC and MPSC examination of Civil Engineering as well as GATE Examination.

I must record my deep sense of indebtedness to Hon'ble Dr. N. J. Pawar, Vice Chancellor, Dr. A. S. Bhoite, Pro Vice Chancellor, Shivaji University, Kolhapur and my friends and well-wishers for their inspiration and support. I am thankful to Dr. Tanaji Kolekar, Dr. Annie John, Dr. Arvind Nawale, Dr. Deepak Nanware, Dr. Gophane, Dr. Arun Patil and Dr. Mane for inspiring and motivating me to bring out this book.

I am thankful to doctoral research scholars Mr. Mahesh Chougule and Mr. Sachin Mane for their help in collecting and analyzing the data. I am also thankful to....., Managing Director and the team ofPublication for pursuing me to bring out present book. Thanks are also due to my wife Jyoti and children Amartya and Akanksha for their constant support.

-Capt (Dr.) Nitin P. Sonaje

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About Author



Capt. (Dr.) Nitin Pandurang Sonaje is at presently working as the Dy. Registrar, Shivaji University, Kolhapur (M.S.). He also worked as the Registrar of Solapur University, Solapur. He is a techno administrator and an academician served as a commissioned officer in Indian Army (Engineers) previously. He has also taught engineering and technology at College of Military Engg, Pune as well as Dept. of Technology, Shivaji University, Kolhapur. He has a professional experience as an engineer as well as research experience as a recognized research guide in Environment Science and Technology and Civil Engineering. Apart from this book, he has few other books to his credit which includes, *Mathcad a Tool for Infiltration Modeling*, *ICT for Doctoral Research* and *Role of ICT in Enhancing the Productivity of Higher Education in India*.

1.Engineering Mechanics

S.N.	Questions with Options	Answer
1	<p>Which of the following statement is correct?</p> <p>a) A force is an agent which produces or tends to produce motion.</p> <p>b) A force is an agent which stops or tends to stop motion.</p> <p>c) A force may balance a given number of forces acting on a body.</p> <p>d) Both (a) and (b).</p>	d
2	<p>In order to determine the effects of a force acting on a body, we must know</p> <p>a) Its magnitude and direction of the line along which it acts.</p> <p>b) Its nature (whether push or pull).</p> <p>c) Point through which it acts on the body.</p> <p>d) All of the above.</p>	d
3	<p>For a non-concurrent force system to be in equilibrium</p> <p>a) only the closure of force polygon is sufficient</p> <p>b) only the closure of funicular polygon is sufficient</p> <p>c) both force polygon and funicular polygon must close</p> <p>d) none of the above</p>	c
4	<p>If a number of forces are acting simultaneously on a particle, then the resultant of these forces will have the same effect as produced by the all the forces. This is known as,</p> <p>a) Principle of physical independence of forces.</p> <p>b) Principle of transmissibility of forces.</p> <p>c) Principle of resolution of forces.</p> <p>d) None of the above.</p>	a
5	<p>The moment of a force about any point is geometrically equal to.....area of the triangle whose base is the line representing the force and vertex is the point about which the moment is taken.</p>	a

	a) Half	b) Same	c) Twice	d) None of these		
6	A couple consists of a) Two like parallel forces of same magnitude. b) Two like parallel forces of different magnitudes. c) Two unlike parallel forces of same magnitude. d) Two unlike parallel forces of different magnitudes.				c	
7	A system of forces acting on a lamina is shown in the given figure. The resultant of the force system will meet AB at a) A b) B c) C d) D					b
8	According to Lami's Theorem, the three forces a) Must be equal. b) Must be at 120° to each other. c) Must be both of above. d) May not be any of the two.				d	
9	The Lami's Theorem is applicable only for a) Coplanar forces b) Non-Concurrent forces c) Coplanar and concurrent forces d) Any type of forces				c	
10	If a body is in equilibrium. We may conclude that a) No force is acting on the body b) The resultant of all the forces acting on it is zero. c) The moments of the forces about any point are zero. d) Both (b) and (c)				d	
11	If the sum of all the forces acting on a body is zero, then the body may be in equilibrium provided the forces are a) Concurrent b) Parallel c) Like parallel d) Unlike parallel				a	
12	The moment of inertia of a triangular section of base (b) and height (h) about an axis passing through its vertex and parallel to the base is as that passing through its C.G. and parallel to the base. a) twelve times b) nine times c) six times d) four times				c	
13	The moment of inertia of a triangular section of base (b) and height (h) about				c	

	a) $\frac{1}{2}$ b) $\frac{3}{2}$ ' c) 2 d) 3	
30	For a given velocity of a projectile, the range is maximum when the angle of projection is a) 30° b) 45° c) 90° d) 0°	b
31	The maximum value of the horizontal range for a projectile projected with a velocity of 98 m/sec is a) 98 m b) 490 m c) 980 m d) 1960 m	c
29	If the direction of projection bisects the angle between the vertical and the inclined plane, then the range of projectile on the inclined plane is a) zero b) maximum c) minimum d) unpredictable	b
32	A funicular polygon cannot be made to pass through a) one specified point b) two specified points c) three specified points d) more than three specified points	d
33	A stone is thrown up a slope of inclination 60° to the horizontal. At what angle to the slope must the stone be thrown so as to land as far as possible from the point of projection? a) 15° b) 30° c) 45° d) 75°	a
34	A particle of mass 2 kg executes simple harmonic motion of frequency $\frac{6}{71}$ Hz and amplitude 0.25 m. Its maximum kinetic energy is a) 4.5 J b) 9.0 J c) 12.0 J d) 18.0 J	b
35	Free body diagram is an a) isolated joint with only body forces acting on it b) isolated joint with internal forces acting on it c) isolated joint with all the forces, internal & external, acting on it d) none of the above	c
36	The member forces in a statically indeterminate truss a) can be obtained by graphic statics b) cannot be obtained by graphic statics c) may be obtained by graphic statics d) can be obtained by graphic statics by trial and error	b

37	<p>One end of an elastic string of natural length l and modulus X is kept fixed while to the other end is attached a particle of mass m which is hanging freely under gravity. The particle is pulled down vertically through a distance x, held at rest and then released. The motion is</p> <p>a) a simple harmonic motion b) a rectilinear motion with constant speed c) a damped oscillatory motion d) none of the above</p>	a
38	<p>The periodic time of a body moving with simple harmonic motion</p> <p>a) depends upon its amplitude under all conditions. b) is independent of its amplitude c) depends upon its amplitude under certain conditions d) has no relation with its frequency.</p>	b
39	<p>The frequency of vibration in case of simple harmonic motion</p> <p>a) means the number of cycles per second b) represents time taken by the particle for one complete oscillation c) depends upon its amplitude. d) is directly proportional to its beat.</p>	a
40	<p>Which of the following statement is wrong?</p> <p>a) The matter contained in a body is called mass. b) The force with which a body is attracted towards the centre of the earth is called weight. c) The total motion possessed by a moving body is called impulsive force d) none of them</p>	d
41	<p>Two masses of 10 kg and 15 kg are connected to two ends of an inextensible rope and passing over a smooth pulley. The 10 kg mass is lying over a rough plane, which is inclined at an angle of 25° with the horizontal. If this angle is made 30°, then</p> <p>a) tension in the string will increase b) tension in the string will decrease</p>	a

	<p>c) isolated joint with all the forces, internal as well as external, acting on it</p> <p>d) none of the above</p>	
50	<p>The shape of a suspended cable for a uniformly distributed load over it is</p> <p>a) circular b) parabolic c) catenary d) cubic parabola</p>	b
51	<p>Which of the following statement is wrong?</p> <p>(a) If two springs of stiffness s^1 and s^2 are arranged in series, then stiffness of the equivalent spring is $s^1 + s^2$.</p> <p>(b) The motion of a body from one extremity to another is known as beat.</p> <p>(c) A pendulum, which executes one beat per second is known as second's pendulum.</p> <p>(d) none of them.</p>	a
52	<p>The total momentum of two bodies remains constant after collision or any other mutual action. This is known as</p> <p>a) Law of Conservation of Momentum</p> <p>b) Newton's Law of Collision of Elastic Bodies</p> <p>c) both (a) and (b)</p> <p>d) none of them</p>	a
53	<p>The loss of kinetic energy due to direct impact of two bodies depends on</p> <p>a) the mass of two bodies b) the initial velocities of two bodies</p> <p>c) the final velocities of two bodies d) Both (a) and (b)</p>	d
54	<p>If a lead ball with a certain velocity is made to strike a wall, it does not rebound. But if a rubber ball of same mass and velocity strikes the same wall, it rebounds. Select correct reason from the following :</p> <p>a) the change in momentum suffered by the rubber ball is more than that of the lead ball.</p> <p>b) the change in momentum suffered by the lead ball is more than that of the rubber ball.</p> <p>c) both (a) and (b).</p> <p>d) none of the above.</p>	a
55	<p>A ball moving on a smooth horizontal table hits a rough vertical wall, the</p>	d

	coefficient of restitution between ball and wall being $1/3$. The ball rebounds at the same angle. The fraction of its kinetic energy lost is a) $1/3$ b) $2/3$ c) $1/9$ d) $8/9$	
56	A particle is dropped from a height of 3 m on a horizontal floor, which has a coefficient of restitution with the ball of $1/2$. The height to which the ball will rebound after striking the floor is a) 0.5 m b) 0.75 m c) 1.0 m d) 1.5 m	b
57	A car negotiates a curve of radius 100 m at 25 m/sec. The angle to the horizontal at which the road must be banked to prevent sideways friction on the car wheels is $\tan^{-1} x$, where x is (Assume $g = 10 \text{ m/sec}^2$) a) $3/8$ b) $1/2$ c) $9/5$ d) $5/8$	d
58	Two objects moving with uniform speeds are 5 m apart after 1 second when they move towards each other and are 1 m apart when they move in the same direction. The speeds of the objects are a) 2 m/sec and 2 m/sec b) 3 m/sec and 2 m/sec c) 3 m/sec and 3 m/sec d) 4 m/sec and 6 m/sec	b
59	The angular speed of a car taking a circular turn of radius 100 m at 36 km/hr will be a) 0.1 rad/sec b) 1 rad/sec c) 10 rad/sec d) 100 rad/sec	a
60	A stone was thrown vertically upwards from the ground with a velocity of 50 m/sec. After 5 seconds another stone was thrown vertically upwards from the same place. If both the stones strike the ground at the same time, then the velocity with which the second stone was thrown should be (Assume $g = 10 \text{ m/sec}^2$) a) 15 m/sec b) 25 m/sec c) 40 m/sec d) 50 m/sec	b

	a) 0° b) 30° c) 45° d) 90°	
10	The practical limit of moisture content achieved in air drying of timber is a) 5 % b) 15 % c) 25 % d) 35 %	b
11	Crushing strength of a first class brick should not be less than a) 3.5 N/mm ² b) 7.0 N/mm ² c) 10.5 N/mm ² d) 14.0 N/mm ²	c
12	The percentage of alumina in a good brick earth lies between a) 5 to 10 % b) 20 to 30 % c) 50 to 60 % d) 70 to 80 %	b
13	The nominal size of the modular brick is a) 190 mm x 90 mm x 80 mm b) 190 mm x 190 mm x 90 mm c) 200 mm x 100 mm x 100 mm d) 200 mm x 200 mm x 100 mm	c
14	Study the following statements. i) Hydraulic lime is suitable for white washing, ii) Fat lime is suitable for whitewashing, iii) Hydraulic lime is suitable for making mortar, iv) Fat lime is suitable for making mortar. The correct answer is a) (i) and (iv) b) (ii) and (iii) c) (i) and (ii) d) (iii) and (iv)	b
15	Le Chatelier's device is used for determining the a) setting time of cement b) soundness of cement c) tensile strength of cement d) compressive strength of cement	b
16	According to IS specifications, the compressive strength of ordinary Portland cement after three days should not be less than a) 7 MPa b) 11.5 MPa c) 16 MPa d) 21 MPa	c
17	For testing compressive and tensile strength of cement, the cement mortar is made by mixing cement and standard sand in the proportions of a) 1:2 b) 1:3 c) 1:4 d) 1:6	b
18	The slump recommended for mass concrete is about a) 25 mm to 50 mm b) 50 mm to 100 mm c) 100 mm to 125 mm d) 125 mm to 150 mm	a
19	Which of the following cements is suitable for use in massive concrete	b

	structures such as large dams? a) ordinary Portland cement b) low heat cement c) rapid hardening cement d) sulphate resisting cement	
20	Proper amount of entrained air in concrete results in i) better workability ii) better resistance to freezing and thawing iii) lesser workability iv) less resistance to freezing and thawing The correct answer is a) (i) and (ii) b) (i) and (iv) c) (ii) and (iii) d) (iii) and (iv)	a
21	Which of the following is a mineral a) quartzite b) laterite c) granite d) calcite	d
22	Most weather resisting metamorphic rock is a) lime stone b) slate c) marble d) quartzite	d
23	Red colour is imparted to bricks due to a) ironoxide b) lime c) silica d) magnesia	a
24	The number of bricks required per cubic meter of brick masonry is a) 400 b) 450 c) 500 d) 550	c
25	The basic purpose of a retarder in concrete is a) to increase the initial setting time of cement paste in concrete b) to decrease the initial setting time of cement paste in concrete c) to render the concrete more water tight d) to improve the workability of concrete mix	a
26	Compared to mild steel, cast iron has i) high compressive strength ii) high tensile strength iii) low compressive strength iv) low tensile strength The correct answer is a) (i) and (ii) b) (ii) and (iii) c) (iii) and (iv) d) (i) and (iv)	d
27	Assertion A: Paints with white lead base are not recommended for painting of	a

	<p>iron works.</p> <p>Reason R: Paints with white lead base do not check rusting of iron.</p> <p>Select your answer according to the coding system given below :</p> <p>a) Both A and R are true and, R is the correct explanation of A.</p> <p>b) Both A and R are true but R is not the correct explanation of A</p> <p>c) A is true but R is false</p> <p>d) A is false but R is true</p>	
28	<p>The pressure acting on the stones in stone masonry construction should be</p> <p>a) along the direction of bedding planes</p> <p>b) at 45° to the direction of bedding planes</p> <p>c) at 60° to the direction of bedding planes</p> <p>d) perpendicular to the direction of bedding planes</p>	d
29	<p>The depression provided in the face of brick during its manufacturing is known as-</p> <p>a) Indentation b) Anchorage c) Well d) Frog</p>	d
30	<p>The type of bond provided in brick masonry for carrying heavy loads is</p> <p>a) single Flemish bond b) double Flemish bond</p> <p>c) English bond d) zigzag bond</p>	c
31	<p>The slenderness ratio for masonry walls should not be more than</p> <p>a) 10 b) 20 c) 30 d) 40</p>	b
32	<p>The proportions of lime and sand in the mortar normally used in brick construction are</p> <p>a) 1:2 b) 1:4 c) 1:6 d) 1:8</p>	a
33	<p>Number of vertical joints in a stretcher course is x times the number of joints in the header course, where x is equal to</p> <p>a) 1/2 b) 1 c) 2 d) 1/4</p>	a
34	<p>As compared to stretcher course, the thickness of joints in header course should be</p> <p>a) less b) more c) equal d) equal or more</p>	a
35	<p>The differential settlement in case of foundations on sandy soils should not</p>	a

	exceed a) 25 mm b) 40 mm c) 65 mm d) 100 mm	
36	In case of foundations on black cotton soils, the most suitable method to increase the bearing capacity of soils is to a) increase the depth of foundation b) drain the soil c) compact the soil d) replace the poor soil	d
37	The type of footing which is used to transmit heavy loads through steel columns is a) raft foundation b) grillage foundation c) well foundation d) isolated footing	b
38	The type of pile which is driven at an inclination to resist inclined forces is known as a) friction pile b) sheet pile c) batter pile d) anchor pile	c
39	The minimum depth of foundation in clayey soils is a) 0.5 m b) 0.7 m c) 0.9 m d) 1.2 m	c
40	The maximum total settlement for raft foundation on clayey soils should be limited to a) 25 mm b) 25 to 40 mm c) 40 to 65 mm d) 65 to 100 mm	d
41	The bearing capacity of a water logged soil can be improved by a) compacting the soil b) draining the soil c) increasing the depth of foundation d) grouting	b
42	The type of flooring suitable for use in churches, theatres, public libraries and other places where noiseless floor covering is desired is a) cork flooring b) glass flooring c) wooden flooring d) linoleum flooring	a
43	The vertical distance between the springing line and highest point of the inner curve of an arch is known as a) intrados b) rise c) spandrel d) extrados	b
44	The minimum hardness number for marble is about a)3 b)8 c)5 d)10	a

45	Percentage of silica in a good brick earth lies between a)10-20% b)20-30% c) 30-40% d)40-50%	c
46	Swelling of bricks is known as a)bloating b) lamination c)chuffs d)efflorescence	a
	Fire bricks are used a)to reflect heat b)to increase heat flow c)to decrease heat flow	c
47	Depth or height of the arch is the a) perpendicular distance between intrados and extrados b) vertical distance between springing line and intrados c) perpendicular distance between springing line and extrados d) none of the above	a
48	The triangular space formed between the extrados and the horizontal line drawn through the crown of an arch is known as a) haunch b) spandrel c) voussoirs d) skewbacks	b
49	The lintels are preferred to arches because a) arches require more headroom to span the openings like doors, windows etc. b) arches require strong abutments to withstand arch thrust c) arches are difficult in construction d) all of the above	d
50	In the construction of arches, sand box method is used for a) centering b) actual laying of arch work c) striking of centering d) none of the above	c
51	The type of arch generally constructed over a wooden lintel or over a flat arch for the purpose of carrying the load of the wall above is a) segmental arch b) pointed arch c) relieving arch d) flat arch	c
52	The type of joint commonly used at the junction of a principal rafter and tie beam in timber trusses is	b

	<p>a) mortise and tennon joint b) oblique mortise and tennon joint</p> <p>c) butt joint d) mitred joint</p>	
53	<p>The type of roof suitable in plains where rainfall is meagre and temperature is high is</p> <p>a) pitched and sloping roof b) flat roof</p> <p>c) shell roof d) none of the above</p>	b
54	<p>Pitched and sloping roofs are suitable for</p> <p>a) coastal regions b) plain regions</p> <p>c) covering large areas d) all of the above</p>	a
55	<p>Quick lime is</p> <p>a) calcium oxide b) calcium hydroxide</p> <p>c) calcium carbonate d) none of the above</p>	a
56	<p>Hydraulic lime is obtained by</p> <p>a) burning of kankar b) burning of lime stone</p> <p>c) adding water to quicklime d) all the above</p>	a
57	<p>Plaster of paris is obtained from the calcination of</p> <p>a) bauxite b) lime stone c) dolomite d) gypsum</p>	c
58	<p>Fat lime can be used in</p> <p>a) distempers b) lime mortars c) lime terracing d) none of these</p>	a
59	<p>The silica in Portland cement is</p> <p>a) 10-20% b) 20-25% c) 25-40% d) 40-60%</p>	b
60	<p>Plan of arrangement of bricks in masonry Shown in figure is called as-</p> <p>(a) English bond</p> <p>(b) Double Flemish bond</p> <p>(c) Dutch bond</p> <p>(d) Zigzag bond</p>	b
61	<p>The type of roof which slopes in two directions with a break in the slope on each side is known as</p> <p>a) gable roof b) hip roof c) gambrel roof d) mansard roof</p>	c

62	<p>Mansard roof is a roof which slopes in</p> <p>a) two directions without break in the slope on each side</p> <p>b) two directions with break in the slope on each side</p> <p>c) four directions without break in the slope on each side</p> <p>d) four directions with break in the slope on each side</p>	d
63	<p>Higher pitch of the roof</p> <p>i) results in stronger roof</p> <p>ii) results in weaker roof</p> <p>iii) requires more covering material</p> <p>iv) requires less covering material</p> <p>The correct answer is</p> <p>a) (i) and (iii) b) (i) and (iv) c) (ii) and (iii) d) (ii) and (iv)</p>	a
64	<p>The function of king post in a king post roof truss is</p> <p>a) to support the frame work of the roof</p> <p>b) to receive the ends of principal rafter</p> <p>c) to prevent the walls from spreading outward</p> <p>d) to prevent the tie beam from sagging at its centre</p>	d
65	<p>The vertical posts placed at the top and bottom ends of a flight supporting the hand rail are known as</p> <p>a) balusters b) newel posts c) balustrades d) railings</p>	b
66	<p>Sum of tread and rise must lie between</p> <p>a) 300 to 350 mm b) 400 to 450 mm</p> <p>c) 500 to 550 mm d) 600 to 650 mm</p>	b
67	<p>Where a structural component or a system is providing lateral support to five or more walls or columns, the lateral load to be resisted may be taken as</p> <p>a) 4 percent b) 5 percent c) 6 percent d) 7 percent</p> <p>of the total vertical load on the most heavily loaded wall or column in the group.</p>	d
68	<p>The effective height of free standing non load bearing wall and column respectively will be</p>	d

77	<p>The timber floor not spanning on the masonry wall but properly anchored to the wall gives</p> <p>a) lateral restraint but not rotational restraint b) rotational restraint but not lateral restraint c) both lateral and rotational restraints d) neither lateral nor rotational restraint</p>	a
78	<p>Full restraint is provided by</p> <p>(i) foundation footing of a wall (ii) timber floor spanning on the wall and anchored to the wall (iii) RCC slab with a minimum bearing of 10 cm on the wall Of these statements</p> <p>a) (i) and (iii) are correct b) (i) and (ii) are correct c) (ii) and (iii) are correct d) (i), (ii) and (iii) are correct</p>	d
79	<p>Minimum thickness of stiffening wall for 1 to 3 storeys shall not be less than</p> <p>a) 10 cm b) 15 cm c) 20 cm d) 30 cm</p>	a
80	<p>For masonry work with solid bricks, consistency of mortar should be</p> <p>a) 5 to 8 cm b) 9 to 13 cm c) 14 to 18 cm d) 19 to 23 cm</p>	b
81	<p>Water retentivity for brick masonry should not be less than</p> <p>a) 50 % b) 60 % c) 70 % d) 80 %</p>	c
82	<p>Rich cement mortars are more liable to cracking as compared to lean mortars because rich mortars have</p> <p>a) high shrinkage b) less strength c) both (a) and (b) d) none of above</p>	a
83	<p>Cement mortars richer than 1 : 3 are not used in masonry because</p> <p>(i) there is no gain in strength of masonry (ii) there is high shrinkage (iii) they are prone to segregation Of these statements</p> <p>a) Only (ii) is correct b) (i) and (ii) are correct c) (ii) and (iii) are correct d) (i), (ii) and (iii) are correct</p>	b
84	<p>For earthquake resistant masonry buildings, the vertical distance between openings one above the other in a load bearing wall shall not be less than</p>	b

	a) 50 cm b) 60 cm c) 75 cm d) 100 cm	
85	In a cavity wall, both leaves of which are load bearing, the effective thickness is taken as a) sum of thickness of both leaves b) two-third of the sum of thickness of both the leaves c) actual thickness of the stronger leaf d) larger of (b) and (c)	d
86	Consider the following statements regarding provision of chases in masonry, (i) No chase should be permitted in a half brick load-bearing wall, (ii) Vertical chases should not be closer than 2 m in any stretch of a wall, (iii) Chases should be provided near to bearings of beams and lintels. Of these statements a) (i) and (ii) are correct b) (i) and (iii) are correct c) (ii) and (iii) are correct d) (i), (ii) and (iii) are correct	a
87	Consider the following statements: The use of relatively weak mortar 1. Will accommodate movements due to loads and, cracking if any, and will be distributed as thin hair cracks which are less noticeable or harmful. 2. Will result in reduction of stresses due to differential expansion of masonry units. Of these statements a) 1 alone is correct b) 2 alone is correct c) both 1 and 2 are correct d) neither 1 nor 2 is correct	c
88	For strengthening a 50 m long and 5 m high straight compound wall built in brick work, which one of the following would be most suitable? a) providing buttresses at certain intervals b) providing a deeper foundation c) using a richer mortar d) using stronger bricks	a

89	<p>Consider the following statements: Sand in mortar is needed for</p> <ol style="list-style-type: none"> 1. decreasing the quantity of cement. 2. reducing shrinkage. 3. decreasing the surface area of the binding material. 4. increasing the strength. <p>Of these statements:</p> <p>a) 2, 3 and 4 are correct b) 1,2 and 3 are correct c) 1,3 and 4 are correct d) 1,2 and 4 are correct</p>	a
90	<p>Consider the following statements:</p> <p>A high lime content in a composite cement-lime mortar results in</p> <ol style="list-style-type: none"> 1. slow hardening. 2. quick setting. 3. weaker mortar. Of these statements <p>a) 2 and 3 are correct b) 1 and 2 are correct c) 1 and 3 are correct d) 1, 2 and 3 are correct</p>	c
91	<p>Direct load carrying capacity of a brick masonry wall standing freely as against when it supports RC slab will be</p> <p>a) more b) less c) the same in both the cases d) 100%</p>	b
92	<p>A 200 mm thick wall made of modular bricks is 5 m long between cross walls and 3.8 m clear height between RCC slabs at top and bottom. The slenderness ratio of the wall is</p> <p>a) 15 b) 19 c) 20 d) 25</p>	a
93	<p>The basic stress in masonry units having height to width ratio of 1.5 may be increased by a factor of</p> <p>a) 1.2 b) 1.4 c) 1.6 d) 2.0</p>	c
94	<p>Consider the following statements:</p> <ol style="list-style-type: none"> 1. Masonry in rich cement mortar though having good strength with high shrinkage is much liable for surface cracks. 2. Lime mortar possesses poor workability and poor water retentivity and also 	d

	<p>suffers high shrinkage.</p> <p>3. Masonry in lime mortar has better resistance against rain penetration and is less liable to crack when compared to masonry in cement mortar.</p> <p>Which of these statements are correct?</p> <p>a) 1,2 and 3 b) 1 and 2 c) 2 and 3 d) 1 and 3</p>	
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	<p>c) measurement of vertical angles only</p> <p>d) measurement of both horizontal and vertical angles</p>	
14	<p>The process of turning the telescope about the vertical axis in horizontal plane is known as</p> <p>a) transiting b) reversing c) plunging d) swinging</p>	d
15	<p>Size of a theodolite is specified by</p> <p>a) the length of telescope b) the diameter of vertical circle</p> <p>c) the diameter of lower plate d) the diameter of upper plate</p>	c
16	<p>Which of the following is not the function of levelling head?</p> <p>a) to support the main part of the instrument</p> <p>b) to attach the theodolite to the tripod</p> <p>c) to provide a means for leveling the theodolite</p> <p>d) none of the above</p>	d
17	<p>If the lower clamp screw is tightened and upper clamp screw is loosened, the theodolite may be rotated</p> <p>a) on its outer spindle with a relative motion between the vernier and graduated scale of lower plate</p> <p>b) on its outer spindle without a relative motion between the vernier and graduated scale of lower plate</p> <p>c) on its inner spindle with a relative motion between the vernier and the graduated scale of lower plate</p> <p>d) on its inner spindle without a relative motion between the vernier and the graduated scale of lower plate</p>	c
18	<p>A telescope is said to be inverted if its</p> <p>a) vertical circle is to its right and the bubble of the telescope is down</p> <p>b) vertical circle is to its right and the bubble of the telescope is up</p> <p>c) vertical circle is to its left and the bubble of the telescope is down</p> <p>d) vertical circle is to its left and the bubble of the telescope is up</p>	a
19	<p>The cross hairs in the surveying telescope are placed</p> <p>a) midway between eye piece and objective lens</p>	b

	<ul style="list-style-type: none"> a) reading both verniers and taking the mean of the two b) taking both face observations and taking the mean of the two c) double sighting d) taking mean of several readings distributed over different portions of the graduated circle 	
27	<p>In the double application of principle of reversion, the apparent error is</p> <ul style="list-style-type: none"> a) equal to true error b) half the true error c) two times the true error d) four times the true error 	d
28	<p>Which of the following errors can be eliminated by taking mean of both face observations?</p> <ul style="list-style-type: none"> a) error due to imperfect graduations b) error due to eccentricity of verniers c) error due to imperfect adjustment of plate levels d) error due to line of collimation not being perpendicular to horizontal axis 	d
29	<p>Which of the following errors cannot be eliminated by taking both face observations?</p> <ul style="list-style-type: none"> a) error due to horizontal axis not being perpendicular to the vertical axis b) index error i.e. error due to imperfect adjustment of the vertical circle vernier c) error due to non-parallelism of the axis of telescope level and line of collimation d) none of the above 	d
30	<p>If a tripod settles in the interval that elapses between taking a back sight reading and the following foresight reading, then the elevation of turning point will</p> <ul style="list-style-type: none"> a) increase b) decrease c) not change d) either 'a' or 'b' 	a
31	<p>If altitude bubble is provided both on index frame as well as on telescope of a theodolite, then the instrument is levelled with reference to</p> <ul style="list-style-type: none"> i) altitude bubble on index frame 	b

53	Sensitiveness of a level tube is designated by a) radius of level tube b) length of level tube c) length of bubble of level tube d) none of the above	a
54	Which of the following statements is incorrect? a) Error due to refraction may not be completely eliminated by reciprocal levelling. b) Tilting levels are commonly used for precision work. c) The last reading of levelling is always a foresight. d) All of the above statements are incorrect.	d
55	Dumpy level is most suitable when a) the instrument is to be shifted frequently b) fly levelling is being done over long distance c) many readings are to be taken from a single setting of the instrument d) all of the above	c
56	The difference of levels between two stations A and B is to be determined. For best results, the instrument station should be a) equidistant from A and B b) closer to the higher station c) closer to the lower station d) as far as possible from the line AB	a
57	Contour interval is a) inversely proportional to the scale of the map b) directly proportional to the flatness of ground c) larger for accurate works d) larger if the time available is more	a
58	An imaginary line lying throughout the surface of ground and preserving a constant inclination to the horizontal is known as a) contour line b) horizontal equivalent c) contour interval d) contour gradient	d
	The suitable contour interval for a map with scale 1 : 10000 is	a

	c) 6 x size of weld d) 10 x size of weld	
9	Size of fillet weld with unequal legs is equal to a) smaller leg length b) longer leg length c) throat thickness d) average of smaller and longer leg lengths	a
10	Truss shown in the figure is called as- (a) perfect frame (b) Imperfect frame (c) Redundant frame (d) Deficient frame	a
11	Weakest section in a fillet weld is a) throat of the fillet b) smaller side c) side parallel to force d) side perpendicular to force	a
12	Effective throat thickness of a fillet weld is a) 0.707 x size of weld b) 1.414 x size of weld c) a function of the angle between fusion faces d) equal to the side of the fillet	c
13	If the rivet value is 16.8 kN and force in the member is 16.3 kN, then the number of rivets required for the connection of the member to a gusset plate is a) 1 b) 2 c) 3 d) 4	b
14	If a prismatic member with area of cross-section A is subjected to a tensile load P, then the maximum shear stress and its inclination with the direction of load respectively are a) P/A and 45° b) $P/2A$ and 45° c) $P/2A$ and 60° d) P/A and 30°	b
15	The sum of normal stresses is a) constant b) variable	a

	c) dependent on the planes d) none of the above	
16	The radius of Mohr's circle for two equal unlike principal stresses of magnitude p is a) p b) $p/2$ c) zero d) none of these	a
17	Shear stress on principal planes is a) zero b) maximum c) minimum d) none of these	a
18	The state of pure shear stress is produced by a) tension in one direction and equal compression in perpendicular direction b) equal tension in two directions at right angles c) equal compression in two directions at right angles d) none of the above	a
19	According to Rankine's hypothesis, the criterion of failure of a brittle material is a) maximum principal stress b) maximum shear stress c) maximum strain energy d) maximum shear strain energy	a
20	Maximum bending moment in a beam occurs where a) deflection is zero b) shear force is maximum c) shear force is minimum d) shear force changes sign	d
21	Rate of change of bending moment is equal to a) shear force b) deflection c) slope d) rate of loading	d
22	The diagram showing the variation of axial load along the span is called a) shear force diagram b) bending moment diagram c) thrust diagram d) influence line diagram	a
23	The difference in ordinate of the shear curve between any two sections is equal to the area under a) load curve between these two sections b) shear curve between these two sections c) bending moment curve between these two sections d) load curve between these two sections plus concentrated loads applied between the sections	d

	d) none of the above	
31	Of the several prismatic beams of equal lengths, the strongest in flexure is the one having maximum a) moment of inertia b) section modulus c) tensile strength d) area of cross-section	b
32	Of the two prismatic beams of same material, length and flexural strength, one is circular and other is square in cross-section. The ratio of weights of circular and square beams is a) 1.118 b) 1.342 c) 1.000 d) 0.793	a
33	A flitched beam consists of a wooden joist 150 mm wide and 300 mm deep strengthened by steel plates 10 mm thick and 300 mm deep one on either side of the joist. If modulus of elasticity of steel is 20 times that of wood, then the width of equivalent wooden section will be a) 150 mm b) 350 mm c) 500 mm d) 550 mm	d
34	A beam of rectangular cross-section is 100 mm wide and 200 mm deep. If the section is subjected to a shear force of 20 kN, then the maximum shear stress in the section is a) 1 N/mm ² b) 1.125 N/mm ² c) 1.33 N/mm ² d) 1.5 N/mm ²	d
35	A beam of square cross-section with side 100 mm is placed with one diagonal vertical. If the shear force acting on the section is 10 kN, the maximum shear stress is a) 1 N/mm ² b) 1.125 N/mm ² c) 2 N/mm ² d) 2.25 N/mm ²	b
36	A prismatic bar when subjected to pure bending assumes the shape of a) catenary b) cubic parabola c) quadratic parabola d) arc of a circle	d
37	A beam of triangular cross section is placed with its base horizontal. The maximum shear stress intensity in the section will be a) at the neutral axis b) at the base c) above the neutral axis d) below the neutral axis	c

38	A beam of uniform strength has at every cross-section same a) bending moment b) bending stress c) deflection d) stiffness	b
39	For no torsion, the plane of bending should a) be parallel to one of the principal axes b) pass through shear centre of section c) pass through neutral axis of the section d) pass through centre of gravity of the section	b
40	Two beams, one of circular cross-section and other of square cross-section, have equal areas of cross-section. If subjected to bending a) circular section is more economical b) square section is more economical c) both sections are equally strong d) both sections are equally stiff	b
41	The portion, which should be removed from top and bottom of a circular cross section of diameter d in order to obtain maximum section modulus, is a) $0.01 d$ b) $0.1 d$ c) $0.011 d$ d) $0.11 d$	c
42	A beam of overall length l rests on two simple supports with equal overhangs on both sides. Two equal loads act at the free ends. If the deflection at the centre of the beam is the same as at either end, then the length of either overhang is a) $0.152 l$ b) $0.207 l$ c) $0.252 l$ d) $0.277 l$	a
43	A beam ABC rests on simple supports at A and B with BC as an overhang. D is centre of span AB. If in the first case a concentrated load P acts at C while in the second case load P acts at D, then the a) deflection at D in the first case will be equal to the deflection at C in the second case b) deflection at C in the first case is equal to the deflection at D in the second case c) deflection at D in the first case will always be smaller than the deflection at	a

	c) ends and loaded anywhere d) centre and loaded anywhere	
51	Laminated springs are subjected to a) direct stress b) bending stress c) shear stress d) none of the above	c
52	Deflection in a leaf spring is more if its a) strength is more b) strength is less c) stiffness is less d) stiffness is more	c
53	Buckling load for a given column depends upon a) length of column only b) least lateral dimension only c) both length and least lateral dimension d) none of the above	c
54	When both ends of a column are fixed, the crippling load is P. If one end of the column is made free, the value of crippling load will be changed to a) $P/16$ b) $P/4$ c) $P/2$ d) $4P$	a
55	Euler's formula for a mild steel long column hinged at both ends is not valid for slenderness ratio a) greater than 80 b) less than 80 c) greater than 180 d) greater than 120	b
56	A long column has maximum crippling load when its a) both ends are hinged b) both ends are fixed c) one end is fixed and other end is hinged d) one end is fixed and other end is free	b
57	Slenderness ratio of a 5 m long column hinged at both ends and having a circular cross-section with diameter 160 mm is a) 31.25 b) 62.5 c) 100 d) 125	d
58	The effect of arching a beam is a) to reduce bending moment throughout b) to increase bending moment throughout	a

	<p>c) to increase shear force</p> <p>d) to decrease shear force</p>	
59	<p>Internal forces at every cross-section in a arch are</p> <p>a) normal thrust and shear force</p> <p>b) shear force and bending moment</p> <p>c) normal thrust and bending moment</p> <p>d) normal thrust, shear force and bending moment</p>	d
60	<p>According to Eddy's theorem, the vertical intercept between the linear arch and the centre line of actual arch at any point represents to some scale</p> <p>a) bending moment b) shear force</p> <p>c) normal thrust d) deflection</p>	a
61	<p>If a three hinged parabolic arch carries a uniformly distributed load over the entire span, then any section of the arch is subjected to</p> <p>a) normal thrust only</p> <p>b) normal thrust and shear force</p> <p>c) normal thrust and bending moment</p> <p>d) normal thrust, shear force and bending moment</p>	a

5.Theory of Structures

S.N.	Question with options	Answer
1	Principle of superposition is applicable when a) deflections are linear functions of applied forces b) material obeys Hooke's law c) the action of applied forces will be affected by small deformations of the structure d) none of the above	a
2	The number of independent equations to be satisfied for static equilibrium of a plane structure is a) 1 b) 2 c) 3 d) 6	c
3	Muller Breslau's principle for obtaining influence lines is applicable i) trusses ii) statically determinate beams and frames iii) statically indeterminate structures, the material of which is elastic and follows Hooke's law iv) any statically indeterminate structure The correct answer is a) (i), (ii) and (iii) b) (i), (ii) and (iv) c) (i) and (ii) d) only (i)	a
4	A load 'W is moving from left to right support on a simply supported beam of span T. The maximum bending moment at 0.4 l from the left support is a) 0.16 Wl b) 0.20 Wl c) 0.24 Wl d) 0.25 Wl	c
5	Degree of static indeterminacy of a rigid-jointed plane frame having 15 members, 3 reaction components and 14 joints is a) 2 b) 3 c) 6 d) 8	c
6	Independent displacement components at each joint of a rigid-jointed plane frame are a) three linear movements	b

13	The deflection at any point of a perfect frame can be obtained by applying a unit load at the joint in a) vertical direction b) horizontal direction c) inclined direction d) the direction in which the deflection is required	d
14	The number of independent displacement components at each joint of a rigid-jointed space frame is a) 1 b) 2 c) 3 d) 6	d
15	If in a rigid-jointed space frame, $(6m + r) < 6j$, then the frame is a) unstable b) stable and statically determinate c) stable and statically indeterminate d) none of the above	a
16	The principle of virtual work can be applied to elastic system by considering the virtual work of a) internal forces only b) external forces only c) internal as well as external forces d) none of the above	c
17	Castigliano's first theorem is applicable a) for statically determinate structures only b) when the system behaves elastically c) only when principle of superposition is valid d) none of the above	c
18	Principle of superposition is applicable when a) deflections are linear functions of applied forces b) material obeys Hooke's law c) the action of applied forces will be affected by small deformations of the structure d) none of the above	a
19	In moment distribution method, the sum of distribution factors of all the members meeting at any joint is always a) zero b) less than 1 c) 1 d) greater than 1	c
20	The carryover factor in a prismatic member whose far end is fixed is a) 0 b) $\frac{1}{2}$ c) $\frac{3}{4}$ d) 1	b

21	<p>In column analogy method, the area of an analogous column for a fixed beam of span L and flexural rigidity EI is taken as</p> <p>a) L/EI b) $L/2EI$ c) $L/3EI$ d) $L/4EI$</p>	a
22	<p>Figure shows graph between for many materials at stresses well below those at which they will break there is a linear relationship between stress and strain. Where E is called as-</p> <p>(a) Modulus of flexibility (b) Modulus of Elasticity (c) Young's Modulus (d) Both b and c</p>	d
23	<p>The degree of static indeterminacy up to which column analogy method can be used is</p> <p>a) 2 b) 3 c) 4 d) unrestricted</p>	b
24	<p>The deflection at any point of a perfect frame can be obtained by applying a unit load at the joint in</p> <p>a) vertical direction b) horizontal direction c) inclined direction d) the direction in which the deflection is required</p>	d
25	<p>In the slope deflection equations, the deformations are considered to be caused by</p> <p>i) bending moment ii) shear force iii) axial force</p> <p>The correct answer is</p> <p>a) only (i) b) (i) and (ii) c) (ii) and (iii) d) (i), (ii) and (iii)</p>	a
26	<p>The three moments equation is applicable only when</p> <p>a) the beam is prismatic</p>	c

	d) none of the above	
34	When a uniformly distributed load, longer than the span of the girder, moves from left to right, then the maximum bending moment at mid section of span occurs when the uniformly distributed load occupies a) less than the left half span b) whole of left half span c) more than the left half span d) whole span	d
35	When a uniformly distributed load, shorter than the span of the girder, moves from left to right, then the conditions for maximum bending moment at a section is that a) the head of the load reaches the section b) the tail of the load reaches the section c) the load position should be such that the section divides it equally on both sides d) the load position should be such that the section divides the load in the same ratio as it divides the span	d
36	When a series of wheel loads crosses a simply supported girder, the maximum bending moment under any given wheel load occurs when a) the center of gravity of the load system is midway between the center of span and wheel load under consideration b) the center of span is midway between the center of gravity of the load system and the wheel load under consideration c) the wheel load under consideration is midway between the center of span and the center of gravity of the load system d) none of the above	b
37	Which of the following is not the displacement method? a) Equilibrium method b) Column analogy method c) Moment distribution method d) Kani's method	b
38	Study the following statements. i) The displacement method is more useful when degree of kinematic indeterminacy is greater than the degree of static indeterminacy.	d

	<p>ii) The displacement method is more useful when degree of kinematic indeterminacy is less than the degree of static indeterminacy.</p> <p>iii) The force method is more useful when degree of static indeterminacy is greater than the degree of kinematic indeterminacy.</p> <p>iv) The force method is more useful when degree of static indeterminacy is less than the degree of kinematic indeterminacy.</p> <p>The correct answer is</p> <p>a) (i) and (iii) b) (ii) and (iii) c) (i) and (iv) d) (ii) and (iv)</p>	
39	<p>Select the correct statement</p> <p>a) Flexibility matrix is a square symmetrical matrix</p> <p>b) Stiffness matrix is a square symmetrical matrix</p> <p>c) both (a) and (b)</p> <p>d) none of the above</p>	c
40	<p>To generate the jth column of the flexibility matrix</p> <p>a) a unit force is applied at coordinate j and the displacements are calculated at all coordinates</p> <p>b) a unit displacement is applied at co-ordinate j and the forces are calculated at all coordinates</p> <p>c) a unit force is applied at coordinate j and the forces are calculated at all coordinates</p> <p>d) a unit displacement is applied at co-ordinate j and the displacements are calculated at all co-ordinates</p>	a
41	<p>For stable structures, one of the important properties of flexibility and stiffness matrices is that the elements on the main diagonal</p> <p>i) of a stiffness matrix must be positive</p> <p>ii) of a stiffness matrix must be negative</p> <p>iii) of a flexibility matrix must be positive</p> <p>iv) of a flexibility matrix must be negative</p> <p>The correct answer is</p> <p>a) (i) and (iii) b) (ii) and (iii) c) (i) and (iv) d) (ii) and (iv)</p>	a

42	Effects of shear force and axial force on plastic moment capacity of a structure are respectively to a) increase and decrease b) increase and increase c) decrease and increase d) decrease and decrease	d
43	Which of the following methods of structural analysis is a force method? a) slope deflection method b) column analogy method c) moment distribution method d) none of the above	b
44	Which of the following methods of structural analysis is a displacement method? a) moment distribution method b) column analogy method c) three moment equation d) none of the above	a
45	In the displacement method of structural analysis, the basic unknowns are a) displacements b) force c) displacements and forces d) none of the above	a
46	The fixed support in a real beam becomes in the conjugate beam a a) roller support b) hinged support c) fixed support d) free end	d
47	When a load crosses a through type Pratt truss in the direction left to right, the nature of force in any diagonal member in the left half of the span a) change from compression to tension b) change from tension to compression c) always be compression d) always be tension	a
48	Consider the following statements: Sinking of an intermediate support of a continuous beam 1. reduces the negative moment at support. 2. increases the negative moment at support. 3. reduces the positive moment at support. 4. increases the positive moment at the center of span. Of these statements	a

	<p>a) 1 and 4 are correct b) 1 and 3 are correct</p> <p>c) 2 and 3 are correct d) 2 and 4 are correct</p>	
49	<p>Muller Breslau's principle for obtaining influence lines is applicable</p> <p>i) trusses</p> <p>ii) statically determinate beams and frames</p> <p>iii) statically indeterminate structures, the material of which is elastic and follows Hooke's law</p> <p>iv) any statically indeterminate structure</p> <p>The correct answer is</p> <p>a) (i), (ii) and (iii) b) (i), (ii) and (iv)</p> <p>c) (i) and (ii) d) only (i)</p>	a
50	<p>For a single point load W moving on a symmetrical three hinged parabolic arch of span L, the maximum sagging moment occurs at a distance x from ends. The value of x is</p> <p>a) $0.211 L$ b) $0.25 L$ c) $0.234 L$ d) $0.5 L$</p>	a
51	<p>The deformation of a spring produced by a unit load is called</p> <p>a) stiffness b) flexibility</p> <p>c) influence coefficient d) unit strain</p>	b
52	<p>A simply supported beam deflects by 5 mm when it is subjected to a concentrated load of 10 kN at its center. What will be deflection in a 1/10 model of the beam if the model is subjected to a 1 kN load at its center?</p> <p>a) 5 mm b) 0.5 mm c) 0.05 mm d) 0.005mm</p>	a
53	<p>The width of the analogous column in the method of column analogy is</p> <p>a) $2/EI$ b) $1/EI$ c) $1/2 EI$ d) $1/4 EI$</p>	b
54	<p>The fixed support in a real beam becomes in the conjugate beam a</p> <p>a) roller support b) hinged support</p> <p>c) fixed support d) free end</p>	d
55	<p>In the displacement method of structural analysis, the basic unknowns are</p> <p>a) displacements b) force</p> <p>c) displacements and forces d) none of the above</p>	a

56	Which of the following methods of structural analysis is a displacement method a) moment distribution method b) column analogy method c) three moment equation d) none of the above	a
57	Effects of shear force and axial force on plastic moment capacity of a structure are respectively to a) increase and decrease b) increase and increase c) decrease and increase d) decrease and decrease	d
58	Degree of kinematic indeterminacy of a pin-jointed plane frame is given by a) $2j - r$ b) $j - 2r$ c) $3j - r$ d) $2j + r$	a
59	For a two-hinged arch, if one of the supports settles down vertically, then the horizontal a) is increased b) is decreased c) remains unchanged d) becomes zero	b
60	The principle of virtual work can be applied to elastic system by considering the virtual work of a) internal forces only b) external forces only c) internal as well as external forces d) none of the above	c
61	In moment distribution method, the sum of distribution factors of all the members meeting at any joint is always a) zero b) less than 1 c) 1 d) greater than 1	c

6. Concrete Structures

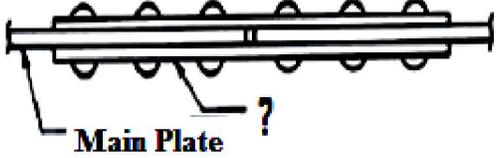
S.N.	Question with options	Answer
1	Strength of concrete increases with a) increase in water-cement ratio b) increase in fineness of cement c) decrease in curing time d) decrease in size of aggregate	b
2	Increase in the moisture content in concrete a) reduces the strength b) increases the strength c) does not change the strength d) all of these	a
3	Admixtures which cause early setting, and hardening of concrete are called a) workability admixtures b) accelerators c) retarders d) air entraining agents	b
4	The percentage of voids in cement is approximately a) 25% b) 40% c) 60% d) 80%	b
5	As compared to ordinary Portland cement, high alumina cement has a) higher initial setting time but lower final setting time b) lower initial setting time but higher final setting time c) higher initial and final setting times d) lower initial and final setting times	a
6	The effect of adding calcium chloride in concrete is i) to increase shrinkage ii) to decrease shrinkage iii) to increase setting time iv) to decrease setting time The correct answer is a) (i) and (iii) b) (i)and(iv) c) (ii) and (iii) d) (ii) and (iv)	b
7	Modulus of rupture of concrete is a measure of a) flexural tensile strength b) direct tensile strength c) compressive strength d) split tensile strength	a

	workability of concrete expressed as compacting factor should be a) 0.75-0.80 b) 0.80-0.85 c) 0.85 - 0.92 d) above 0.92	
23	Maximum quantity of water needed per 50 kg of cement for M 15 grade of concrete is a) 28 litres b) 30 litres c) 32 litres d) 34 litres	c
24	According to IS : 456-1978, the flexural strength of concrete is a) directly proportional to compressive strength b) inversely proportional to compressive strength c) directly proportional to square root of compressive strength d) inversely proportional to square root of compressive strength	c
25	According to IS : 456-1978, the column or the strut is the member whose effective length is greater than a) the least lateral dimension b) 2 times the least lateral dimension c) 3 times the least lateral dimension d) 4 times the least lateral dimension	c
26	According to IS : 456- 1978, minimum slenderness ratio for a short column is a) less than 12 b) less than 18 c) between 18 and 24 d) more than 24	a
27	The minimum cover in a slab should neither be less than the diameter of bar nor less than a) 10 mm b) 15 mm c) 25 mm d) 13 mm	b
28	For a longitudinal reinforcing bar in a column, the minimum cover shall neither be less than the diameter of bar nor less than a) 15 mm b) 25 mm c) 30 mm d) 40 mm	d
29	The ratio of the diameter of reinforcing bars and the slab thickness is a) $\frac{1}{4}$ b) $\frac{1}{5}$ c) $\frac{1}{6}$ d) $\frac{1}{8}$	d
30	The percentage of reinforcement in case of slabs, when high strength	b

	deformed bars are used is not less than a) 0.15 b) 0.12 c) 0.30 d) 1.00	
31	Which of the following statements is incorrect? a) Minimum cross sectional area of longitudinal reinforcement in a column is 0.8%. b) Spacing of longitudinal bars measured along the periphery of column should not exceed 300 mm. c) Reinforcing bars in a column should not be less than 12 mm in diameter. d) The number of longitudinal bars provided in a circular column should not be less than four.	d
32	Which of the following statements is incorrect ? a) Higher Vee-Bee time shows lower workability. b) Higher slump shows higher workability. c) Higher compacting factor shows higher workability. d) none of the above	d
33	Minimum pitch of transverse reinforcement in a column is a) the least lateral dimension of the member b) sixteen times the smallest diameter of longitudinal reinforcement bar to be tied c) forty-eight times the diameter of transverse reinforcement d) lesser of the above three values	d
34	Maximum distance between expansion joints in structures as per IS : 456 - 1978 is a) 20 m b) 30 m c) 45 m d) 60 m	c
35	A continuous beam is deemed to be a deep beam when the ratio of effective span to overall depth (l/D) is less than a) 1.5 b) 2.0 c) 2.5 d) 3.0	c
36	Critical section for shear in case of flat slabs is at a distance of a) effective depth of slab from periphery of column/drop panel b) d/2 from periphery of column/capital/ drop panel	b

	Grashoff Rankine's theory a) is always less than 1 b) is always greater than 1 c) can be more than 1 d) can be less than 1	
45	The limits of percentage p of the longitudinal reinforcement in a column is given by a) 0.15 % to 2 % b) 0.8 % to 4 % c) 0.8 % to 6 % d) 0.8 % to 8 %	c
46	The minimum diameter of longitudinal bars in a column is a) 6 mm b) 8 mm c) 12 mm d) 16 mm	c
47	The minimum cover to the ties or spirals should not be less than a) 15 mm b) 20 mm c) 25 mm d) 50mm	c
48	The load carrying capacity of a helically reinforced column as compared to that of a tied column is about a) 5 % less b) 10 % less c) 5 % more d) 10 % more	c
49	The diameter of ties in a column should be a) more than or equal to one fourth of diameter of main bar b) more than or equal to 5 mm c) more than 5 mm but less than one-fourth of diameter of main bar d) more than 5 mm and also more than one-fourth of diameter of main bar	d
50	Due to circumferential action of the spiral in a spirally reinforced column a) capacity of column is decreased b) ductility of column reduces c) capacity of column is decreased but ductility of column increases d) both the capacity of column and ductility of column increase	d
51	Which of the following R.C. retaining walls is suitable for heights beyond 6m? a) L-shaped wall b) T-shaped wall c) counterfort type d) all of the above	c
52	In counterfort type retaining walls i) the vertical slab is designed as a continuous slab	a

	<p>ii) the heel slab is designed as a continuous slab</p> <p>iii) the vertical slab is designed as a cantilever</p> <p>iv) the heel slab is designed as a cantilever</p> <p>The correct answer is</p> <p>a) (i) and (ii) b) (i) and (iv) c) (ii) and (iii) d) (iii) and (iv)</p>	
53	<p>The main reinforcement in the toe of a T- shaped R C. retaining wall is provided on</p> <p>i) top face parallel to the wall</p> <p>ii) top face perpendicular to the wall</p> <p>iii) bottom face parallel to the wall</p> <p>iv) bottom face perpendicular to the wall</p> <p>The correct answer is</p> <p>a) only (ii) is correct b) (i) and (ii) are correct</p> <p>c) (iii) and (iv) are correct d) only (iv) is correct</p>	d
54	<p>In a counterfort retaining wall, the main reinforcement is provided on the</p> <p>i) bottom face in front counterfort</p> <p>ii) inclined face in front counterfort</p> <p>iii) bottom face in back counterfort</p> <p>iv) inclined face in back counterfort</p> <p>The correct answer is</p> <p>a) (i) and (ii), b) (ii) and (iii) c) (i) and (iv) d) (iii) and (iv)</p>	c
55	<p>The critical section for finding maximum bending moment for footing under masonry wall is located</p> <p>a) at the middle of the wall</p> <p>b) at the edge of the wall</p> <p>c) halfway between the middle and edge of the wall</p> <p>d) at a distance equal to effective depth of footing from the edge of the wall</p>	c
56	<p>While designing the pile as a column, the end conditions are nearly</p> <p>a) both ends hinged</p> <p>b) both ends fixed</p>	c

8	<p>The overlap of batten plates with the main members in welded connections should be more than</p> <p>a) $3t$ b) $4t$ c) $6t$ d) $8t$</p> <p>where t = thickness of the batten plate</p>	b
9	<p>The slenderness ratio of lacing bars should not exceed</p> <p>a) 100 b) 120 c) 145 d) 180</p>	c
10	<p>Economical depth of a plate girder corresponds to</p> <p>a) minimum weight b) minimum depth</p> <p>c) maximum weight d) minimum thickness of web</p>	a
11	<p>A tension member in the form of steel plate is to be Supported plates and rivets. Technical Name of these plates where question mark has been shown in figure</p>  <p>a) Supporting plate b) subsidiary plate</p> <p>c) Splice plates d) thin plates</p>	c
12	<p>Shear buckling of web in a plate girder is prevented by using</p> <p>a) vertical intermediate stiffener b) horizontal stiffener at neutral axis</p> <p>c) bearing stiffener d) none of the above</p>	a
13	<p>Horizontal stiffener in a plate girder is provided to safeguard against</p> <p>a) shear buckling of web plate b) compression buckling of web plate</p> <p>c) yielding d) all of the above</p>	b
14	<p>Minimum thickness of web in a plate girder, when the plate is accessible and also exposed to weather, is</p> <p>a) 5 mm b) 6 mm c) 8 mm d) 10 mm</p>	b
15	<p>The web crippling due to excessive bearing stress can be avoided by</p> <p>a) increasing the web thickness</p> <p>b) providing suitable stiffeners</p> <p>c) increasing the length of the bearing plates</p> <p>d) none of the above</p>	c

23	Rivets connecting flange angles to cover plates in a plate girder are subjected to a) horizontal shear only b) vertical load only c) both (a) and (b) d) none of the above	a
24	The maximum spacing of vertical stiffeners is a) 1.33 d b) 1.25 d c) 1.50 d d) 1.75 d where d is the distance between flange angles	c
25	The range of economical spacing of trusses varies from a) $L/3$ to $L/5$ b) $L/4$ to $2L/5$ c) $L/3$ to $L/2$ d) $2L/5$ to $3L/5$ where L is span	a
26	The maximum permissible span of asbestos cement sheets is a) 650 mm b) 810 mm c) 1250 mm d) 1680 mm	d
27	Maximum pitch of rivets, used in steel stacks, is limited to a) 6 t b) 10 t c) 12 t d) 16 t where t is thickness of thinner plate being connected	b
28	The diameter of base of conical flare of a steel stack is a) less than d b) equal to d c) more than d d) any of the above where d is the diameter of the cylindrical part	c
29	Hudson's formula gives the dead weight of a truss bridge as a function of a) bottom chord area b) top chord area c) effective span of bridge d) heaviest axle load of engine	a
30	If the loaded length of span in meters of a railway steel bridge carrying a single track is 6 m, then impact factor is taken as a) 0 b) 0.5 c) between 0.5 and 1.0 d) 1.0	c
31	If the floor is supported at or near the bottom but top chords of a bridge are not braced, then the bridge is called a) deck type b) through type c) half through type d) double deck type	c

32	<p>The centrifugal force due to curvature of track is assumed to act on the bridge at a height of</p> <p>a) 1.23 m above the rail level b) 1.50 m above the rail level c) 1.83 m above the rail level d) 2.13 m above the rail level</p>	c
33	<p>The effect of racking forces is considered in the design of</p> <p>i) lateral braces ii) chord members</p> <p>The correct answer is</p> <p>a) only (i) b) only (ii) c) both (i) and (ii) d) none of these</p>	a
34	<p>The portal bracing in a truss bridge is used to</p> <p>a) transfer load from top of end posts to bearings b) keep the rectangular shape of the bridge cross-section c) stiffen the structure laterally d) prevent the sideways buckling of top chord</p>	a
35	<p>Study the following statements.</p> <p>i) Top lateral bracing prevents the sidesway buckling of the chord. ii) Sway bracing keeps the rectangular shape of the bridge cross-section. iii) Sway bracing transfers the load from top of end posts to bearings.</p> <p>The correct answer is</p> <p>a) only (i) b) both (i) and (ii) c) both (i) and (iii) d) all (i), (ii) and (iii)</p>	b
36	<p>The elastic strain for steel is about</p> <p>a) 1/12 of strain at the initiation of strain hardening and about 1/120 of maximum strain b) 1/2 of strain at the initiation of strain hardening and about 1/12 of maximum strain c) 1/12 of strain at the initiation of strain hardening and 1/200 of maximum strain d) 1/24 of strain at the initiation of strain hardening and about 1/200 of</p>	c

	maximum strain	
37	The mechanism method and the statical method give a) lower and upper bounds respectively on the strength of structure b) upper and lower bounds respectively on the strength of structure c) lower bound on the strength of structure d) upper bound on the strength of structure	b
38	Shape factor is a property which depends a) only on the ultimate stress of the material b) only on the yield stress of the material c) only on the geometry of the section d) both on the yield stress and ultimate stress of material	c
39	The mechanism method of plastic analysis satisfies a) equilibrium and mechanism conditions b) equilibrium and plastic moment conditions c) mechanism and plastic moment conditions d) equilibrium condition only	a
40	Load factor is a) always equal to factor of safety b) always less than factor of safety c) always greater than factor of safety d) sometimes greater than factor of safety	c
41	To minimise the total cost of a roof truss, the ratio of the cost of truss to the cost of purlins shall be a) 1 b) 2 c) 3 d) 4	a
42	Generally the purlins are placed at the panel points so as to avoid a) axial force in rafter b) shear force in rafter c) deflection of rafter d) bending moment in rafter	d
43	For the buildings having a low permeability, the internal wind pressure acting normal to the wall and roof surfaces is taken as a) zero b) $\pm 0.2 p$ c) $\pm 0.5 p$ d) $\pm 0.7 p$	b

	where p is basic wind pressure	
44	The basic wind speed is specified at a height 'h' above mean ground level in an open terrain. The value of 'h' is a) 10 m b) 20 m c) 25 m d) 50 m	a
45	The risk coefficient k , depends on a) mean probable design life of structures b) basic wind speed c) both (a) and (b) d) none of the above	c
46	The external wind pressure acting on a roof depends on a) degree of permeability of roof b) slope of roof c) both (a) and (b) d) none of the above	b
47	Area of openings for buildings of large permeability is more than a) 10 % of wall area b) 20 % of wall area c) 30 % of wall area d) 50 % of wall area	b
48	When the axis of load lies in the plane of rivet group, then the most heavily loaded rivet will be the one which a) is at the maximum distance from CG of the rivet group b) is at the minimum distance from CG of the rivet group c) gives the maximum angle between the two forces F_a and F_m d) gives the minimum angle between the two forces F_a and F_m Where, F_a is the load shared by each rivet due to axial load and F_m is the shearing load due to moment in any rivet.	d
49	Which of the following types of riveted joint is free from bending stresses? a) lap joint b) butt joint with single cover plate c) butt joint with double cover plates d) none of the above	c
50	The difference between gross diameter and nominal diameter for the rivets up to 25 mm diameter is a) 1.0 mm b) 1.5 mm c) 2.0 mm d) 2.5 mm	b
51	As compared to field rivets, the shop rivets are	a

	a) stronger c) equally strong	b) weaker d) any of the above	
52	If the thickness of plate to be connected by a rivet is 16 mm, then suitable size of rivet as per Unwin's formula will be a) 16 mm b) 20 mm c) 24 mm d) 27 mm		c
53	Providing sufficient edge distance, which of the following failures of riveted joint can be avoided? a) tension failure of the plate b) shear failure of the rivet c) shear failure of the plate d) crushing failure of the rivet		c
54	Minimum pitch of the rivets shall not be less than a) 1.5 d b) 2.0 d c) 2.5 d d) 3.0 d where d is gross diameter of rivet		c
55	Efficiency of a riveted joint, having the minimum pitch as per IS : 800, is a) 40 % b) 50 % c) 60 % d) 70 %		c
56	Select the correct statement a) Material cost of a rivet is higher than that of a bolt. b) Tensile strength of a bolt is lesser than that of a rivet. c) Bolts are used as temporary fastenings whereas rivets are used as permanent fastenings. d) Riveting is less noisy than bolting.		c
57	Bolts are most suitable to carry a) shear b) bending c) axial tension d) shear and bending		b
58	Diameter of a bolt hole is usually taken as a) gross diameter of bolt b) nominal diameter + 1.5 mm c) nominal diameter + 2.0 mm d) nominal diameter of bolt		b
59	When the bolts are subjected to reversal of stresses, the most suitable type of bolt is a) black bolt b) ordinary unfinished bolt c) turned and fitted bolt d) high strength bolt		d
60	As per IS : 875, for the purposes of specifying basic wind velocity, the country		c

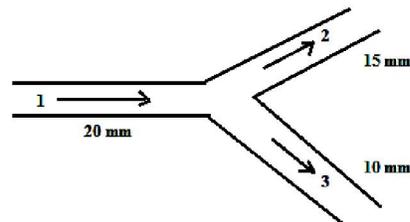
	has been divided into a) 4 zones b) 5 zones c) 6 zones d) 7 zones	
61	The number of seismic zones in which the country has been divided are a) 3 b) 5 c) 6 d) 7	b

8.Fluid Mechanics

S.N.	Question with options	Answer
1	The branch of science which deals with study of properties of water is called as a) Dynamics b) Kinetics c) Hydraulics d) Pneumatics	c
2	The viscosity of a gas a) decreases with increase in temperature b) increases with increase in temperature c) is independent of temperature d) is independent of pressure for very high pressure intensities	c
3	Newton's law of viscosity relates a) intensity of pressure and rate of angular deformation b) shear stress and rate of angular deformation c) shear stress, viscosity and temperature d) viscosity and rate of angular deformation	b
4	Centre of buoyancy always a) coincides with the centre of gravity b) coincides with the centroid of the volume of fluid displaced c) remains above the centre of gravity d) remains below the centre of gravity	b
5	Metacentric height for small values of angle of heel is the distance between the a) centre of gravity and centre of buoyancy b) centre of gravity and metacentre c) centre of buoyancy and metacentre d) free surface and centre of buoyancy	b
6	A floating body is said to be in a state of stable equilibrium a) when its metacentric height is zero b) when the metacentre is above the centre of gravity c) when the metacentre is below the centre of gravity d) only when its centre of gravity is below its centre of buoyancy	b

7	<p>The increase in metacentric height</p> <p>i) increases stability ii) decreases stability iii) increases comfort for passengers iv) decreases comfort for passengers</p> <p>The correct answer is</p> <p>a) (i) and (iii) b) (i) and (iv) c) (ii) and (iii) d) (ii) and (iv)</p>	b
8	<p>The point in the immersed body through which the resultant pressure of the liquid may be taken to act is known as</p> <p>a) center of gravity b) center of buoyancy c) center of pressure d) metacentre</p>	c
9	<p>If a vessel containing liquid moves downward with a constant acceleration equal to 'g' then</p> <p>a) the pressure throughout the liquid mass is atmospheric b) there will be vacuum in the liquid c) the pressure in the liquid mass is greater than hydrostatic pressure d) none of the above</p>	a
10	<p>When a liquid rotates at a constant angular velocity about a vertical axis as a rigid body, the pressure intensity varies</p> <p>a) linearly with radial distance b) as the square of the radial distance c) inversely as the square of the radial distance d) inversely as the radial distance</p>	b
11	<p>A right circular cylinder open at the top is filled with liquid and rotated about its vertical axis at such a speed that half the liquid spills out, then the pressure intensity at the center of bottom is</p> <p>a) zero b) one-fourth its value when cylinder was full c) one-half its value when cylinder was full d) cannot be predicted from the given data</p>	a

12	<p>The horizontal component of force on a curved surface is equal to the</p> <p>a) product of pressure intensity at its centroid and area b) force on a vertical projection of the curved surface c) weight of liquid vertically above the curved surface d) force on the horizontal projection of the curved surface</p>	b
13	<p>A closed tank containing water is moving in a horizontal direction along a straight line at a constant speed. The tank also contains a steel ball and a bubble of air. If the tank is decelerated horizontally, then</p> <p>i) the ball will move to the front ii) the bubble will move to the front iii) the ball will move to the rear iv) the bubble will move to the rear Find out which of the above statements is correct?</p> <p>a) (i) and (ii) b) (i) and (iv) c) (ii) and (iii) d) (iii) and (iv)</p>	b
14	<p>The eddy viscosity for turbulent flow is</p> <p>a) a function of temperature only b) a physical property of the fluid. c) dependent on the flow d) independent of the flow</p>	c
15	<p>A 20 mm diameter pipe forks one branch being 10 mm diameter and the other 15 mm in diameter. The velocity in 10 mm pipe is 0.3 m/s and in the 15 mm pipe is 0.6 m/s calculate the rate of flow (Q) in cm³/s and velocity (V) in m/s in 20mm diameter pipe.</p> <p>(a) Q = 129.6 cm³/s, V= 0.413 m/s (b) Q = 192.6 cm³/s, V= 0.314 m/s (c) Q = 169.2 cm³/s, V= 0.134 m/s (d) Q = 291.6 cm³/s, V= 0.413 m/s</p>	a
16	<p>Flow at constant rate through a tapering pipe is</p> <p>i) steady flow ii) uniform flow iii) unsteady flow</p>	b



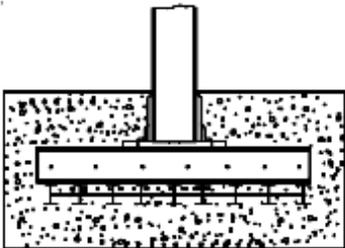
	<p>iv) non-uniform flow</p> <p>The correct answer is</p> <p>a) (i) and (ii) b) (i) and (iv) c) (ii) and (iii) d) (ii) and (iv)</p>	
17	<p>In a two dimensional incompressible steady flow around an airfoil, the stream lines are 2 cm apart at a great distance from the airfoil, where the velocity is 30 m/sec. The velocity near the airfoil, where the stream lines are 1.5 cm apart, is</p> <p>a) 22.5 m/sec. b) 33 m/sec. c) 40 m/sec. d) 90 m/sec.</p>	c
18	<p>When the velocity distribution is uniform over the cross-section, the correction factor for momentum is</p> <p>a) 0 b) 1 c) 4/3 d) 2</p>	b
19	<p>Least possible value of correction factor for</p> <p>i) kinetic energy is zero</p> <p>ii) kinetic energy is 1</p> <p>iii) momentum is zero</p> <p>iv) momentum is 1</p> <p>The correct statements are</p> <p>a) (i) and (iii) b) (ii) and (iii) c) (i) and (iv) d) (ii) and (iv)</p>	d
20	<p>If the velocity is zero over half of the cross-sectional area and is uniform over the remaining half, then the momentum correction factor is</p> <p>a) 1 b) 4/3 c) 2 d) 4</p>	c
21	<p>If velocity is zero over 1/3rd of a cross-section and is uniform over remaining 2/3rd of the cross-section, then the correction factor for kinetic energy is</p> <p>a) 4/3 b) 3/2 c) 9/4 d) 27/8</p>	c
22	<p>The motion of air mass in a tornado is a</p> <p>a) free vortex motion</p> <p>b) forced vortex motion</p> <p>c) free vortex at center and forced vortex outside</p> <p>d) forced vortex at center and free vortex outside</p>	d
23	<p>In a forced vortex motion, the velocity of flow is</p> <p>a) directly proportional to its radial distance from axis of rotation</p>	a

	<ul style="list-style-type: none"> a) pipe diameter b) throat diameter c) angle of diverging section d) both pipe diameter as well as throat diameter 	
33	<p>Due to each end contraction, the discharge of rectangular sharp crested weir is reduced by</p> <p>a) 5 % b) 10 % c) 15 % d) 20 %</p>	a
34	<p>Which of the following is an incorrect statement?</p> <ul style="list-style-type: none"> a) Coefficient of contraction of a venturimeter is unity. b) Flow nozzle is cheaper than venturimeter but has higher energy loss. c) Discharge is independent of orientation of venturimeter whether it is horizontal, vertical or inclined. d) None of the above statement is correct. 	d
35	<p>Coefficient of velocity of venturimeter</p> <ul style="list-style-type: none"> a) is independent of Reynolds number b) decreases with higher Reynolds number c) is equal to the coefficient of discharge of venturimeter d) none of the above 	c
36	<p>The pressure at the summit of a syphon is</p> <ul style="list-style-type: none"> a) equal to atmospheric b) less than atmospheric c) more than atmospheric d) none of the above 	b
37	<p>A.V between two stream lines represents</p> <ul style="list-style-type: none"> a) velocity b) discharge c) head d) pressure 	b
38	<p>Coefficient of velocity for Borda's mouth piece running full is</p> <ul style="list-style-type: none"> a) 0.611 b) 0.707 c) 0.855 d) 1.00 	b
39	<p>Coefficient of discharge for a totally submerged orifice as compared to that for an orifice discharging free is</p> <ul style="list-style-type: none"> a) slightly less b) slightly more c) nearly half d) equal 	a
40	<p>The major loss of energy in long pipes is due to</p>	d

	<ul style="list-style-type: none"> a) sudden enlargement b) sudden contraction c) gradual contraction or enlargement d) friction 	
41	<p>Coefficient of contraction for an external cylindrical mouthpiece is</p> <ul style="list-style-type: none"> a) 1.00 b) 0.855 c) 0.70 d) 0.611 	a
42	<p>Which of the following has highest coefficient of discharge?</p> <ul style="list-style-type: none"> a) sharp edged orifice b) venturimeter c) Borda's mouthpiece running full d) Cipoletti weir 	b
43	<p>Which of the following statements is correct?</p> <ul style="list-style-type: none"> a) Lower critical Reynolds number is of no practical significance in pipe flow problems. b) Upper critical Reynolds number is significant in pipe flow problems. c) Lower critical Reynolds number has the value 2000 in pipe flow d) Upper critical Reynolds number is the number at which turbulent flow changes to laminar flow. 	a
44	<p>For a sphere of radius 15 cm moving with a uniform velocity of 2 m/sec through a liquid of specific gravity 0.9 and dynamic viscosity 0.8 poise, the Reynolds number will be</p> <ul style="list-style-type: none"> a) 300 b) 337.5 c) 600 d) 675 	d
45	<p>The shear stress distribution for a fluid flowing in between the parallel plates, both at rest, is</p> <ul style="list-style-type: none"> a) constant over the cross section b) parabolic distribution across the section c) zero at the mid plane and varies linearly with distance from mid plane d) zero at plates and increases linearly to midpoint 	c
46	<p>If x is the distance from leading edge, then the boundary layer thickness in laminar flow varies as</p> <ul style="list-style-type: none"> a) x b) x c) x d) $x/7$ 	a
47	<p>Stanton diagram is a</p>	a

	<ul style="list-style-type: none"> a) a circular disc of plate held normal to flow b) a sphere c) a cylinder d) a streamlined body 	
54	<p>In which of the following the friction drag is generally larger than pressure drag?</p> <ul style="list-style-type: none"> a) a circular disc or plate held normal to flow b) a sphere c) a cylinder d) an airfoil 	d
55	<p>For hydro-dynamically smooth boundary, the friction coefficient for turbulent flow is</p> <ul style="list-style-type: none"> a) constant b) dependent only on Reynolds number c) a function of Reynolds number and relative roughness d) dependent on relative roughness only 	b
56	<p>The value of friction factor 'f' for smooth pipes for Reynolds number 106 is approximately equal to</p> <ul style="list-style-type: none"> a) 0.1 b) 0.01 c) 0.001 d) 0.0001 	b
57	<p>For laminar flow in a pipe of circular cross-section, the Darcy's friction factor f is</p> <ul style="list-style-type: none"> a) directly proportional to Reynolds number and independent of pipe wall roughness b) directly proportional to pipe wall roughness and independent of Reynolds number c) inversely proportional to Reynolds number and independent of pipe wall roughness d) inversely proportional to Reynolds number and directly proportional to pipe wall roughness 	c
58	<p>Separation of flow occurs when</p> <ul style="list-style-type: none"> a) the pressure intensity reaches a minimum b) the cross-section of a channel is reduced 	c

	<p>c) the boundary layer comes to rest</p> <p>d) all of the above</p>	
59	<p>The ratio of average velocity to maximum velocity for steady laminar flow in circular pipes is</p> <p>a) $\frac{1}{2}$ b) $\frac{2}{3}$ c) $\frac{3}{2}$ d) 2</p>	a
60	<p>The distance from pipe boundary, at which the turbulent shear stress is one-third the wall shear stress, is</p> <p>a) $\frac{1}{3} R$ b) $\frac{1}{2} R$ c) $\frac{2}{3} R$ d) $\frac{3}{4} R$</p> <p>Where R is the radius of pipe.</p>	a
61	<p>The velocity distribution for laminar flow through a circular tube</p> <p>a) is constant over the cross-section</p> <p>b) varies linearly from zero at walls to maximum at centre</p> <p>c) varies parabolically with maximum at the centre</p> <p>d) none of the above</p>	c

	<p>of the sample is</p> <p>a) less than specific gravity of soil</p> <p>b) equal to specific gravity of soil</p> <p>c) greater than specific gravity of soil</p> <p>d) independent of specific gravity of soil</p>		
9	<p>The ratio of volume of voids to the total volume of soil mass is called</p> <p>a) air content b) porosity c) percentage air voids d) voids ratio</p>	b	
10	<p>Relative density of a compacted dense sand is approximately equal to</p> <p>a) 0.4 b) 0.6 c) 0.95 d) 1.20</p>	c	
11	<p>Foundation shown in the figure is called as -</p> <p>(a) Inverted footing</p> <p>(b) Stepped footing</p> <p>(c) Well Foundation</p> <p>(d) Grillage foundation</p>		d
12	<p>If the sand in-situ is in its densest state, then t</p> <p>a) zero b) 1 c) between 0 and 1 d) greater than 1</p>	b	
13	<p>Which of the following methods is most accurate for the determination of the water content of soil?</p> <p>a) oven drying method b) sand bath method</p> <p>c) calcium carbide method d) pycnometer method</p>	a	
14	<p>For proper field control, which of the following methods is best suited for quick determination of water content of a soil mass?</p> <p>a) oven drying method b) sand bath method</p> <p>c) alcohol method d) calcium carbide method</p>	d	
15	<p>A pycnometer is used to determine</p> <p>a) water content and voids ratio b) specific gravity and dry density</p> <p>c) water content and specific gravity d) voids ratio and dry density</p>	c	
16	<p>Stoke's law is valid only if the size of particle is</p> <p>a) less than 0.0002 mm b) greater than 0.2 mm</p> <p>c) between 0.2 mm and 0.0002 mm d) all of the above</p>	c	

	c) the liquid limit of soil may increase d) the liquid limit of soil may decrease	
31	According to IS classification, the range of silt size particles is a) 4.75 mm to 2.00 mm b) 2.00 mm to 0.425 mm c) 0.425 mm to 0.075 mm d) 0.075 mm to 0.002 mm	d
32	The effective stress is a) an abstract quantity b) actual contact stress c) equal to total stress d) none	a
33	When the degree of consolidation is 50 % ,the time factor is about a) 0.2 b) 0.5 c) 1 d) 2	a
34	Vacum well points are generally used for draining a) coarse sand b) fine sand & silty sands c) silts d) clay	b
35	Highway Research Board (HRB) classification of soils is based on a) particle size composition b) plasticity characteristics c) both particle size composition and plasticity characteristics d) none of the above	c
36	Inorganic soils with low compressibility are represented by a) MH b) SL c) ML d) CH	c
37	Sand particles are made of a) rock minerals b) kaolinite c) illite d) montmorillonite	a
38	The clay mineral with the largest swelling and shrinkage characteristics is a) kaolinite b) illite c) montmorillonite d) none of these	c
39	Dispersed type of soil structure is an arrangement comprising particles having a) face to face or parallel orientation b) edge to edge orientation c) edge to face orientation d) all of the above	a

40	<p>Effective stress is</p> <p>a) the stress at particles contact</p> <p>b) a physical parameter that can be measured</p> <p>c) important because it is a function of engineering properties of soil</p> <p>d) all of the above</p>	c
41	<p>Rise of water table above the ground surface causes</p> <p>a) equal increase in pore water pressure and total stress</p> <p>b) equal decrease in pore water pressure and total stress</p> <p>c) increase in pore water pressure but decrease in total stress</p> <p>d) decrease in pore water pressure but increase in total stress</p>	a
42	<p>The total and effective stresses at a depth of 5 m below the top level of water in a swimming pool are respectively</p> <p>a) zero and zero</p> <p>b) 0.5 kg/cm^2 and zero</p> <p>c) 0.5 kg/cm^2 and 0.5 kg/cm^2</p> <p>d) 1.0 kg/cm^2 and 0.5 kg/cm^2</p>	b
43	<p>If the water table rises upto ground surface, then the</p> <p>a) effective stress is reduced due to decrease in total stress only but pore water pressure does not change</p> <p>b) effective stress is reduced due to increase in pore water pressure only but total stress does not change</p> <p>c) total stress is reduced due to increase in pore water pressure only but effective stress does not change</p> <p>d) total stress is increased due to de-crease in pore water pressure but effective stress does not change</p>	b
44	<p>Quick sand is a</p> <p>a) type of sand</p> <p>b) flow condition occurring in cohesive soils</p> <p>c) flow condition occurring in cohesionless soils</p> <p>d) flow condition occurring in both cohesive and cohesionless soils</p>	a
45	<p>Chemical grouting is used for</p> <p>a) medium & fine sands</p> <p>b) fine sand & coarse silts</p>	a

	c) coarse sand d) clay	
46	The gas formed by the reaction of calcium carbide with water is a) CO ₂ b) SO ₂ c) ethane d) acetylene	d
47	The seepage pressure is proportional to a) hydraulic gradient b) unit wt of water c) length of specimen d) all	d
48	The hydraulic head that would produce a quick condition in a sand stratum of thickness 1.5 m, specific gravity 2.67 and voids ratio 0.67 is equal to a) 1.0 m b) 1.5 m c) 2.0 m d) 3 m	b
49	Physical properties of a permeant which influence permeability are a) viscosity only b) unit weight only c) both viscosity and unit weight d) none of the above	c
50	Select the correct statement. a) The greater the viscosity, the greater is permeability. b) The greater the unit weight, the greater is permeability. c) The greater the unit weight, the smaller is permeability. d) Unit weight does not affect permeability.	b
51	The behavior of clay is governed by a) mass energy b) surface energy c) both a & b d) none	b
52	The weakest bond in soil is a) hydrogen bond b) secondary valanced bond c) covalent bond d) ionic bond	b
53	Honey combed structure is found in a) clay b) coarse sand c) gravel d) fine sand & silts	d
54	Effective stress on soil a) increases voids ratio and decreases permeability b) increases both voids ratio and permeability c) decreases both voids ratio and permeability	c

	d) decreases voids ratio and increases permeability	
55	If the permeability of a soil is 0.8 mm/sec, the type of soil is a) gravel b) sand c) silt d) clay	b
56	Which of the following methods is more suitable for the determination of permeability of clayey soil? a) constant head method b) falling head method c) horizontal permeability test d) none of the above	b
57	Which of the following methods is best suited for determination of permeability of coarse grained soils? a) constant head method b) falling head method c) both the above d) none of the above	a
58	Due to a rise in temperature, the viscosity and the unit weight of the percolating fluid are reduced to 60 % and 90 % respectively. If other things remain constant, the coefficient of permeability a) increases by 25 % b) increases by 50 % c) increases by 33.3 % d) decreases by 33.3 %	b
59	Coefficient of permeability of soil a) does not depend upon temperature b) increases with the increase in temperature c) increases with the decrease in temperature d) none of the above	b
60	The average coefficient of permeability of natural deposits a) parallel to stratification is always greater than that perpendicular to stratification b) parallel to stratification is always less than that perpendicular to stratification c) is always same in both directions d) parallel to stratification may or may not be greater than that perpendicular to stratification	a
61	The total discharge from two wells situated near to each other is	b

	<p>a) sum of the discharges from individual wells</p> <p>b) less than the sum of the discharges from individual wells</p> <p>c) greater than the sum of the discharges from individual wells</p> <p>d) equal to larger of the two discharges from individual wells</p>	
62	<p>Relative density of a compacted dense sand is approximately equal to</p> <p>a) 0.4 b) 0.6 c) 0.95 d) 1.2</p>	c
63	<p>Terzaghi's bearing capacity factor depends on</p> <p>a) cohesion of soil b) permeability of soil</p> <p>c) ϕ of soil d) all above</p>	c
64	<p>Co efficient of curvature of a well graded gravel is</p> <p>a) less than 1 b) greater than 6</p> <p>c) lies between 1 and 3</p> <p>d) lies between 3 and 6</p>	c
65	<p>The flownet for an earthen dam with 30 m water depth consists of 25 potential drops and 5 flow channels. The coefficient of permeability of dam material is 0.03 mm/sec. The discharge per metre length of dam is</p> <p>a) 0.00018 m³/sec b) 0.0045 m³/sec</p> <p>c) 0.18 m³/sec d) 0.1125 m³/sec</p>	a
66	<p>The most suitable method for drainage of fine grained cohesive soils is</p> <p>a) well point system b) vacuum method</p> <p>c) deep well system d) electro-osmosis method</p>	d
67	<p>Total number of stress components at a point within a soil mass loaded at its boundary is</p> <p>a) 3 b) 6 c) 9 d) 16</p>	c
68	<p>The slope of isochrone at any point at a given time indicates the rate of change of</p> <p>a) effective stress with time b) effective stress with depth</p> <p>c) pore water pressure with depth d) pore water pressure with time</p>	c
69	<p>The value of compression index for a remoulded sample whose liquid limit is 50 % is</p>	b

	a) 0.028 b) 0.28 c) 0.36 d) 0.036	
70	A normally consolidated clay settled 10 mm when effective stress was increased from 100 kN/m ² to 200 kN/m ² . If the effective stress is further increased from 200 kN/m ² to 400 kN/m ² , then the settlement of the same clay is a) 10 mm b) 20 mm c) 40 mm d) none of these	a
71	A cylindrical specimen of saturated soil failed under an axial vertical stress of 100 kN/m ² when it was laterally unconfined. The failure plane was inclined to the horizontal plane at an angle of 45°. The values of cohesion and angle of internal friction for the soil are respectively a) 0.5 N/mm ² and 30° b) 0.05 N/mm ² and 0° c) 0.2 N/mm ² and 0° d) 0.05 N/mm ² and 45°	b
72	A 300 mm square bearing plate settles by 15 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 under the same intensity of loading is a) 15 mm b) 30 mm c) 50 mm d) 167 mm	c
73	In a deposit of normally consolidated clay a) effective stress increases with depth but water content of soil and undrained strength decrease with depth b) effective stress and water content increase with depth but undrained strength decreases with depth c) effective stress and undrained strength increase with depth but water content decreases with depth d) effective stress, water content and undrained strength decrease with depth	c
74	The most accurate method for the determination of water content in the laboratory is a) Sand bath method b) oven drying method c) pycnometer method d) calcium carbide method	b
75	An inorganic clay of high compressibility is represented by the symbol	b

	a) SM b) CH c) MH d) MI	
76	Phreatic line in an earthen dam is a) straight line b) parabolic c) circular d) Elliptical	b

9	The population of a town in three consecutive years are 5000, 7000 and 8400 respectively. The population of the town in the fourth consecutive year according to geometrical increase method is a) 9500 b) 9800 c) 10100 d) 10920	d
10	The suitable method of forecasting population for a young and rapidly increasing city is a) arithmetical increase method b) geometrical increase method c) incremental increase method d) graphical method	b
11	In water treatment for removal of solids an unit is used as shown in the figure which is called as- a) Filter bed b) activated carbon unit c) Circular settling tank d) chlorination unit	c
12	BOD in portable water may be a) 0 b) 5 c) 10 d) none	a
13	Fresh and septic sewage are respectively a) acidic and alkaline b) alkaline and acidic c) both acidic d) both alkaline	b
14	The depression of water table in a well due to pumping will be maximum a) at a distance R from the well b) close to the well c) at a distance R/2 from the well d) none of the above where R is the radius of influence	b
15	The devices which are installed for drawing water from the sources are called a) aquifers b) aquiclude c) filters d) intakes	d
16	The type of valve, which is provided on the suction pipe in a tube-well, is a) air relief valve b) reflux valve c) pressure relief valve d) sluice valve	b
17	22. Standard EDTA (ethylene diamine tetra acetic acid) solution is used to	a

27	Which of the following compounds is widely used for algae control? a) sodium sulphate b) copper sulphate c) sodium chloride d) calcium chloride	b
28	The specific gravity of sewage is a) much greater than 1 b) slightly less than 1 c) equal to 1 d) slightly greater than 1	d
29	The self cleansing velocity for all sewers in India is usually a) less than 1.0 m/sec b) 1.0 m/sec to 1.2 m/sec c) 1.5 m/sec to 2.0 m/sec d) 3.0 m/sec to 3.5 m/sec	b
30	The slope of sewer shall be a) given in the direction of natural slope of ground b) given in the direction opposite to natural slope of ground c) zero d) steeper than 1 in 20	a
31	As the result of stabilization of sewage effluent, the most approximate end product is a) hardness b) alkalinity c) chloride d) plant nutrient	b
32	The specific gravity of sewage is a) slightly less than 1 b) zero c) equal to 1 d) slightly greater than 1	d
33	Most of the bacteria in sewage are a) anaerobic b) pathogenic c) saprophytic d) parasitic	c
34	The design discharge for the separate sewer system shall be taken as a) equal to dry weather flow (DWF) b) 2xDWF c) 3 x DWF d) 6xDWF	d
35	The design discharge for the combined sewer system shall be taken as a) equal to rainfall b) rainfall + DWF c) rainfall + 2 DWF d) rainfall + 6 DWF	c
36	The minimum and maximum diameters of sewers shall preferably be a) 15 cm and 100 cm b) 15 cm and 300 cm	b

	c) 30 cm and 450 cm d) 60 cm and 300cm	
37	The main disadvantage of cement concrete sewers is a) less strength b) difficulty in construction c) difficulty in transportation due to heavy weight d) less life	c
38	Most suitable section of sewer in separate sewage system is a) rectangular section b) circular section c) standard form of egg shaped sewer d) modified egg shaped section	b
39	An egg shaped section of sewer a) is economical than circular section b) provides self cleansing velocity at low discharges c) is more stable than circular section d) is easy to construct	b
40	The ratio of minimum hourly flow to the average flow of sewage is a) 1/3 b) 1/2 c) 2/3 d) 3	a
41	Laying of sewers is usually done with the help of a) theodolite b) compass c) a plane table d) sight rails and bonding rocks	d
42	The best sewer material to resist hydrogen sulphide corrosion is a) RCC b) Brick masonry c) glazed stone ware d) asbestos cement	c
43	The velocity of flow does not depend on a) grade of sewer b) length of sewer c) hydraulic mean depth of sewer d) roughness of sewer	b
44	The hydraulic mean depth (HMD) for an egg-shaped sewer flowing two-third full is a) equal to HMD when flowing full b) less than HMD when flowing full c) greater than HMD when flowing full	c

54	Select the correct statement. a) 5 day BOD is the ultimate BOD. b) 5 day BOD is greater than 4 day BOD keeping other conditions same. c) 5 day BOD is less than 4 day BOD keeping other conditions same. d) BOD does not depend on time.	c
55	If Biochemical oxygen demand (BOD) of a town is 20000 kg/day and BOD per capita per day is 0.05 kg, then population equivalent of town is a) 1000 b) 4000 c) 100000 d) 400000	d
56	The rate of BOD exerted at any time is a) directly proportional to BOD satisfied b) directly proportional to BOD remaining c) inversely proportional to BOD satisfied d) inversely proportional to BOD remaining	b
57	The ratio of 5 day BOD to ultimate BOD is about a) 1/3 b) 2/3 c) 3/4 d) 1.0	b
58	The minimum dissolved oxygen which should always be present in water in order to save the aquatic life is a) 1 ppm b) 4 ppm c) 10 ppm d) 40 ppm	b
59	Facultative bacteria are able to work in a) presence of oxygen only b) absence of oxygen only c) presence as well as in absence of oxygen d) presence of water	c
60	Sewerage system is designed for a) maximum flow only b) minimum flow only c) average flow only d) maximum and minimum flow	d
62	Sewage treatment units are designed for a) maximum flow only b) minimum flow only c) average flow only d) maximum and minimum flow	c
63	Laying of sewers is usually done with the help of a) a theodolite b) a compass c) sight rails and boning rods d) a plane table	c

64	Corrosion in concrete sewers is caused by a) septic conditions b) dissolved oxygen c) chlorine d) nitrogen	a
65	If the sewage contains grease and fatty oils, these are removed in a) grit chambers b) detritus tanks c) skimming tanks d) sedimentation tanks	c
66	Generally the detention period for grit chambers is kept as a) 1 minute b) 5 minutes c) 2-4 hours d) 12 hours	a
67	Which of the following unit works in anaerobic conditions? a) sludge digestion tank b) sedimentation tank c) activated sludge treatment d) trickling filters	a
68	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	a
69	The gas from sludge digestion tank is mainly composed of a) nitrogen b) carbon dioxide c) hydrogen sulphide d) methane	d
70	A pipe which is installed in the house drainage to preserve the water seal of traps is called a) vent pipe b) antisiphonage pipe c) waste pipe d) soil pipe	b
71	If any human being comes in contact of 600 ppm of CO for 10 hours effect will be a) headaches and reduced ability to think b) loss of consciousness c) nausea and loss of consciousness	d

11. Highway and Railway Engineering

S.N.	Question with options	Answer
1	Transverse slope given to road cross section for surface water removal is known as a) Gradient b) Sub drainage c) Camber d) Crown	c
2	At the curved road outer side of road is increased than inner side is called as a) Sub grade b) Elevation c) Banking of road d) Shoulder	c
3	Most suitable material for highway embankments is a) granular soil b) organic soil c) silts d) clays	a
4	When the bituminous surfacing is done on already existing black top road or over existing cement concrete road, the type of treatment to be given is a) seal coat b) tack coat c) prime coat d) spray of emulsion	b
5	The desirable length of overtaking zone as per IRC recommendation is equal to a) overtaking sight distance b) two times the overtaking sight distance c) three times the overtaking sight distance d) five times the overtaking sight distance	d
6	Stopping sight distance is always a) less than overtaking sight distance b) equal to overtaking sight distance c) more than overtaking sight distance d) none of the above	a
7	Reaction time of a driver a) increases with increase in speed b) decreases with increase in speed c) is same for all speeds d) none of the above	b
8	If the stopping distance is 60 meters, then the minimum stopping sight distance for two lane, two way traffic is a) 30 m b) 60 m c) 120 m d) 180 m	b
9	The effect of grade on safe overtaking sight distance is	c

	<p>a) an ascending gradient meets with another ascending gradient</p> <p>b) an ascending gradient meets with a descending gradient</p> <p>c) a descending gradient meets with another descending gradient</p> <p>d) an ascending gradient meets with a level surface</p>	
26	<p>If an ascending gradient of 1 in 50 meets a descending gradient of 1 in 50, the length of summit curve for a stopping sight distance of 80 m will be</p> <p>a) zero b) 64 m c) 80 m d) 60 m</p>	d
27	<p>Highway facilities are designed for</p> <p>a) annual average hourly volume b) annual average daily traffic</p> <p>c) thirtieth highest hourly volume d) peak hourly volume of the year</p>	c
28	<p>Select the correct statement.</p> <p>a) Traffic volume should always be more than traffic capacity.</p> <p>b) Traffic capacity should always be more than traffic volume.</p> <p>c) Spot speed is the average speed of a vehicle at a specified section.</p> <p>d) 85th percentile speed is more than 98th percentile speed.</p>	b
29	<p>Length of a vehicle affects</p> <p>a) width of traffic lanes</p> <p>b) extra width of pavement and minimum turning radius</p> <p>c) width of shoulders and parking facilities</p> <p>d) clearance to be provided under structures such as overbridges, under-bridges etc.</p>	b
30	<p>As per IRC recommendations, the maximum limit of super elevation for mixed traffic in plain terrain is</p> <p>a) 1 in 15 b) 1 in 12.5 c) 1 in 10 d) equal to camber</p>	a
31	<p>For the design of super elevation for mixed traffic conditions, the speed is reduced by</p> <p>a) 15 % b) 20 % c) 25 % d) 75 %</p>	c
32	<p>On a horizontal curve if the pavement is kept horizontal across the alignment, then the pressure on the outer wheels will be</p> <p>a) more than the pressure on inner wheels</p>	a

	<ul style="list-style-type: none"> b) less than the pressure on inner wheels c) equal to the pressure on inner wheels d) zero 	
33	<p>For a constant value of coefficient of lateral friction, the value of required super-elevation increases with</p> <ul style="list-style-type: none"> a) increase in both speed and radius of curve b) decrease in both speed and radius of curve c) increase in speed and with decrease in radius of curve d) decrease in speed and with increase in radius of curve 	d
34	<p>To calculate the minimum value of ruling radius of horizontal curves in plains, the design speed is given by</p> <p>a) 8 kmph b) 12 kmph c) 16 kmph d) 20 kmph</p>	c
35	<p>Minimum thickness of the base of a flexible pavement is</p> <p>a) 10cm b) 15cm c) 20cm d) 30cm</p>	a
36	<p>Design of highway is based on</p> <p>a) Axle load b) Axle spacings c) Wheel bases d) All of these</p>	d
37	<p>For water bound macadams the camber should be</p> <p>a) 1-2% b) 2-2.5% c) 2.5-3% d) 3-4%</p>	c
38	<p>The absolute minimum radius of curve for safe operation for a speed of 110 kmph is</p> <p>a) 110 m b) 220 m c) 440 m d) 577 m</p>	c
39	<p>The attainment of super elevation by rotation of pavement about the inner edge of the pavement</p> <ul style="list-style-type: none"> a) is preferable in steep terrain b) results in balancing the earthwork c) avoids the drainage problem in flat terrain d) does not change the vertical alignment of road 	c
40	<p>Select the correct statement.</p> <ul style="list-style-type: none"> a) Psychological extra widening depends on the number of traffic lanes. b) Mechanical extra widening depends on the speed of vehicle. 	d

48	With increase in speed of the traffic stream, the maximum capacity of the lane a) increases b) decreases c) first increases and then decreases after reaching a maximum value at optimum speed d) first decreases and then increases after reaching a minimum value at optimum speed	c
49	Equivalent factor of passenger car unit (PCU) for a passenger car as per IRC is a) 1.0 b) 2.0 c) 0.5 d) 10	a
50	If the stopping distance and average length of a vehicle are 18 m and 6 m respectively, then the theoretical maximum capacity of a traffic lane at a speed of 10 m/sec is a) 1500 vehicles per hour b) 2000 vehicles per hour c) 2500 vehicles per hour d) 3000 vehicles per hour	a
51	Scientific planning of transportation system and mass transit facilities in cities should be based on a) spot speed data b) origin and destination data c) traffic volume data d) accident data	b
52	If is a dorry abrasion test the loss in weight 21 gms, then the coefficient of hardness is a) 9.5 b) 13 c) 17 d) 21	b
53	For improvement road carrying fast traffic an average level of illumination recommended by IRC is a) 4 lux b) 8 lux c) 15 lux d) 30 lux	d
54	The top height of route marker above crown level is a) 1.50m b) 2.2m c) 2.25m d) None of these	c
55	The diagram which shows all important physical conditions of an accident location like roadway limits, bridges, trees and all details of roadway conditions is known as a) pie chart b) spot maps	c

	c) condition diagram d) collision diagram	
56	When the speed of traffic flow becomes zero, then a) traffic density attains maximum value whereas traffic volume becomes zero b) traffic density and traffic volume both attain maximum value c) traffic density and traffic volume both become zero d) traffic density becomes zero whereas traffic volume attains maximum value	a
57	On a right angled road intersection with two way traffic, the total number of conflict points is a) 6 b) 11 c) 18 d) 24	d
58	The background colour of the informatory sign board is a) red b) yellow c) green d) white	b
59	Which of the following is indicated by a warning sign? a) level crossing b) no parking c) end of speed limit d) overtaking prohibited	a
60	"Dead Slow" is a a) regulatory sign b) warning sign c) informatory sign d) none of the above	a
61	The ductility value of bitumen for suitability in road construction should not be less than a) 30 cm b) 40 cm c) 50 cm d) 60 cm	c
62	The maximum limit of water absorption for aggregate suitable for road construction is a) 0.4 % b) 0.6 % c) 0.8 % d) 1.0 %	b
63	Which of the following represents hardest grade of bitumen? a) 30/40 b) 60/70 c) 80/100 d) 100/120	a
64	Penetration test on bitumen is used for determining its a) grade b) viscosity c) ductility d) temperature susceptibility	a

65	Bitumen of grade 80/100 means a) its penetration value is 8 mm b) its penetration value is 10 mm c) its penetration value is 8 to 10 mm d) its penetration value is 8 to 10 cm	c
66	The shape of the transition curve used by the Indian railway is a) cubic parabola b) spiral c) sine curve d) laminscate	a
67	Thickness of a pavement is may be reduced considerably by a) compaction of soils b) stabilization of soil c) drainage of soil d) All of these	d
68	When two road with two lane, two way traffic, cross at an uncontrolled intersection the number of potential major conflict point would be a) 32 b) 24 c) 16 d) 4	a
69	RC-2, MC-2 and SC-2 correspond to a) same viscosity b) viscosity in increasing order from RC-2 to SC-2 c) viscosity in decreasing order from RC-2 to SC-2 d) none of the above	a
70	The recommended grade of tar for grouting purpose is a) RT-1 b) RT-2 c) RT.3 d) RT-5	d
71	Softening point of bitumen to be used for read construction at a place where maximum temperature is 40° C should be a) less-than 40°C b) greater than 40°C c) equal to 40°C d) none of the above	b
72	For rapid curing cutbacks, the oil used is a) gasoline b) kerosene oil c) light diesel d) heavy diesel	a
73	The method of design of flexible pavement as recommended by IRC is a) group index method b) CBR method c) Westerguard method d) Benkelman beam method	b
74	For developing thinly populated areas, the correct choice of gauge is a) Broad Gauge b) Meter Gauge	c

	c) Narrow Gauge d) any of the above	
75	Due to battering action of wheels over the end of the rails, the rails get bent down and are deflected at ends. These rails are called a) roaring rails b) hogged rails c) corrugated rails d) buckled rails	b
76	The slipping of driving wheels of locomotives on the rail surface causes a) wheel burns b) hogging of rails c) scabbing of rails d) corrugation of rails	a
77	The width of foot for 90 R rail section is a) 100 mm b) 122.2 mm c) 136.5 mm d) 146.0 mm	c
78	The height of the rail for 52 kg rail section is a) 143 mm b) 156 mm c) 172 mm d) 129mm	b
79	The formation width for a railway track depends on the i) type of gauge ii) number of tracks to be laid side by side iii) slope of sides of embankment or cutting The correct answer is a) only (i) b) both (i) and (ii) c) both (i) and (iii) d) (i), (ii) and (iii)	b
80	The formation width for a single line meter gauge track in embankment as adopted on Indian Railways is a) 4.27 m b) 4.88 m c) 5.49 m d) 6.10 m	b
81	The side slope of embankments for a railway track is generally taken as a) 1:1 b) 1.5:1 c) 2:1 d) 1:2	c
82	The formation width for a double line Broad Gauge track in cutting (excluding drains) as adopted on Indian Railways is a) 6.10 m b) 8.84 m c) 10.21m d) 10.82 m	c
83	The total gap on both sides between the inside edges of wheel flanges and gauge faces of the rail is kept as a) 10mm b) 13mm c) 16mm d) 19 mm	d
84	Creep is the	a

	a) longitudinal movement of rail b) lateral movement of rail c) vertical movement of rail d) difference in level of two rails	
85	Anti creep bearing plates are provided on a) bridges and approaches b) joints c) both (a) and (b) d) none of the above	d
86	Study the following statements regarding creep. i) Creep is greater on curves than on tangent railway track, ii) Creep in new rails is more than that in old rails, iii) Creep is more on steep gradients than on level track. The correct answer is a) only (i) b) (i) and (ii) c) (ii) and (iii) d) (i), (ii) and (iii)	b
87	The maximum degree of curvature for Meter Gauge is limited to a) 10° b) 16° c) 30° d) 40°	b
88	Staggered joints are generally provided a) on curves b) on straight track c) when two different rail sections are required to be joined d) none of the above	a
89	When the rail ends rest on a joint sleeper, the joint is termed as a) supported rail joint b) suspended rail joint c) bridge joint d) base joint	a
90	Which of the following types of sleepers is preferred on joints? a) CST-9 sleeper b) steel trough sleeper c) wooden sleeper d) concrete sleeper	c
91	Minimum depth of ballast cushion for a Broad Gauge wooden sleeper of size 275x25x13 cm with 75cm sleeper spacing is a) 15 cm b) 20 cm c) 25 cm d) 30cm	c
92	Sleeper density in India is normally kept as a) M + 2 to M + 7 b) M to M+2	a

	a) 25 mm b) 40 mm c) 50 mm d) 10 mm	
102	At points and crossings, the total number of sleepers for 1 in 12 turnouts in Broad Gauge is a) 51 b) 62 c) 70 d) 78	c
103	Width of ballast section for Broad Gauge is a) 1.83 m b) 2.25 m c) 3.35 m d) 4.30 m	c
104	The type of spike used for fixing chairs of bull headed rails to wooden sleepers is a) dog spike b) rail screw c) elastic spike d) round spike	d
105	The sleepers resting directly on girder are fastened to the top flange of girder by a) hook bolts b) dog spikes c) fang bolts d) rail screws	a
106	Number of keys used in CST-9 sleeper is a) 2 b) 3 c) 4 d) none of the above	a
108	Pandrol clips cannot be used with a) wooden sleepers b) concrete sleepers c) CST-9 sleepers d) steel trough sleepers	c
109	Loose jaws of steel trough sleepers are made of a) cast steel b) mild steel c) cast iron d) spring steel	c
110	Number of cotters used in CST-9 sleepers is a) 2 b) 3 c) 4 d) 5	c
111	The desirable rate of change of cant deficiency in case of Meter Gauge is a) 20 mm/sec b) 35 mm/sec c) 55 mm/sec d) 65 mm/sec	b
112	The limiting value of cant excess for Broad Gauge is a) 55 mm b) 65 mm c) 75 mm d) 100 mm	c
113	A Broad Gauge branch line takes off as a contrary flexure from a main line If the super elevation required for branch line is 10 mm and cant deficiency is 75 mm, the super elevation to be actually provided on the branch line will be a) 10 mm b) 64 mm c) 85 mm d) 65 mm	d
114	Switch angle depends on	a

	i) heel divergence ii) length of tongue rail iii) flangeway clearance iv) throw of switch The correct answer is a) (i) and (ii) b) (ii) and (iii) c) (iii) and (iv) d) (i) and (iv)	
115	Life of cement concrete road is take as a) 5-10yr b) 10-15ur c) 15-20 d) 25-30yr	d
116	Super elevation is provided a) on straight roads b) heap slopes c) at level crossing on curves d) on curves	d
117	Normally the limiting value of cant is a) G/8 b) G/10 c) G/12 d) G/15	c

	kmph, then the air speed and ground speed of the aircraft respectively will be a) 450 kmph and 500 kmph b) 500 kmph and 450 kmph c) 450 kmph and 450 kmph d) 500 kmph and 500 kmph	
13	As per ICAO, for airports serving big aircrafts, the crosswind component should not exceed a) 15 kmph b) 25 kmph c) 35 kmph d) 45 kmph	c
14	As per ICAO recommendation, minimum width of safety area for instrumental runway should be a) 78 m b) 150 m c) 300 m d) 450 m	c
15	As per ICAO, for A, B, and C type of airports, maximum effective, transverse and longitudinal grades in percentage respectively are a) 1.0, 1.5 and 1.5 b) 1.0, 1.5 and 2.0 c) 1.5, 1.5 and 2.0 d) 2.0, 2.0 and 2.0	a
16	As per ICAO recommendation, the rate of change of longitudinal gradient per 30 m length of vertical curve for A and B type of airports is limited to a maximum of a) 0.1 % b) 0.2 % c) 0.3 % d) 0.4 %	a
17	Calm period is the percentage of time during which wind intensity is less than a) 4.8 kmph b) 6.4 kmph c) 8.0 kmph d) 9.6 kmph	b
18	For determining the basic runway. length, the landing case requires that aircraft should come to a stop within p % of the landing distance. The value of p is a) 40 % b) 50 % c) 60 % d) 75 %	c
19	According to ICAO, all markings on the runways are a) Yellow b) White c) Black d) Red	b
20	Runway threshold is indicated by a series of parallel lines starting from a distance of a) 3 m from runway end b) 6 m from runway end c) 10 m from runway end d) 15m from runway end	b
21	The width and interval of transverse centre line bars along the extended centre line of runway, in approach lighting system are	b

	<p>a) Both A and R are true and R is the correct explanation of A</p> <p>b) Both A and R are true but R is not the correct explanation of A</p> <p>c) A is true but R is false</p> <p>d) A is false but R is true</p>	
28	<p>For supersonic transport aircraft, the minimum turning radius of taxiway is</p> <p>a) 60 m b) 120 m c) 180 m d) 240 m</p>	c
29	<p>As per UK design criteria, if LCN of aircraft is between 1.25 to 1.5 times the LCN of pavement, then the number of movements allowed are</p> <p>a) Zero b) 300 c) 3000 d) Unrestricted</p>	b
30	<p>Which of the following is an example of failure in flexible pavements ?</p> <p>a) Alligator cracking b) Mud pumping</p> <p>c) Warping cracks d) Shrinkage cracks</p>	a
31	<p>The main disadvantage of angle nose out parking configuration of aircraft is that the</p> <p>a) aircraft rear loading door is far away from terminal building.</p> <p>b) hot blast is directed towards the terminal building</p> <p>c) overall apron area required is more</p> <p>d) all the above</p>	b
32	<p>Which of the following is used for servicing and repairs of the aircraft ?</p> <p>a) Apron b) Hanger</p> <p>c) Terminal building d) holding apron</p>	b
33	<p>The slope of the transitional surface for A, B and C type of runway shall be</p> <p>a) 1:5 b) 1:7 c) 1:10 d) 1:12</p>	b
34	<p>The length of clear zone for none instrument runway of a small aircraft is</p> <p>a) 150 m b) 300 m c) 600 m d) 750 m</p>	b
35	<p>In approach areas of runways equipped with instrumental landing facilities any object within 4.5 km distance from runway end shall be considered as an obstruction if its height is more than</p> <p>a) 20 m b) 30 m c) 45 m d) 51 m</p>	b

36	<p>Maximum gross take-off weight of an aircraft is</p> <p>a) equal to the maximum structural landing weight b) less than the maximum structural landing weight c) more than the maximum structural landing weight d) equal to the empty operating weight plus the payload</p>	c
37	<p>Consider the following statements: Wind rose diagram is used for the purposes of</p> <ol style="list-style-type: none"> 1. runway orientation 2. estimating the runway capacity 3. geometric design of holding apron <p>Of these statements</p> <p>a) 1 and 2 are correct b) 2 and 3 are correct c) 1 and 3 are correct d) 1 alone is correct</p>	d
38	<p>Which of the following factors are taken into account for estimating the runway length required for aircraft landing?</p> <ol style="list-style-type: none"> 1. Normal maximum temperature 2. Airport elevation 3. Maximum landing weight 4. Effective runway gradient <p>Select the correct answer using the codes given below Codes:</p> <p>a) 1,2,3 and b) 1,3, and c) 2 and 3 d) 1,2 and 4</p>	d
39	<p>In an airport, if 4 groups of 5 gates each located well-separated are considered for traffic and the future to present traffic ratio is 3, then the total requirement of future gates will be</p> <p>a) 32 b) 36 c) 44 d) 68</p>	b
40	<p>Castor angle is defined as the angle</p> <p>a) formed by the longitudinal axis of the aircraft and the direction of movement of the nose gear b) between the direction of wind and the longitudinal axis of the runway c) between the true speed of the aircraft and the crosswind component d) between the horizontal and the fuselage axis</p>	a

41	The runway length after correcting for elevation and temperature is 2845 m. If the effective gradient on runway is 0.5 percent then the revised runway length will be a) 2845 m b) 2910 m c) 3030 m d) 3130 m	c
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13.Docks and Harbour Engineering

S.N.	Question with options	Answer
1	Which of the following are repair docks? a) marine railways, dry docks, floating docks, wet docks b) dry docks, wet docks, floating docks, lift docks c) wet docks, floating docks, lift docks, marine railways d) wet docks, lift docks, marine railways, dry docks	c
2	Which of the following structures protects the shore by trapping of littoral drift? a) groynes b) sea walls c) revetments d) moles	a
3	Which of the following conditions of loading imposes the greatest load on the foundation in case of dry docks? a) when the dock is empty b) when the dock is empty with the ship of maximum tonnage c) when the dock is full of water d) when the dock is dry and is under construction	c
4	For designing the dock, the proportion of ship load assumed to be borne by keel blocks is a) 5/8 b) 3/8 c) 3/16 d) 5/16	a
5	A ship strikes the berth generally at an angle a) 90° with the face of the dock b) 45° with the face of the dock c) 30° with the face of the dock d) 10° with the face of the dock	d
6	Consider the following statements. (i) Fender is the cushion provided on the face of the jetty for ships to come in contact, (ii) Slip is the space of water area between two adjacent piers where ships are berthed, (iii) Pier head is a structure constructed near the tip of break water near the harbor entrance. Of the statements a) (i) and (ii) are correct b) (ii) and (iii) are correct	d

	c) (i) and (iii) are correct d) (i), (ii) and (iii) are correct	
7	A ship is berthed in a chamber and lifted by principles of buoyancy Such a chamber is called. a) Dry dock b) Wet dock c) Floating dock d) Refuge dock	c
8	Assertion A: Depth and width required at the entrance to a harbour are more than those required in the channel. Reason R: The entrance to a harbour is usually more exposed to waves as compared to the harbour itself. 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.	a
9	When a ship floats at its designed water line, the vertical distance from water line to the bottom of the ship is known as a) beam b) depth c) freeboard d) draft	d
10	The maximum harbour depth below lowest low water is generally equal to (i) loaded draft + 1.2 m when bottom is rock (ii) loaded draft + 1.8 m when bottom is soft (iii) loaded draft + 1.2 m when bottom is soft (iv) loaded draft + 1.8 m when bottom is rock Of these statements a) (i) and (ii) are correct b) (i) and (iii) are correct c) (ii) and (iv) are correct d) (iii) and (iv) are correct	d
11	The minimum diameter of turning basin, where ships turn by going ahead and without tug assistance should be a) L b) 1.5 L c) 2.0 L d) 4.0 L where L is the length of the largest ship to use the port	d
12	Dead weight tonnage of a ship i) varies with latitude and season	c

	<p>ii) is more than displacement tonnage</p> <p>iii) is the difference between displacement load and displacement light Of these statements</p> <p>a) i) and ii) are correct b) ii) and iii) are correct</p> <p>c) i) and iii) are correct d) Only iii) is correct</p>	
13	<p>In basins subjected to strong winds and tide, the length of the berthing area should not be less than</p> <p>a) the length of design vessel</p> <p>b) the length of design vessel + 10% clearance between adjacent vessels</p> <p>c) the length of design vessel + 20% clearance between adjacent vessels</p> <p>d) twice the length of design vessel</p>	c
14	<p>As per Stevenson's empirical formula, the approximate value of the height of the wave in metres is given by</p> <p>a) 0.34 VF b) 0.5 VF c) 1.5 VF d) 3.4 VF</p> <p>where F is the fetch in km.</p>	a
15	<p>As per Berlin's formula, the length of wave in metres is given by</p> <p>a) 1.3412 b) 1.5612 c) 1.7412 d) 1.9412</p> <p>where 't' is the period in seconds for two successive waves to pass the same section.</p>	b
16	<p>Assertion A: Intervention of undulations in the sea bed reduces the depth of wave at the section.</p> <p>Reason R: No wave can have a height greater than the depth of water through which it passes.</p> <p>Select your answer based on the coding system given below:</p> <p>a) Both A and R are true and R is correct explanation of A.</p> <p>b) Both A and R are true but R is not the correct explanation of A.</p> <p>c) A is true but R is false.</p> <p>d) A is false but R is true.</p>	a
17	<p>Consider the following statements in regard to Beaufort scale for wind speeds,</p> <p>(i) The Beaufort number ranges from 1 to 12.</p>	b

	<p>(ii) Higher Beaufort number indicates higher speed of wind, (iii) Beaufort number for calm is smallest and for hurricane is highest Of these statements</p> <p>a) (i) and (ii) are correct b) (ii) and (iii) are correct c) (i) and (iii) are correct d) (i), (ii) and (iii) are correct</p>	
18	<p>At a given port, the fetch is 400 nautical miles, the maximum height of storm wave will be</p> <p>a) 2.073 m b) 8.169 m c) 9.144 m d) 6.8 m</p>	c
19	<p>Minimum width of ship clearance shall be</p> <p>a) B or 30 m b) 1.5 B or 50 m c) 1.5 B d) 50 m</p> <p>where "B" is beam of the design vessel</p>	a
20	<p>Select the incorrect statement.</p> <p>a) The progress of work in low level method of mound construction is very slow. b) Barge method of mound construction is economical. c) In low level method of mound construction, the area of working is limited. d) In staging method of mound construction, the work is not interrupted even during stormy weather.</p>	b
21	<p>Assertion A: Marine structures are made specially bulky and strong. Reason R: Sea insects result in undermining of the hardest and the soundest building material. Select your answer based on the coding system given below:</p> <p>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.</p>	a
22	<p>As compared to wall type breakwater, mound type breakwater</p> <p>a) requires skilled labour b) requires low maintenance cost c) requires less material d) results in less damage due to gradual failure</p>	d
23	<p>The difference in height between highest high water and lowest low water is called</p>	b

	a) mean range b) maximum range c) maximum rise d) mean rise	
24	If the maximum spring rise is 2 m and height of the waves expected is 4 m , then the breakwater height above the datum will be a) 2.5 m b) 4 m c) 5 m d) 7 m	d
25	If H is the height of the wave expected, then the height of the breakwater is generally taken as a) 1.2 H to 1.25 H above the datum b) 1.2 H to 1.25 H above the low water level c) 1.2 H to 1.25 H above the high water level d) 1.2 H to 1.25 H above the mean sea level	c
26	Assertion A: Basin walls have to be of much greater height than dock walls. Reason R: Tidal basins are subject to fluctuations of levels due to tidal variations. 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 correct explanation of A. c) A is true but R is false. d) A is false but R is true.	a
27	In multiple point mooring system, vessel is secured to minimum of a) two points b) four points c) six points d) eight points	b
28	By increasing the rise of lock gates, (i) the length of the lock gate will increase (ii) transverse stress due to water pressure on the gate will increase (iii) compressive force on the gate will increase Of these statements a) (i) and (ii) are correct b) (i) and (iii) are correct c) Only (ii) is correct d) Only (iii) is correct	a
29	Which of the following is a fixed type mooring accessory? a) bollard b) buoys c) cables d) anchors	a
30	The significant wave height is defined is the average height of the	a

	<p>a) one - third highest waves b) one - fourth highest waves</p> <p>c) one - fifth highest waves d) one - tenth highest waves</p>	
31	<p>If H_s is the significant wave height, then the average wave height and highest wave height respectively are given by</p> <p>a) $0.6 H_s$ and $1.67 H_s$ b) $0.6 H_s$ and $1.87 H_s$</p> <p>c) $1.27 H_s$ and $1.87 H_s$ d) $1.27 H_s$ and $1.67 H_s$</p>	b
32	<p>When a wave strikes a vertical breakwater in deep water, it is reflected back and on meeting another advancing wave of similar amplitude merges and rises vertically in a wall of water. This phenomenon is called</p> <p>a) Surf b) Clapotis c) Fetch d) Swell</p>	b
33	<p>Which of the following structures are constructed parallel to shore line to develop a demarcating line between land area and water area?</p> <p>a) sea walls, bulk heads and groynes</p> <p>b) sea walls, bulk heads and revetments</p> <p>c) sea walls, revetments and groynes</p> <p>d) bulk heads, revetments and groynes</p>	b
34	<p>Which of the following type of sea walls results in greatest protection of shore structures?</p> <p>a) vertical sea wall b) sea wall with batter</p> <p>c) stepped sea wall d) sea wall with concave face</p>	d
35	<p>Assertion A : Large size stones are required in stone revetment in shore protection.</p> <p>Reason R: Resistance of stone to wave force is proportional to its volume and wave force is proportional to the exposed area of the stone.</p> <p>Select your answer based on the coding system given below.</p> <p>a) Both A and R are true and R is the correct explanation of A.</p> <p>b) Both A and R are true but R is not a correct explanation of A.</p> <p>c) A is true but R is false.</p> <p>d) A is false but R is true.</p>	a

14. Tunnel Engineering

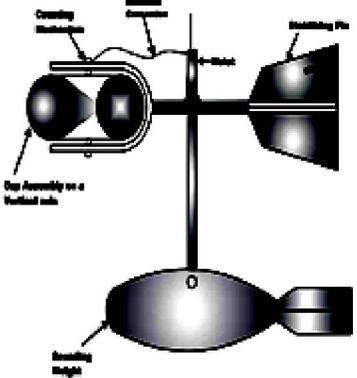
S.N.	Question with options	Answer
1	In Tunneling, for drilling holes horizontal, up or down following equipments are used- a) Dozers b) Power Shovels c) Drifters d) Trucks	c
2	The correct sequence of drilling equipment for increasing size of holes in tunnels is a) wagon drill, churn drill, shot drill b) wagon drill, shot drill, churn drill c) shot drill, churn drill, wagon drill d) churn drill, wagon drill, shot drill	a
3	Which of the following is not a component of the shield? a) propelling jacks b) liner plate c) hood d) tail	b
4	Which of the following are percussion drills? (i) shot drill (ii) diamond drill (iii) wagon drill (iv) churn drill Of these statements a) (i) and (ii) are correct b) (iii) and (iv) are correct c) (i) and (iv) are correct d) (ii) and (iii) are correct	b
5	Assertion A: English method of tunneling requires more time as compared to other methods of tunneling. Reason R: In English method of tunneling, the masons and excavators have to work alternately. 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 and R is not the correct explanation of A. c) A is true but R is false. d) A is false but R is true.	a
6	American method of tunneling i) is suitable for large sized tunnels ii) is no, ' suitable for railway or highway tunnel's	a

	<p>iii) requires heavy timbers Of these statements</p> <p>a) only (i) is correct b) (i) and (iii) are correct</p> <p>c) (ii) and (iii) are correct d) (i) and (ii) are correct</p>	
7	<p>Which of the following lining material is useful for shield driven tunnels in sub aqueous regions?</p> <p>a) stone masonry b) timber</p> <p>c) cast iron d) cement concrete</p>	c
8	<p>If 'D' is the diameter of tunnel in metres, then the thickness of lining in mm, as per the empirical formula is given by</p> <p>a) 42 D b) 82 D c) 104 D d) 124 D</p>	b
9	<p>Which one of the following tunneling methods is used for laying underground sewers?</p> <p>a) Needle beam method b) Army method</p> <p>c) German method d) Italian method</p>	b
10	<p>Ribs are used for strengthening and stiffening the liner plate for tunnels of diameter greater than</p> <p>a) 2 m b) 3 m c) 4 m d) 5 m</p>	b
11	<p>The most suitable soil for compressed air tunneling is</p> <p>a) silt b) sand c) clay d) gravel</p>	c
12	<p>The needle beam method of tunnelling</p> <p>(i) is suitable for soils in which roof can stand for few minutes without support</p> <p>(ii) is suitable for brick lining</p> <p>(iii) is suitable for concrete lining</p> <p>(iv) requires large number of trench jacks Of these statements</p> <p>a) only (i) is correct b) (i), (ii) and (iv) are correct</p> <p>c) (i), (iii) and (iv) are correct d) (i) and (ii) are correct</p>	b
13	<p>Which of the following methods of tunneling is used for long tunnels at great depths?</p> <p>a) Army method b) Needle beam method</p>	c

	1. drilling and blasting 2. timbering 3. pumping 4. mucking Select the correct answer using the codes given below Codes : a) 1,2,3,4 b) 1,4,2,3 c) 2,1,4,3 d) 2,4,1,3	
24	A good blast with a good yield is obtained if the cut hole is a) normal to face b) inclined at 45° to the face c) inclined at 15° to the face d) inclined at 30° to the face	b
25	As compared to a single free face, if a charge of explosive is placed equidistant from two faces, then the yield a) remains same b) decreases c) increases by 2.25 times d) increases by 3.5 times	c

15. Water Resources Engineering

S.N.	Question with options	Answer
1	Irrigation engineering mainly deals with supplying water for – a) Nourishment of crops b) Navigation c) Fire fighting d) Industries.	a
2	For supplying water to rabi crop, kharif crop and sugarcane, the channel is designed for a capacity equal to the greater of the water requirement of a) rabi or kharif b) rabi and kharif or sugarcane c) rabi and sugarcane or kharif and sugarcane d) rabi or kharif or sugarcane	c
3	The ratio of the quantity of water stored in the root zone of the crops to the quantity of water actually delivered in the field is known as a) water conveyance efficiency b) water application efficiency c) water use efficiency d) none of the above	b
4	The water utilizable by plants is available in soils mainly in the form of a) gravity water b) capillary water c) hygroscopic water d) chemical water	b
5	The amount of irrigation water required to meet the evapotranspiration needs of the crop during its full growth is called a) effective rainfall b) consumptive use c) consumptive irrigation requirement d) net irrigation requirement	c
6	With the increase in the quantity of water supplied, the yield of most crops a) increases continuously b) decreases continuously c) increases upto a certain limit and then becomes constant d) increases upto a certain limit and then decreases	d
7	Hydrograph is the graphical representation of a) runoff and time b) surface runoff and time	a

	c) ground water flow and time d) rainfall and time	
8	Infiltration rate is always a) more than the infiltration capacity b) less than the infiltration capacity c) equal to or less than the infiltration capacity d) equal to or more than the infiltration capacity	c
9	The depth of water required to bring the soil moisture content of a given soil up to its field capacity is called a) hygroscopic water b) equivalent moisture c) soil moisture deficiency d) pellicular water	c
10	Infiltration capacity a) is a constant factor b) changes with time c) changes with location d) changes with both time and location	d
11	The velocity is measured with a instrument shown is called as - a) velocity meter b) speedometer c) horizontal axis current meter d) vertical axis current meter	d
		
12	The cavitation occurs in the pipe when the pressure is a) equal to vapour pressure b) very high c) negative d) none of these	a
13	Laminar sublayer exists within a) laminar boundary layer region b) transition zone c) turbulent boundary layer region d) none of these	c
14	The mean velocity in open channels can be estimated from the known velocity at the free surface it is appx equal to a) 0.88 b) 0.75 c) 0.65 d) 1.1	a
15	Infiltration is the	a

	<p>a) movement of water through the soil</p> <p>b) absorption of water by soil surface</p> <p>c) both (a) and (b)</p> <p>d) none of the above</p>	
16	<p>If the intensity of rainfall is more than the infiltration capacity of soil, then the infiltration rate will be</p> <p>a) equal to rate of rainfall b) equal to infiltration capacity</p> <p>c) more than rate of rainfall d) more than infiltration capacity</p>	b
17	<p>Cyclonic precipitation is caused by lifting of an air mass due to</p> <p>a) pressure difference b) temperature difference</p> <p>c) natural topographical barriers d) all of the above</p>	a
18	<p>Which of the following is a non-recording raingauge?</p> <p>a) tipping bucket type raingauge b) Simon's raingauge</p> <p>c) Steven's weighing type raingauge d) floating type raingauge</p>	c
19	<p>A raingauge should preferably be fixed</p> <p>a) near the building b) under the tree</p> <p>c) in an open space d) in a closed space</p>	c
20	<p>Which of the following types of rain gauges is used for measuring rain in remote hilly inaccessible areas?</p> <p>a) tipping bucket type b) weighing type</p> <p>c) floating type d) Simon's raingauge</p>	a
21	<p>Rate of evaporation from a water surface increases if</p> <p>i) difference of vapour pressure between water and air is increased</p> <p>ii) velocity of wind is decreased</p> <p>iii) concentration of soluble solids in water is decreased</p> <p>The correct answer is</p> <p>a) (i) and (ii) b) (i) and (iii) c) (ii) and (iii) d) (i), (ii) and (iii)</p>	b
22	<p>A 70 % index of wetness means</p> <p>a) rain excess of 30 % b) rain deficiency of 30 %</p> <p>c) rain deficiency of 70 % d) none of the above</p>	b
23	<p>Under the same conditions, which of the following shapes of water surface will</p>	b

	<p>give the highest rate of evaporation?</p> <p>a) flat water surface b) convex water surface</p> <p>c) concave water surface d) independent of shape of water surface</p>	
24	<p>Assertion A: To estimate the rainfall over a catchment, the number of raingauges required per unit area is large for hilly areas.</p> <p>Reason R: Rainfall gradient is steep. Select your correct answer according to the coding system given below :</p> <p>a) Both A and R are true and R is the correct explanation of A</p> <p>b) Both A and R are true but R is not the correct explanation of A</p> <p>c) A is true but R is false</p> <p>d) A is false but R is true</p>	a
25	<p>The depth of flow at which specific energy is minimum is called</p> <p>a) Normal depth b) alternate depth</p> <p>c) critical depth d) none</p>	c
26	<p>In MLT system the dimension for specific volume would be</p> <p>a) L³ b) L⁻³ c) ML⁻³ d) M-1L³</p>	d
27	<p>A Turbine is called reaction turbine, if at the inlet of the turbine the total energy is</p> <p>a) Kinetic energy only b) kinetic energy & pressure energy</p> <p>c) pressure energy only d) none of these</p>	b
28	<p>When surface of transpiration is submerged under water, then potential evapotranspiration is</p> <p>a) much more than evapotranspiration</p> <p>b) much less than evapotranspiration</p> <p>c) equal to evapotranspiration</p> <p>d) equal to or less than evapotranspiration</p>	a
29	<p>Unit of runoff in M.K.S. system is</p> <p>a) cubic metre/sec b) metre/sec</p> <p>c) cubic metre d) square metre</p>	a
30	<p>The runoff increases with</p>	a

	a) increase in intensity of rain b) increase in infiltration capacity c) increase in permeability of soil d) all of the above	
31	The area between the isohyets 45 cm and 55 cm is 100 square km and between 55 cm and 65 cm is 150 square km. The average depth of annual precipitation over the above basin of 250 square km will be a) 50 cm b) 55 cm c) 56 cm d) 60 cm	c
32	A current meter is used to measure the a) velocity of flow of water b) depth of flow of water c) discharge d) none of the above	a
33	If it rains between 2 P.M. and 3 P.M. and the entire basin area just starts contributing water at 3 P.M. to the outlet, then time of concentration will be a) 15 minutes b) 20 minutes c) 30 minutes d) 60 minutes	d
34	The rainfalls of five successive days were measured as 100 mm, 80 mm, 60 mm, 40 mm and 20 mm respectively. If the infiltration index or the storm loss rate for the catchment area is earlier estimated as 50 mm/day, the total surface run off will be a) 50 mm b) 60 mm c) 90 mm d) 140 mm	c
35	The normal annual precipitation at stations X, A, B and C are 700 mm, 1000 mm, 900 mm and 800 mm respectively. If the storm precipitation at three station A, B and C were 100 mm, 90 mm and 80 mm respectively, then the storm precipitation for station X will be a) 70mm b) 80mm c) 90 mm d) 105 mm	a
36	The best unit duration of storm for a unit hydrograph is a) 1 hour b) one-fourth of basin lag c) one-half of basin lag d) equal to basin lag	b
37	The unit hydrograph due to a storm may be obtained by dividing the ordinates of the direct runoff hydrograph by a) direct runoff volume b) period of storm c) total rainfall d) none of the above	a
38	The unit hydrograph of a specified duration can be used to evaluate the	d

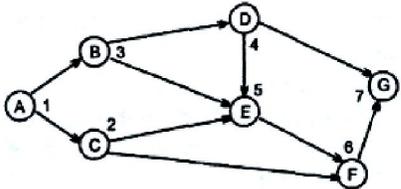
	hydrograph of storms of a) same duration only b) same and shorter duration c) same and longer duration d) any duration	
39	S-hydrograph is used to obtain unit hydrograph of a) shorter duration from longer duration b) longer duration from shorter duration c) both (a) and (b) d) none of the above	b
40	An artesian aquifer is the one where a) water surface under the ground is at atmospheric pressure b) water is under pressure between two impervious strata c) water table serves as upper surface of zone of saturation d) none of the above	b
41	The velocity distribution in turbulent flow follows a) parabolic law b) logarithmic law c) linear law d) hyperbolic law	b
42	The flow in a open channel is turbulent, if the Reynolds no is a) 2000 b) > 2000 c) >4000 d) 4000	b
43	If the Froude no in open channel is less than 1 the flow is called a) critical b) super critical c) sub critical d) None of these	c
44	A deep well a) is always deeper than a shallow well b) has more discharge than a shallow well c) is weaker structurally than a shallow well d) both (a) and (b)	b
45	A multipurpose reservoir is the one which is a) designed for one purpose but serves more than one purpose b) planned and constructed to serve various purposes c) both (a) and (b) d) none of the above	b
46	The useful storage is the volume of water stored in the reservoir between	b

	c) unflumed glacis fall d) all of the above	
68	The aqueduct or superpassage type of works are generally used when a) high flood drainage discharge is small b) high flood drainage discharge is large and short lived c) high flood drainage discharge is large and continues for a long time d) none of the above	a
69	An aggrading river is a a) silting river b) scouring river c) both silting and scouring river d) neither silting nor scouring river	a
70	The meander pattern of a river is developed by a) average discharge b) dominant discharge c) maximum discharge d) critical discharge	b
71	Select the correct statement. a) A meander increases the river length but a cut off reduces the river length. b) A cutoff increases the river length but a meander reduces the river length. c) Both meander and cutoff increase the river length. d) Both meander and cutoff decrease the river length.	a
72	Study the following statements. i) Levees are constructed parallel to river flow, ii) Spurs are constructed parallel to river flow, iii) Levees are constructed transverse to river flow, iv) Spurs are constructed transverse to river flow. The correct answer is a) (i) and (ii) b) (i) and (iv) c) (ii) and (iii) d) (iii) and (iv)	b
73	Variability of rainfall is i) largest in regions of high rainfall ii) largest in coastal areas iii) largest in regions of scanty rainfall The correct answer is a) only (i) b) (i) and (ii) c) only (iii) d) (ii) and (iii)	c
74	Model analysis of free surface flows are based on	c

	a) Reynolds's number c) Mach no	b) Froude's no d) Euler no	
75	The horizontal to vertical side slope in case of cippoete weir is a) 1:1 b) 1: $\sqrt{2}$ c) 1:2 d) 1:4		d
76	For measuring very low pressure which of the following you will use? a) barometer b) piezometer c) manometer d) none of these		d

16. Construction Management and Equipments

S.N.	Question with options	Answer
1	The performance of a specific task in CPM is known as a) dummy b) event c) activity d) constant	c
2	The final technical authority of a project is a) Assistant Engineer b) Executive Engineer c) Superintending Engineer d) Chief Engineer	d
3	Time and progress chart of a construction is also known as a) Bar chart b) Gantt chart c) Modified milestone chart d) any of the above	d
4	Whenever an activity has zero total float, then a) free float of the activity must be zero but independent float need not be zero b) independent float must be zero but free float need not be zero c) free float and independent float both must be zero d) free float and independent float both need not be zero	c
5	Total float for any activity is defined as the difference between a) its latest finish time and earliest start time for its successor activity b) its latest start time and earliest start time c) its latest start time and earliest finish time d) its earliest finish time and earliest start time for its successor activity	b
6	In the network shown in Fig. independent float for the activity 3-5 will be (the number on the arrow shows the duration of activity) a) 0 b) 1 c) 2 d) none of these	b
7	Select the incorrect statement. a) A critical path always begins at the very first event. b) A critical path always terminates at the last event. c) Critical activities control the project duration. d) Critical activity is the one for which free float is zero.	d
8	Free float for any activity is defined as the difference between	a

	<ul style="list-style-type: none"> a) its earliest finish time and earliest start time for its successor activity b) its latest start time and earliest start time c) its latest finish time and earliest start time for its successor activity d) its earliest finish time and latest start time for its successor activity 	
9	<p>Critical path</p> <ul style="list-style-type: none"> a) is always longest b) is always shortest c) may be longest d) may be shortest 	a
10	<p>The independent float affects only</p> <ul style="list-style-type: none"> a) preceding activities b) succeeding activities c) the particular activity involved d) none of the above 	c
11	<p>According to Fulkerson's rule, what are the correct event numbers corresponding to events A, B, C, D, E, F and G of the network shown in Fig. ?</p>  <ul style="list-style-type: none"> a) 1, 2,3, 4, 5, 6 and 7 respectively b) 1, 3,2,4, 5,6 and 7 respectively c) 1,2, 3, 5, 6,4 and 7 respectively d) 1, 3,2, 5, 6,4 and 7 respectively 	b
12	<p>In India, are prefabricated components costlier than those of traditional cast-in-situ items that the prefabricated components replace?</p> <ul style="list-style-type: none"> a) Yes, because of heavier overheads and handling cost b) Yes, because of the very high order of quality control for the factory made components c) No, because of repetitive manufacture of a number of elements d) No, because of savings in site labour 	c
13	<p>The time by which a particular activity can be delayed without affecting the preceding and succeeding activities is known as</p> <ul style="list-style-type: none"> a) total float b) free float c) interfering float d) independent float 	d
14	<p>The time with which direct cost does not reduce with the increase in time is</p>	b

	<p>c) crash durations for all the activities along the critical path obtained by taking into account the normal duration for all the activities</p> <p>d) crash durations for all the activities along the critical path obtained by taking into account the crash duration for all the activities.</p>	
23	<p>Interfering float is the difference between</p> <p>a) total float and free float b) total float and independent float</p> <p>c) free float and independent float d) none of the above</p>	a
24	<p>A tractor whose weight is 20 tonnes has a drawbar pull of 2500 kg, when operated on a level road having a rolling resistance of 30 kg per tonne. If this tractor is operated on a level road having a rolling resistance of 40 kg per tonne, then the drawbar pull of the tractor will</p> <p>a) reduce by 200 kg b) increase by 200 kg</p> <p>c) increase by 250 kg d) reduce by 250 kg</p>	a
25	<p>Which of the following earth moving machines has the shortest cycle time?</p> <p>a) Drag line b) Hoe c) Clam shell d) Dipper shovel</p>	d
26	<p>The part of a derrick crane include</p> <p>(i) Mast</p> <p>(ii) Boom</p> <p>(iii) Bull wheel</p> <p>(iv) Jack</p> <p>Of these statements</p> <p>a) (i), (ii) and (iv) are correct b) (ii), (iii) and (iv) are correct</p> <p>c) (i), (iii) and (iv) are correct d) (i), (ii) and (iii) are correct</p>	d
27	<p>A machine costs Rs. 20000 and its useful life is 8 years. The money is borrowed at 8 % interest per annum. The capital recovery factor at 8 % interest per annum for 8 years is 0.174. The annual equipment cost of the machine will be</p> <p>a) Rs.1740 b) Rs.3480 c) Rs.5220 d) Rs.6960</p>	b
28	<p>The probability of completion of any activity within its expected time is</p> <p>a) 50 % b) 84.1 % c) 99.9 % d) 100 %</p>	a

	c) 1 and 4 are correct	d) 1 and 2 are correct	
34	<p>In time-cost optimization of a project, crashing is done.</p> <p>a) on all the activities</p> <p>b) on all the activities lying on the critical path</p> <p>c) only on activities lying on the original critical path and having flatter cost slopes</p> <p>d) on original critical activities and those that become critical at any stage of crashing in the order of ascending cost slope</p>		d
35	<p>During the construction period, price variation clause in contracts caters to</p> <p>a) increase in rates of only important materials</p> <p>b) variation in cost in materials element, labour element and petrol-oil-lubricant element</p> <p>c) variation in total cost of the project on an ad hoc basis</p> <p>d) rate of inflation</p>		b
36	<p>At a work site, statistical quality control of concrete means</p> <p>a) measurement of risks to eliminate failures</p> <p>b) applying the theory' of probability to sample testing or inspection</p> <p>c) reduction in wastage of inspection costs</p> <p>d) reduction in costs for the removal of defects</p>		b
37	<p>A father notes that when his teenage daughter uses the telephone, she takes not less than 6 minutes for a call and som? Times as much as an hour. Fifteen minutes calls are more frequent than calls of any other duration. If these phone calls were an activity in PERT project, then phone calls expected duration will be</p> <p>a) 15 minutes</p> <p>b) 20.143 minutes</p> <p>c) 21 minutes</p> <p>d) 27 minutes</p>		c
38	<p>In resources levelling</p> <p>a) total duration of project is reduced</p> <p>b) total duration of project is increased</p> <p>c) uniform demand of resources is achieved</p>		c

	d) cost of project is controlled	
39	<p>The original cost of an equipment is Rs.10,000/-. Its salvage value at the end of its total useful life of five years is Rs. 1,000/-. Its book value at the end of two years of its useful life (as per straight line method of evaluation of depreciation) will be</p> <p>a) Rs. 8,800/- b) Rs. 7,600/- c) Rs. 6,400/- d) Rs. 5,000/-</p>	c
40	<p>Consider the following features/factors:</p> <ol style="list-style-type: none"> 1. Projects are of the non-repetitive type. 2. Time required need not be known. 3. Time required is known precisely. 4. Events have been established for planning. 5. Emphasis is given to activities of project. <p>PERT is preferred for planning because of</p> <p>a) 1,2 and 4 b) 3,4 and 5 c) 1,3 and 4 d) 1,2 and 5</p>	a
41	<p>Consider the following activities in a building construction:</p> <ol style="list-style-type: none"> 1. Concreting of roof slabs 2. Brick-jelly lime concrete terracing 3. Erection of formwork for slab 4. Construction of parapet wall in terrace <p>The correct sequence of these activities is</p> <p>a) 1,3,2,4 b) 3,1,4,2 c) 3,1,2,4 d) 1,3,4, 2</p>	c
42	<p>Consider the following operations:</p> <ol style="list-style-type: none"> 1. Drilling 2. Blasting 3. Mucking 4. Placing steel 5. Placing concrete <p>The correct sequence of these operations in tunnel construction is</p> <p>a) 1,2,4,3,5 b) 1,3,2,4,5 c) 1,2,3,4,5 d) 1,3,4,2,5</p>	c
43	For a given activity, the optimistic time, pessimistic time and the most	b

	probable estimates are 5, 17 and 8 days respectively, The expected time is a) 8 days b) 9 days c) 10 days d) 15 days	
44	Grader is used mainly for a) trimming and finishing b) shaping and trimming c) finishing and shaping d) finishing, shaping and trimming	d
45	Which one of the following is not an excavating & moving type of equipment ? a) Bulldozer b) Clam shell c) Scraper d) Dump truck	d
46	The most suitable type of equipment for compaction of cohesive soils is a) Smooth-wheeled rollers b) Vibratory rollers c) Sheep foot rollers d) Tampers	c
47	For excavating utility trenches with precise control of depth, the excavation equipment used is a) Hoe b) Shovel c) Drag line d) None of these	a
48	The basic action involved in sheep foot rolling is a) Kneading b) Pressing c) Tamping d) Vibration	a
49	Batching refers to a) controlling the total quantity at each batch b) weighing accurately, the quantity of each material for a job before mixing c) controlling the quantity of each material into each batch d) adjusting the water to be added in each batch according to the moisture content of the materials being mixed in the batch	c
50	Consider the following statements: Wheeled tractors are replacing crawler tractors because 1. wheeled tractors travel faster. 2. crawler tractors are more expensive. 3. track parts of a crawler wear out quickly. 4. crawler tractors have stick control. Of these statements a) 1,3 and 4 are correct b) 2, 3 and 4 are correct c) 1,2 and 3 are correct d) 1, 2 and 4 are correct	c

	(iii) Ground conditions Of these statements a) only (i) is correct b) (i) and (ii) are correct c) (i) and (iii) are correct d) (ii) and (iii) are correct	
61	A wheeled tractor hauling unit is working on firm earth. The total loaded weight distribution of this unit is: Drive wheels : 25000 kg Scraper wheels : 10000 kg If the coefficient of traction for wheeled tractor on firm earth is 0.5, the rimpull which this tractor can exert without slipping is a) 10000 kg b) 12500 kg c) 22500 kg d) 5000 kg	b

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