# 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 of .......Publication 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

## **CONTENTS**

#### **Preface Engineering Mechanics Building Construction** Surveying and Leveling Strength of Materials Theory of Structures **Concrete Structures** Steel Structures Fluid Mechanics Geotechnical Engineering **Environmental Engineering** Transportation Engineering Airport Engineering Docks and Harbor Engineering **Tunnel Engineering** Water Resources Engineering Construction Management

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

	a) Half b) Same c) Twice d) None of these	
6	A couple consists of	С
	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.	
7	A system of forces acting on a lamina is	b
	shown in the given figure. The resultant of	
	the force system will meet AB at  A  C  R  D  Sm  L  Sm  L	
	a) A b) B	
	c) C d) D	
8	According to Lami's Theorem, the three forces	d
	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.	
9	The Lami's Theorem is applicable only for	c
	a) Coplanar forces b) Non-Concurrent forces	
	c) Coplanar and concurrent forces d) Any type of forces	
10	If a body is in equilibrium. We may conclude that	d
	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)	
11	If the sum of all the forces acting on a body is zero, then the body may be in	a
	equilibrium provided the forces are	
	a) Concurrent b) Parallel c) Like parallel d) Unlike parallel	
12	The moment of inertia of a triangular section of base (b) and height (h) about	С
	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	
13	The moment of inertia of a triangular section of base (b) and height (h) about	С

	an axis through its c. g. and parallel to the base is given by the relation,	
	a) $bh^3/12$ b) $bh^3/24$ c) $bh^3/36$ d) $bh^3/48$	
14	A force P of 50 N and another force Q of unknown magnitude act at 90° to	d
	each other. They are balanced by a force of 130 N. The magnitude of Q is	
	a) 60 N b) 80 N c) 100 N d) 120 N	
15	If the resultant of two forces has the same magnitude as either of the force,	d
	then the angle between the two forces is	
	a) 30° b) 45° c) 60° d) 120°	
16	The force polygon representing a set of forces in equilibrium is a	c
	a) triangle b) open polygon c) closed polygon d) parallelogram	
17	A rod AB carries three loads of 30 N, 70 N and 100 N at distances of 20 mm,	a
	90 mm and 150 mm respectively from A.	
	Neglecting the weight of the rod, the point at which the rod will balance is	
	a) 109.5mm from A b) 119.5 mm from A	
	c) 125.5 mm from A d) 132.5 mm from A	
18	The angles between two forces to make their resultant a minimum and a	d
	maximum respectively are	
	a) 0° and 90° b) 180° and 90° c) 90° and 180° d) 180° and 0°	
19	Which of the following represents the state of neutral equilibrium?	d
	a) a cube resting on one edge	
	b) a smooth cylinder lying on a curved surface	
	c) a smooth cylinder lying on a convex surface	
	d) none of the above	
20	Two circular discs of same weight and thickness are made from metals having	b
	different densities. Which disc will have the larger rotational inertia about its	
	central axis?	
	a) disc with larger density b) disc with smaller density	
	c) both discs will have same rotational inertia d) none of the above	
21	The angular speed of a car while taking a circular turn of radius 100 m at 36	a
	km/hour, is	

	a) 0.1 radian/sec b) 1 radian/sec	
	c) 100 radian/sec d) 1000 radian/sec	
22	The torque produced by a force depends on	d
	i) the magnitude of the force	
	ii) the direction of the force	
	iii) the point of application of the force relative to origin The correct answer is	
	a) only (i) b) both (i) and (ii)	
	c) both (i) and (iii) d) all (i), (ii) and (iii)	
23	The ratio of the speed of a rolling cylinder to the speed of sliding cylinder is	a
	a) less than 1 b) equal to 1	
	c) between 1 and 2 d) greater than 2	
24	The graphical method of determining the forces in the members of a truss is	a
	based on	
	a) method of joint b) method of section	
	c) either method d) none of the two methods	
25	The time of flight of a projectile on un upward inclined plane depends upon	c
	a) angle of projection b) angle of inclination of the plane	
	c) both 'a' and 'b' d) none of the above	
26	Rate of change of angular momentum is equal to	b
	a) force b) torque	
	c) linear momentum d) impulse	
27	If the angular distance, $0 = 2t^3 - 3t^2$ , the angular acceleration at $t = 1$ sec. is	С
	a) 1 rad/sec <sup>2</sup> b) 4 rad/sec <sup>2</sup> c) 6 rad/sec <sup>2</sup> d) 12 rad/sec <sup>2</sup>	
28	A particle moves in a straight line and its position is defined by the equation x	b
	$= 6 t^2 - t^3$ where t is expressed in seconds and x in metres. The maximum	
	velocity during the motion is	
	a) 6 m/sec b) 12 m/sec c) 24 m/sec d) 48 m/sec	
29	A flywheel of moment of inertia 20 kg-m <sup>2</sup> is acted upon by a tangential force	b
	of 5 N at 2 m from its axis, for 3 seconds. The increase in angular velocity in	
	radian per second is	

	a) ½ b) 3/2 ' c) 2 d) 3	
30	For a given velocity of a projectile, the range is maximum when the angle of	b
	projection is	
	a) 30° b) 45° c) 90° d) 0°	
31	The maximum value of the horizontal range for a projectile projected with a	c
	velocity of 98 m/sec is	
	a) 98 m b) 490 m c) 980 m d) 1960 m	
29	If the direction of projection bisects the angle between the vertical and the	b
	inclined plane, then the range of projectile on the inclined plane is	
	a) zero b) maximum c) minimum d) unpredictable	
32	A funicular polygon cannot be made to pass through	d
	a) one specified point b) two specified points	
	c) three specified points d) more than three specified points	
33	A stone is thrown up a slope of inclination 60° to the horizontal. At what angle	a
	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°	
34	A particle of mass 2 kg executes simple harmonic motion of frequency 6/71	b
	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	
35	Free body diagram is an	С
	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	
36	The member forces in a statically indeterminate truss	b
	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	

37	One end of an elastic string of natural length / and modulus X is kept fixed	a
	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	
	a) a simple harmonic motion	
	b) a rectilinear motion with constant speed	
	c) a damped oscillatory motion	
	d) none of the above	
38	The periodic time of a body moving with simple harmonic motion	b
	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.	
39	The frequency of vibration in case of simple harmonic motion	a
	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.	
40	Which of the following statement is wrong?	d
	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	
41	Two masses of 10 kg and 15 kg are connected to two ends of an inextensible	a
	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	
	a) tension in the string will increase	
	b) tension in the string will decrease	
l	I	

	c) acceleration of the system will remain the same.	
	d) All of above	
42	The unit of rotational inertia of a body in C.G.S system is	c
	a) cm <sup>4</sup> b) kg-cm <sup>2</sup> c) gm-cm <sup>2</sup> d) gm-cm <sup>3</sup>	
43	In SI units, the units of force and energy are respectively	c
	a) Newton and watt b) Dyne and erg	
	c) Newton and joule d) kg-wt and joule	
44	One Newton is equivalent to	d
	a) 1 kg-wt b) 9.81 kg-wt c) 981 dyne d) 1/9.81 kg-wt	
45	A heavy ladder resting on floor and against a vertical wall may not be in	d
	equilibrium if	
	a) floor is smooth and wall is rough b) floor is rough and wall is rough	
	c) both floor and wall are rough d) both floor and wall are smooth	
46	If a body is lying on a plane whose inclination with the horizontal is less than	c
	the angle of friction, then	
	i) a force is required to move the body upwards	
	ii) a force is required to move the body downward	
	iii) the body will not be in equilibrium The correct answer is	
	a) only (i) b) only (ii) c) both (i) and (ii) d) both (i) and (iii)	
47	The condition for a lifting machine to be reversible is that its efficiency should	b
	be	
	a) less than 50 % b) more than 50 %	
	c) more than 66.67 % d) equal to 100 %	
48	In a lifting machine a weight of 5 kN is lifted through 200 mm by an effort of	a
	0.1 kN moving through 15 m. The mechanical advantage and velocity ratio of	
	the machine are respectively	
	a) 50 and 75 b) 75 and 50 c) 75 and 75 d) 50 and 50	
49	Free body diagram is an	c
	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 as well as external, acting on it	
	d) none of the above	
50	The shape of a suspended cable for a uniformly distributed load over it is	b
	a) circular b) parabolic c) catenary d) cubic parabola	
51	Which of the following statement is wrong?	a
	(a) If two springs of stiffness s <sup>1</sup> and s <sup>2</sup> are arranged in series, then stiffness of	
	the equivalent spring is $s^1 + s^2$ .	
	(b) The motion of a body from one extremity to another is known as beat.	
	(c) A pendulum, which executes one beat per second is known as second's	
	pendulum.	
	(d) none of them.	
52	The total momentum of two bodies remains constant after collision or any	a
	other mutual action. This is known as	
	a) Law of Conservation of Momentum	
	b) Newton's Law of Collision of Elastic Bodies	
	c) both (a) and (b)	
	d) none of them	
53	The loss of kinetic energy due to direct impact of two bodies depends on	d
	a) the mass of two bodies b) the initial velocities of two bodies	
	c) the final velocities of two bodies d) Both (a) and (b)	
54	If a lead ball with a certain velocity is made to strike a wall, it does not	a
	rebound. But if a rubber ball of same mass and velocity strikes the same wall,	
	it rebounds. Select correct reason from the following:	
	a) the change in momentum suffered by the rubber ball is more than that of the	
	lead ball.	
	b) the change in momentum suffered by the lead ball is more than that of the	
	rubber ball.	
	c) both (a) and (b).	
	d) none of the above.	
55	A ball moving on a smooth horizontal table hits a rough vertical wall, the	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	b
	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	
57	A car negotiates a curve of radius 100 m at 25 m/sec. The angle to the	d
	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) ½ c) 9/5 d) 5/8	
58	Two objects moving with uniform speeds are 5 m apart after 1 second when	b
	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	
59	The angular speed of a car taking a circular turn of radius 100 m at 36 km/hr	a
	will be	
	a) 0.1 rad/sec b) 1 rad/sec c) 10 rad/sec d) 100 rad/sec	
60	A stone was thrown vertically upwards from the ground with a velocity of 50	b
	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 $g = 10$	
	$m/sec^2$ )	
	a) 15 m/sec b) 25 m/sec c) 40 m/sec d) 50 m/sec	

# 2.Building Materials and Building Construction

S.N.	Question with options	Answer
1	Slate is formed by metamorphic action on	a
	a) shale b) lime stone c) sand stone d) granite	
2	Sandstone is a	d
	i) sedimentary rock	
	ii) aqueous rock	
	iii) siliceous rock	
	The correct answer is	
	a) only (i) b) both (i) and (ii)	
	c) both (i) and (iii) d) all (i), (ii) and (iii)	
3	A good building stone should not absorb water more than	a
	a) 5 % b) 10 % c) 15 % d) 20 %	
4	Crushing strength of a good building stone should be more than	b
	a) 50 MPa b) 100 MPa c) 150 MPa d) 200 MPa	
5	Specific gravity for most of the building stones lies between	c
	a) 1.5 to 2.0 b) 2.0 to 2.5 c) 2.5 to 3.0 d) 3.0 to 3.5	
6	The age of a tree can be known by examining	b
	a) cambium layer b) annular rings	
	c) medullary rays d) heart wood	
7	Sand stone is	d
	a) volcanic rock b) igneous rock	
	c) metamorphic rock d) sedimentary rock	
8	Common sand is a variety of	b
	a) caicite b) quartz c) felspar d) chlorite	
9	Plywood is made by bonding together thin layers of wood in such a way that	d
	the angle between grains of any layer to grains of adjacent layers is	

	a) 0° b) 30° c) 45° d) 90°	
10	The practical limit of moisture content achieved in air drying of timber is	b
	a) 5 % b) 15 % c) 25 % d) 35 %	
11	Crushing strength of a first class brick should not be less than	c
	a) 3.5 N/mm <sup>2</sup> b) 7.0 N/mm <sup>2</sup> c) 10.5 N/mm <sup>2</sup> d) 14.0 N/mm <sup>2</sup>	
12	The percentage of alumina in a good brick earth lies between	b
	a) 5 to 10 % b) 20 to 30 % c) 50 to 60 % d) 70 to 80 %	
13	The nominal size of the modular brick is	c
	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	
14	Study the following statements.	b
	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)	
15	Le Chatelier's device is used for determining the	b
	a) setting time of cement b) soundness of cement	
	c) tensile strength of cement d) compressive strength of cement	
16	According to IS specifications, the compressive strength of ordinary Portland	c
	cement after three days should not be less than	
	a) 7 MPa b) 11.5 MPa c) 16 MPa d) 21 MPa	
17	For testing compressive and tensile strength of cement, the cement mortar is	b
	made by mixing cement and standard sand in the proportions of	
	a) 1:2 b) 1:3 c) 1:4 d) 1:6	
18	The slump recommended for mass concrete is about	a
	a) 25 mm to 50 mm b) 50 mm to 100 mm	
	c) 100 mm to 125 mm d) 125 mm to 150 mm	
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	a
	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)	
21	Which of the following is a mineral	d
	a) quartzite b) laterite c) granite d) calcite	
22	Most weather resisting metamorphic rock is	d
	a) lime stone b) slate c) marble d) quartzite	
23	Red colour is imparced to bricks due to	a
	a) ironoxide b) lime c) silica d) magnesia	
24	The number of bricks required per cubic meter of brick masonary is	c
	a) 400 b) 450 c) 500 d) 550	
25	The basic purpose of a retarder in concrete is	a
	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	
26	Compared to mild steel, cast iron has	d
	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)	
27	Assertion A: Paints with white lead base are not recommended for painting of	a

	iron works.				
	Reason R: Paints with white lead base do not check rusting of iron.				
	Select your answer according to 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				
28	The pressure acting on the stones in stone masonry construction should be	d			
	a) along the direction of bedding planes				
	b) at 45° to the direction of bedding planes				
	c) at 60° to the direction of bedding planes				
	d) perpendicular to the direction of bedding planes				
29	The depression provided in the face of brick during its manufacturing is	d			
	known as-				
	a) Indentation b) Anchorage c) Well d) Frog				
30	The type of bond provided in brick masonry for carrying heavy loads is	С			
	a) single Flemish bond b) double Flemish bond				
	c) English bond d) zigzag bond				
31	The slenderness ratio for masonry walls should not be more than	b			
	a) 10 b) 20 c) 30 d) 40				
32	The proportions of lime and sand in the mortar normally used in brick	a			
	construction are				
	a) 1:2 b) 1:4 c) 1:6 d) 1:8				
33	Number of vertical joints in a stretcher course is x times the number of joints	a			
	in the header course, where x is equal to				
	a) 1/2 b) 1 c) 2 d) 1/4				
34	As compared to stretcher course, the thickness of joints in header course	a			
	should be				
	a) less b) more c) equal d) equal or more				
35	The differential settlement in case of foundations on sandy soils should not	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	d
	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	
37	The type of footing which is used to transmit heavy loads through steel	b
	columns is	
	a) raft foundation b) grillage foundation	
	c) well foundation d) isolated footing	
38	The type of pile which is driven at an inclination to resist inclined forces is	c
	known as	
	a) friction pile b) sheet pile c) batter pile d) anchor pile	
39	The minimum depth of foundation in clayey soils is	С
	a) 0.5 m b) 0.7 m c) 0.9 m d) 1.2 m	
40	The maximum total settlement for raft foundation on clayey soils should be	d
	limited to	
	a) 25 mm b) 25 to 40 mm c) 40 to 65 mm d) 65 to 100 mm	
41	The bearing capacity of a water logged soil can be improved by	b
	a) compacting the soil b) draining the soil	
	c) increasing the depth of foundation d) grouting	
42	The type of flooring suitable for use in churches, theatres, public libraries and	a
	other places where noiseless floor covering is desired is	
	a) cork flooring b) glass flooring	
	c) wooden flooring d) linoleum flooring	
43	The vertical distance between the springing line and highest point of the inner	b
	curve of an arch is known as	
	a) intrados b) rise c) spandrel d) extrados	
44	The minimum hardness number for marble is about	a
	a)3 b)8 c)5 d)10	

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

	a) mortise and tennon joint b) oblique mortise and tennon joint			
	c) butt joint d) mitred joint			
53	The type of roof suitable in plains where rainfall is meagre and temperature is			
	high is			
	a) pitched and sloping roof b) flat roof			
	c) shell roof d) none of the above			
54	Pitched and sloping roofs are suitable for	a		
	a) coastal regions b) plain regions			
	c) covering large areas d) all of the above			
55	Quick lime is	a		
	a) calcium oxide b) calcium hydroxide			
	c) calcium carbonate d) none of the above			
56	Hydraulic lime is obtained by	a		
	a) burning of kankar b) burning of lime stone			
	c) adding water to quicklime d) all the above			
57	Plaster of paris is obtained from the calcination of	c		
	a) bauxite b) lime stone c) dolomite d) gypsum			
58	Fat lime can be used in	a		
	a) distempers b) lime mortars c) lime terracing d) none of these			
59	The silica in Portland cement is	b		
	a) 10-20% b) 20-25% c) 25-40% d) 40-60%			
60	Plan of arrangement of bricks in masonry	b		
	Shown in figure is called as-			
	(a) English bond			
	(b) Double Flemish bond			
	(c) Dutch bond			
	(d) Zigzag bond 1 Prick wal Front			
61	The type of roof which slopes in two directions with a break in the slope on	c		
	each side is known as			
	a) gable roof b) hip roof c) gambrel roof d) mansard roof			

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

	a) 1.0 H and 1.0 H b) 1.5 H and 1.5 H				
	c) 2.0 H and 1.5 H d) 2.0 H and 2.0 H				
	where H is the height of wall or column between centres of supports.				
69	If H is the height of wall between centres of supports, then the effective height				
	of wall where concrete floors have a bearing on wall irrespective of the				
	direction of span will be				
	a) 0.75 H b) 0.85 H c) 1.0 H d) 1.5 H				
70	The thickness of each leaf of a cavity wall shall not be less than	b			
	a) 5 cm b) 7.5 cm c) 10 cm d) 15 cm				
71	If the horizontal cross-sectional area of a wall is 1200 cm <sup>2</sup> , then the basic	c			
	stress shall be multiplied by a reduction factor equal to				
	a) 0 6 b) 0.75 c) 0.85 d) 0.95				
72	A free standing brick wall 20 cm thick is subjected to a wind pressure of 75	a			
	kg/m <sup>2</sup> . The maximum height of wall from stability consideration is				
	a) 0.64 m b) 0.96 m c) 1.28 m d) 1.5 m				
73	The bending stress in a wall or column subjected to effective vertical load need	a			
	not be considered, if the eccentricity ratio is				
	a) less than or equal to 1/24 b) less than or equal to 1/6				
	c) more than 1/24 d) less than or equal to 1/12				
74	If the eccentricity ratio is more than 1/24, then increase in the permissible	b			
	stress in the design of wall subjected to eccentric loading as per code is				
	a) 10 % b) 25 % c) 33 1/3 % d) 50 %				
75	For designing masonry components of a structure, seismic forces provision in	b			
	the design calculation is not necessary for buildings constructed in				
	a) Zone I only b) Zone I and II				
	c) Zone I, II and III d) Zone I, II, III and IV				
76	The mode of failure of a very short masonry member having h/t ratio of less	a			
	than 4 is by				
	a) shear b) vertical tensile splitting				
	c) buckling d) any of the above				

77	The timber floor not spanning on the masonry wall but properly anchored to	a			
	the wall gives				
	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				
78	Full restraint is provided by	d			
	(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				
	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				
79	Minimum thickness of stiffening wall for 1 to 3 storeys shall not be less than	a			
	a) 10 cm b) 15 cm c) 20 cm d) 30 cm				
80	For masonry work with solid bricks, consistency of mortar should be	b			
	a) 5 to 8 cm b) 9 to 13 cm c) 14 to 18 cm d) 19 to 23 cm				
81	Water retentivity for brick masonry should not be less than	c			
	a) 50 % b) 60 % c) 70 % d) 80 %				
82	Rich cement mortars are more liable to cracking as compared to lean mortars	a			
	because rich mortars have				
	a) high shrinkage b) less strength				
	c) both (a) and (b) d) none of above				
83	Cement mortars richer than 1 : 3 are not used in masonry because	b			
	(i) there is no gain in strength of masonry (ii) there is high shrinkage (iii) they				
	are prone to segregation Of these statements				
	a) Only (ii) is correct b) (i) and (ii) are correct				
	c) (ii) and (iii) are correct d) (i), (ii) and (iii) are correct				
84	For earthquake resistant masonry buildings, the vertical distance between				
	openings one above the other in a load bearing wall shall not be less than				

	a)	50 cm	b) 60 cm	c) 75 cm	d) 100 cm		
85	In a c	avity wall, b	ooth leaves of which	ch are load bearing	g, the effective thickness	d	
	is taken as						
	a) sum of thickness of both leaves						
	b)	b) two-third of the sum of thickness of both the leaves					
	c)	c) actual thickness of the stronger leaf					
	d)	larger of (	b) and (c)				
86	Consi	der the follo	owing statements i	regarding provision	n of chases in masonry,	a	
	(i) N	o chase sho	uld be permitted i	n a half brick load	-bearing wall,		
	(ii) V	ertical chase	es should not be cl	oser than 2 m in a	ny stretch of a wall,		
	(iii) C	hases shoul	d be provided nea	r to bearings of be	eams and lintels. Of these		
	staten	nents					
	a)	(i) and (ii)	are correct	b) (i) and (	iii) are correct		
	c)	(ii) and (ii	i) are correct	d) (i), (ii) a	nd (iii) are correct		
87	Consi	der the follo	owing statements:			С	
	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	t in reduction of st	resses due to diffe	erential expansion of		
	m	asonry units	<b>.</b>				
	Of the	ese statemen	its				
	a)	1 alone is	correct	b) 2 alone			
	c)		1 2 are correct		1 nor 2 is correct		
88			_		compound wall built in	a	
	brick	work, which	n one of the follow	ving would be mos	st suitable?		
	a)	-	buttresses at certa				
	b)	-	a deeper foundation	on			
	c)	•	her mortar				
	d)	using stro	nger bricks				

89	Consider the following statements: Sand in mortar is needed for	a			
	1. decreasing the quantity of cement.				
	2. reducing shrinkage.				
	3. decreasing the surface area of the binding material.				
	4. increasing the strength.				
	Of these statements:				
	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				
90	Consider the following statements:	c			
	A high lime content in a composite cement-lime mortar results in				
	1. slow hardening.				
	2. quick setting.				
	3. weaker mortar. Of these statements				
	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				
91	Direct load carrying capacity of a brick masonry wall standing freely as	b			
	against when it supports RC slab will be				
	a) more b) less				
	c) the same in both the cases d) 100%				
92	A 200 mm thick wall made of modular bricks is 5 m long between cross walls	a			
	and 3.8 m clear height between RCC slabs at top and bottom. The slenderness				
	ratio of the wall is				
	a) 15 b) 19 c) 20 d) 25				
93	The basic stress in masonry units having height to width ratio of 1.5 may	c			
	be increased by a factor of				
	a) 1.2 b) 1.4 c) 1.6 d) 2.0				
94	Consider the following statements:	d			
	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				

suffers high shrinkage.

3. Masonry in lime mortar has better resistance against rain penetration and is less liable to crack when compared to masonry in cement mortar.

Which of these statements are correct?

- a) 1,2 and 3
- b) 1 and 2
- c) 2 and 3
- d) 1 and 3

# 3. Surveying and Leveling

S.N.	Question with options				
1	Hydrographic survey deals with the mapping of				
	a) Large water bodies b) rainfall data				
	c) wave movement d) none of the above				
2	In surveying when curvature of earth is taken into consideration then that type	b			
	is called as —				
	a) Chain surveying b) Geodetic surveying				
	c) Plane surveying d) Contouring				
3	Following is the term used in leveling while reduction of levels	b			
	a) Zero circle b) Height of Instrument				
	c) Fore bearing d) Local attraction				
4	In leveling, for taking levels of ground one of the following instrument is used	С			
	a) Prismatic compass b) Plane table				
	c) Dumpy level d) Prism square				
5	The least count of prismatic compass is	С			
	a) 10' b) 30' c)15' d)20"				
6	In leveling work the diagram or map shown here where each line is having points of equal elevations is called as- (a) Contour map (b) survey map (c) topographic map (d) Survey map	a			
7	The prismatic compass and surveyor's compass  a) give whole circle bearing (WCB) of a line and quadrantal bearing (QB) of	a			

	a line respectively	
	b) both give QB of a line and WCB of a line	
	c) both give QB of a line	
	d) both give WCB of a line	
8	The horizontal angle between the true meridian and magnetic meridian at a	b
	place is called	
	a) azimuth b) declination	
	c) local attraction d) magnetic bearing	
9	A negative declination shows that the magnetic meridian is to the	b
	a) eastern side of the true meridian	
	b) western side of the true meridian	
	c) southern side of the true meridian	
	d) none of the above	
10	If the magnetic bearing of the sun at a place at noon in southern hemisphere is	c
	167°, the magnetic declination at that place is	
	a) 77° N b) 23° S c) 13° E d) 13° W	
11	The graduations in prismatic compass	a
	i) are inverted	
	ii) are upright	
	iii) run clockwise having 0° at south	
	iv) run clockwise having 0° at north	
	The correct answer is	
	a) (i) and (iii) b) (i) and (iv)	
	c) (ii) and (iii) d) (ii) and (iv)	
12	Agate cap is fitted with a	d
	a) cross staff b) level	
	c) chain d) prismatic compass	
13	Theodolite is an instrument used for	d
	a) tightening the capstan-headed nuts of level tube	
	b) measurement of horizontal angles only	

	c) measurement of vertical angles only			
	d) measurement of both horizontal and vertical angles			
14	The process of turning the telescope about the vertical axis in horizontal plane			
	is known as			
	a) transiting b) reversing c) plunging d) swinging			
15	Size of a theodolite is specified by	С		
	a) the length of telescope b) the diameter of vertical circle			
	c) the diameter of lower plate d) the diameter of upper plate			
16	Which of the following is not the function of levelling head?	d		
	a) to support the main part of the instrument			
	b) to attach the theodolite to the tripod			
	c) to provide a means for leveling the theodolite			
	d) none of the above			
17	If the lower clamp screw is tightened and upper clamp screw is loosened, the	С		
	theodolite may be rotated			
	a) on its outer spindle with a relative motion between the vernier and			
	graduated scale of lower plate			
	b) on its outer spindle without a relative motion between the vernier and			
	graduated scale of lower plate			
	c) on its inner spindle with a relative motion between the vernier and the			
	graduated scale of lower plate			
	d) on its inner spindle without a relative motion between the vernier and the			
	graduated scale of lower plate			
18	A telescope is said to be inverted if its	a		
	a) vertical circle is to its right and the bubble of the telescope is down			
	b) vertical circle is to its right and the bubble of the telescope is up			
	c) vertical circle is to its left and the bubble of the telescope is down			
	d) vertical circle is to its left and the bubble of the telescope is up			
19	The cross hairs in the surveying telescope are placed	b		
	a) midway between eye piece and objective lens			
	I .			

	b) much closer to the eye-piece than to the objective lens	
	c) much closer to the objective lens than to the eye piece	
	d) anywhere between eye-piece and objective lens	
20	For which of the following permanent adjustments of theodolite, the spire test	c
	is used?	
	a) adjustment of plate levels	
	b) adjustment of line of sight	
	c) adjustment of horizontal axis	
	d) adjustment of altitude bubble and vertical index frame	
21	The adjustment of horizontal cross hair is required particularly when the	a
	instrument is used for	
	a) leveling	
	b) prolonging a straight line	
	c) measurement of horizontal angles	
	d) all of the above	
22	The needle of magnetic compass is generally supported on	c
	a) Ball bearing b) bush bearing	
	c) needle bearing d) jewel bearing	
23	If 'n' is the number of sides, then the total sum of exterior angles of a closed	c
	traverse should be	
	a) n+2 b) 2n-4 c) 2n+4 d) 4n-2	
24	The box of prismatic compass is made of	b
	a) steel b) brass c) iron d) aluminium	
25	Which of the following errors is not eliminated by the method of repetition of	b
	horizontal angle measurement?	
	a) error due to eccentricity of verniers	
	b) error due to displacement of station signals	
	c) error due to wrong adjustment of line of collimation and trunnion axis	
	d) error due to inaccurate graduation	
26	The error due to eccentricity of inner and outer axes can be eliminated by	a

a) c) 28 Wh obs a) b) c) d) 29 Wh obs a) b) c) d) 30 If a reac will a) c)	reading both verniers and taking the mean of the two	
d)  27 In t a) c)  28 Wh obs a) b) c) d)  29 Wh obs a) b) c) d)  30 If a reac will a) c)	taking both face observations and taking the mean of the two	
27 In to a) c) 28 Wh obs a) b) c) d) 29 Wh obs a) b) c) d) 30 If a reac will a) c)	double sighting	
a) c) 28 Wh obs a) b) c) d) 29 Wh obs a) b) c) d) 30 If a reac will a) c)	taking mean of several readings distributed over different portions of the	
a) c) 28 Wh obs a) b) c) d) 29 Wh obs a) b) c) d) 30 If a reac will a) c)	graduated circle	
c)  28 Wh obs a) b) c) d)  29 Wh obs a) b) c) d)  30 If a reac will a) c)	he double application of principle of reversion, the apparent error is	d
28 Wh obs a) b) c) d) 29 Wh obs a) b) c) d) 30 If a reac will a) c)	equal to true error b) half the true error	
obs a) b) c) d) 29 Wh obs a) b) c) d) 30 If a reac will a) c)	two times the true error d) four times the true error	
a) b) c) d) 29 Wh obs a) b) c) d) 30 If a reac will a) c)	ich of the following errors can be eliminated by taking mean of both face	d
b) c) d) 29 Wh obs a) b) c) d) 30 If a reac will a) c)	ervations?	
c) d) 29 Wh obs a) b) c) d) 30 If a read will a) c)	error due to imperfect graduations	
d) 29 Wh obs a) b) c) d) 30 If a read will a) c)	error due to eccentricity of verniers	
29 Wh obs a) b) c) d) 30 If a read will a) c)	error due to imperfect adjustment of plate levels	
obs a) b) c) d) 30 If a read will a) c)	error due to line of collimation not being perpendicular to horizontal axis	
a) b) c) d) 30 If a read will a) c)	ich of the following errors cannot be eliminated by taking both face	d
b) c) d) 30 If a read will a) c)	ervations?	
c) d) 30 If a read will a) c)	error due to horizontal axis not being perpendicular to the vertical axis	
d) 30 If a read will a) c)	index error i.e. error due to imperfect adjustment of the vertical circle	
d) 30 If a read will a) c)	vernier	
30 If a read will a) c)	error due to non-parallelism of the axis of telescope level and line of	
30 If a read will a) c)	collimation	
reac will a) c)	none of the above	
will a) c)	tripod settles in the interval that elapses between taking a back sight	a
a) c)	ding and the following foresight reading, then the elevation of turning point	
c)	1	
,	increase b) decrease	
21 16 -	not change d) either 'a' or 'b'	
31   If a	ltitude bubble is provided both on index frame as well as on telescope of a	b
theo	odolite, then the instrument is levelled with reference to	
i)	altitude bubble on index frame	
theo	odolite, then the instrument is levelled with reference to	b

	ii) altitude bubble on index frame if it is to be used as a level	
	iii) altitude bubble on telescope	
	iv) altitude bubble on telescope if it is to be used as a level	
	The correct answer is	
	a) only (i) b) both (i) and (iv)	
	c) only (iii) d) both (ii) and (iii)	
32	A 'level line' is a	b
	a) horizontal line	
	b) line parallel to the mean spheriodal surface of earth	
	c) line passing through the center of cross hairs and the center of eye piece	
	d) line passing through the objective lens and the eye-piece of a dumpy or	
	tilting level	
33	The following sights are taken on a "turning point"	С
	a) foresight only b) backsight only	
	c) foresight and backsight d) foresight and intermediate sight	
34	The rise and fall method of levelling provides a complete check on	d
	a) backsight b) intermediate sight	
	c) foresight d) all of the above	
35	If the R.L. of a B.M. is 100.00 m, the back- sight is 1.215 m and the foresight	a
	is 1.870 m, the R.L. of the forward station is	
	a) 99.345 m b) 100.345 m	
	c) 100.655 m d) 101.870 m	
36	In an internal focussing type of telescope, the lens provided is	a
	a) concave b) convex c) plano-convex d) plano-concave	
37	Which of the following errors can be neutralised by setting the level midway	С
	between the two stations?	
	a) error due to curvature only	
	b) error due to refraction only	
	c) error due to both curvature and re-fraction	
	d) none of the above	

38	Height of instrument method of levelling is	c
	a) more accurate than rise and fall method	
	b) less accurate than rise and fall method	
	c) quicker and less tedious for large number of intermediate sights	
	d) none of the above	
39	The principle of working of an optical square is based on	d
	a) refraction b) reflection	
	c) double refraction d) double reflection	
40	Which of the following instrument s used for measurement of angles	С
	a) Geodimeter b) tellurometer c) sextant d) telescope	
41	The angle between two plane mirrors of an optical square should be	b
	a) $30^{0}$ b) $45^{0}$ c) $60^{0}$ d) $90^{0}$	
42	The rise and fall method	c
	a) is less accurate than height of instrument method	
	b) is not suitable for levelling with tilting levels	
	c) provides a check on the reduction of intermediate point levels	
	d) quicker and less tedious for large number of intermediate sights	
43	If the staff is not held vertical at a levelling station, the reduced level calculated	c
	from the observation would be	
	a) true R.L. b) more than true R.L.	
	c) less than true R.L. d) none of the above	
44	The difference between a level line and a horizontal line is that	a
	a) level line is a curved line while horizontal line is a straight line	
	b) level line is normal to plumb line while horizontal line may not be normal	
	to plumb line at the tangent point to level line	
	c) horizontal line is normal to plumb line while level line may not be normal	
	to the plumb line	
	d) both are same	
45	The sensitivity of a bubble tube can be increased by	a
	a) increasing the diameter of the tube	

	b) decreasing the length of bubble	
	c) increasing the viscosity of liquid	
	d) decreasing the radius of curvature of tube	
46	With the rise of temperature, the sensitivity of a bubble tube	a
	a) decreases b) increases	
	c) remains unaffected d) none of the above	
47	Refraction correction	b
	a) completely eliminates curvature correction	
	b) partially eliminates curvature correction	
	c) adds to the curvature correction	
	d) has no effect on curvature correction	
48	The R.L, of the point A which is on the floor is 100 m and back sight reading	d
	on A is 2.455 m. If the foresight reading on the point B which is on the ceiling	
	is 2.745 m, the R.L. of point B will be	
	a) 94.80 m b) 99.71 m c) 100.29 m d) 105.20 m	
49	The permissible limits of error in chaining for measurement on rough or hilly	a
	ground is	
	a) 1:2000 b) 1:1000 c) 1:500 d) 1:250	
50	The scale on which three dimensions can be measured is known as	d
	a) Plain scale b) diagonal scale	
	c) shrunk scale d) comparative scale	
51	The error due bad ranging is	b
	a) compensation b) cumulative positive	
	c) cumulative negative d) both (b) and (c)	
52	The following staff readings were taken with a level, the instrument having	b
	been moved after	
	third and sixth reading:	
	2.200, 1.620, 0.980, 2.250, 2.840, 1.280, 0.600, 1.960, 1.450	
	If RL of first point is 100.00 m. then RL of last point is-	
	a) 101.350 b) 101.340 c) 101.430 d) 100.340	

53	Sensitiveness of a level tube is designated by	a
	a) radius of level tube b) length of level tube	
	c) length of bubble of level tube d) none of the above	
54	Which of the following statements is incorrect?	d
	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.	
55	Dumpy level is most suitable when	С
	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	
56	The difference of levels between two stations A and B is to be determined. For	a
	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	
57	Contour interval is	a
	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	
58	An imaginary line lying throughout the surface of ground and preserving a	d
	constant inclination to the horizontal is known as	
	a) contour line b) horizontal equivalent	
	c) contour interval d) contour gradient	
	The suitable contour interval for a map with scale 1: 10000 is	a

	a) 2 m b) 5m c) 10 m d) 20 m	
59	Select the correct statement.	c
	a) A contour is not necessarily a closed curve.	
	b) A contour represents a ridge line if the concave side of lower value	
	contour lies towards the higher value contour.	
	c) Two contours of different elevations do not cross each other except in case	
	of an overhanging cliff.	
	d) All of the above statements are correct.	
60	A series of closely spaced contour lines represents a	a
	a) steep slope b) gentle slope	
	c) uniform slope d) plane surface	
61	Direct method of contouring is	c
	a) a quick method b) adopted for large surveys only	
	c) most accurate method d) suitable for hilly terrains	
62	If the smallest division of a vernier is longer than the smallest division of its	d
	primary scale, the vernier is known as	
	a) Direct vernier b) double vernier	
	c) simple vernier d) retrograde vernier	
63	The maximum allowable limit upto that a measurement may vary from the true	С
	value is known as	
	a) permissible error b) residual error	
	c) expected error d) safe error	
64	Generally while chaining, the arrow which accompany with one chain must be	b
	a) 3 nos. b) 5 nos. c) 10 nos. d) 12 nos.	
65	As per Indian standard, the length of one link in 30 metre chain should be	a
	a) 20 cm b) 30 cm c) 40 cm d) 10 cm	
66	In direct method of contouring, the process of locating or identifying points	d
	lying on a contour is called	
	a) ranging b) centring	
	c) horizontal control d) vertical control	

67	In the cross-section method of indirect contouring, the spacing of cross-	d
	sections depends upon	
	i) contour interval	
	ii) scale of plan	
	iii) characteristics of ground	
	The correct answer is	
	a) only (i) b) (i) and (ii) c) (ii) and (iii) d) (i), (ii) and (iii)	
68	Which of the following methods of con-touring is most suitable for a hilly	d
	terrain?	
	a) direct method b) square method	
	c) cross-sections method d) tacheometric method	
69	Select the correct statement.	a
	a) Contour interval on any map is kept constant.	
	b) Direct method of contouring is cheaper than indirect method.	
	c) Inter-visibility of points on a contour map cannot be ascertained.	
	d) Slope of a hill cannot be determined with the help of contours.	
70	Closed contours, with higher value inwards, represent a	b
	a) depression b) hillock	
	c) plain surface d) none of the above	
71	Contour interval is	a
	a) the vertical distance between two consecutive contours	
	b) the horizontal distance between two consecutive contours	
	c) the vertical distance between two points on same contour	
	d) the horizontal distance between two points on same contour	
72	Benchmark is established by	С
	a) hypsometry b) barometric levelling	
	c) spirit leveling d) trigonometrical levelling	
73	The type of surveying which requires least office work is	С
	a) tacheometry b) trigonometrical levelling	
	c) plane table surveying d) theodolite surveying	

74	Intersection method of detailed plotting is most suitable for	c
	a) forests b) urban areas c) hilly areas d) plains	
75	If in a closed traverse, the sum of the north latitudes is more than the sum of	b
	the south latitudes and also the sum of west departures is more than the sum of	
	the east departures, the bearing of the closing line is in the	
	a) NE quadrant b) SE quadrant	
	c) NW quadrant d) SW quadrant	

## **4.Strength of Materials**

S.N.	Question with options	Answer
1	If all the dimensions of a prismatic bar are doubled, then the maximum stress	С
	produced in it under its own weight will	
	a) decrease b) remain unchanged	
	c) increase to two times d) increase to four times	
2	The elongation of a conical bar under its own weight is equal to	С
	a) that of a prismatic bar of same length	
	b) one half that of a prismatic bar of same length	
	c) one third that of a prismatic bar of same length	
	d) one fourth that of a prismatic bar of same length	
3	If a material has identical properties in all directions, it is said to be	b
	a) homogeneous b) isotropic c) elastic d) orthotropic	
4	Two bars of different materials are of the same size and are subjected to same	a
	tensile forces. If the bars have unit elongations in the ratio of 4:7, then the	
	ratio of moduli of elasticity of the two materials is	
	a) 7:4 b) 4:7 c) 4:17 d) 16:49	
5	If a composite bar of steel and copper is heated, then the copper bar will be	b
	under	
	a) tension b) compression c) shear d) torsion	
6	Effective length of a weld is equal to	С
	a) overall length - weld size b) overall length - throat thickness	
	c) overall length - 2 x weld size d) overall length - 2 x throat thickness	
7	Size of a right angled fillet weld is given by	b
	a) 0.707 x throat thickness b) 0.414 x throat thickness	
	c) 2.0 x throat thickness d) throat thickness	
8	The effective length of a fillet weld designed to transmit axial load shall not be	b
	less than	
	a) 2 x size of weld b) 4 x size of weld	

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

	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	a
	p is	
	a) p b) p/2 c) zero d) none of these	
17	Shear stress on principal planes is	a
	a) zero b) maximum c) minimum d) none of these	
18	The state of pure shear stress is produced by	a
	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	
19	According to Rankine's hypothesis, the criterion of failure of a brittle material	a
	is	
	a) maximum principal stress b) maximum shear stress	
	c) maximum strain energy d) maximum shear strain energy	
20	Maximum bending moment in a beam occurs where	d
	a) deflection is zero b) shear force is maximum	
	c) shear force is minimum d) shear force changes sign	
21	Rate of change of bending moment is equal to	d
	a) shear force b) deflection c) slope d) rate of loading	
22	The diagram showing the variation of axial load along the span is called	a
	a) shear force diagram b) bending moment diagram	
	c) thrust diagram d) influence line diagram	
23	The difference in ordinate of the shear curve between any two sections is equal	d
	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	

24	The variation of the bending moment in the portion of a beam carrying linearly	c
	varying load is	
	a) linear b) parabolic c) cubic d) constant	
25	The maximum bending moment due to a moving load on a fixed ended beam	a
	occurs	
	a) at a support b) always at the midspan	
	c) under the load only d) none of the above	
26	A cantilever beam AB of length 1 carries a concentrated load W at its midspan	a
	C. If the free end B is supported on a rigid prop, then there is a point of	
	contraflexure	
	a) between A and C	
	b) between C and B	
	c) one between A and C and other between C and B	
	d) nowhere in the beam	
27	A prismatic beam fixed at both ends carries a uniformly distributed load. The	d
	ratio of bending moment at the supports to the bending moment at mid-span is	
	a) 0.5 b) 1.0 c) 1.5 d) 2.0	
28	A beam of overall length 1 with equal overhangs on both sides carries a	c
	uniformly distributed load over the entire length. To have numerically equal	
	bending moments at centre of the beam and at supports, the distance between	
	the supports should be	
	a) 0.2771 b) 0.403 1 c) 0.5861 d) 0.7071	
29	A prismatic beam of length 1 and fixed at both ends carries a uniformly	b
	distributed load. The distance of points of contraflexure from either end is	
	a) 0.207 1 b) 0.211 1 c) 0.277 1 d) 0.25 1	
30	A portion of a beam between two sections is said to be in pure bending when	a
	there is	
	a) constant bending moment and zero shear force	
	b) constant shear force and zero bending moment	
	c) constant bending moment and constant shear force	

	d) none of the above	
31	Of the several prismatic beams of equal lengths, the strongest in flexure is the	b
	one having maximum	
	a) moment of inertia b) section modulus	
	c) tensile strength d) area of cross-section	
32	Of the two prismatic beams of same material, length and flexural strength, one	a
	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	
33	A flitched beam consists of a wooden joist 150 mm wide and 300 mm deep	d
	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	
34	A beam of rectangular cross-section is 100 mm wide and 200 mm deep. If the	d
	section is subjected to a shear force of 20 kN, then the maximum shear stress in	
	the section is	
	a) 1 N/mm <sup>2</sup> b) 1.125 N/mm <sup>2</sup> c) 1.33 N/mm <sup>2</sup> d) 1.5 N/mm <sup>2</sup>	
35	A beam of square cross-section with side 100 mm is placed with one diagonal	b
	vertical. If the shear force acting on the section is 10 kN, the maximum shear	
	stress is	
	a) 1 N/mm <sup>2</sup> b) 1.125 N/mm <sup>2</sup> c) 2 N/mm <sup>2</sup> d) 2.25 N/mm <sup>2</sup>	
36	A prismatic bar when subjected to pure bending assumes the shape of	d
	a) catenary b) cubic parabola	
	c) quadratic parabola d) arc of a circle	
37	A beam of triangular cross section is placed with its base horizontal. The	c
	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	

38	A beam of uniform strength has at every cross-section same	b
	a) bending moment b) bending stress	
	c) deflection d) stiffness	
39	For no torsion, the plane of bending should	b
	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	
40	Two beams, one of circular cross-section and other of square cross-section,	b
	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	
41	The portion, which should be removed from top and bottom of a circular cross	c
	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	
42	A beam of overall length / rests on two simple supports with equal overhangs	a
	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 1 b) 0.207 1 c) 0.252 1 d) 0.277 1	
43	A beam ABC rests on simple supports at A and B with BC as an overhang. D	a
	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	

	C in the second case	
	d) deflection at D in the first case will always be greater than the deflection at	
	C in the second case	
44	If the deflection at the free end of a uniformly loaded cantilever beam is 15mm	b
	and the slope of the deflection curve at the free end is 0.02 radian, then the	
	length of the beam is	
	a) 0.8 m b) 1.0 m c) 1.2 m d) 1.5m	
45	If the deflection at the free end of a uniformly loaded cantilever beam of length	c
	1 m is equal to 7.5 mm, then the slope at the free end is	
	a) 0.01 radian b) 0.015 radian	
	c) 0.02 radian d) none of the above	
46	A cantilever beam carries a uniformly distributed load from fixed end to the	d
	centre of the beam in the first case and a uniformly distributed load of same	
	intensity from centre of the beam to the free end in the second case. The ratio	
	of deflections in the two cases is	
	a) ½ b) 3/11 c) 5/24 d) 7/41	
47	If the length of a simply supported beam carrying a concentrated load at the	c
	centre is doubled, the defection at the centre will become	
	a) two times b) four times c) eight times d) sixteen times	
48	A simply supported beam with rectangular cross-section is subjected to a	d
	central concentrated load. If the width and depth of the beam are doubled, then	
	the deflection at the centre of the beam will be reduced to	
	a) 50 % b) 25 % c) 12.5 % d) 6.25 %	
49	A laminated spring is given an initial curvature because	c
	a) it is more economical	
	b) it gives uniform strength	
	c) spring becomes flat when it is subjected to design load	
1		
	d) none of the above	
50	A laminated spring is supported at	b

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

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

## **5.**Theory of Structures

S.N.	Question with options	Answer
1	Principle of superposition is applicable when	a
	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	
2	The number of independent equations to be satisfied for static equilibrium of	С
	a plane structure is	
	a) 1 b) 2 c) 3 d) 6	
3	Muller Breslau's principle for obtaining influence lines is applicable	a
	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)	
4	A load 'W is moving from left to right support on a simply supported beam	c
	of span T. The maximum bending moment at 0.4 1 from the left support is	
	a) 0.16 Wl b) 0.20 Wl c) 0.24 Wl d) 0.25 Wl	
5	Degree of static indeterminacy of a rigid-jointed plane frame having 15	c
	members, 3 reaction components and 14 joints is	
	a) 2 b) 3 c) 6 d) 8	
6	Independent displacement components at each joint of a rigid-jointed plane	b
	frame are	
	a) three linear movements	

	b) two linear movements and one rotation	
	c) one linear movement and two rotations	
	d) three rotations	
7	If in a pin-jointed plane frame $(m + r) > 2j$ , then the frame is	b
	a) stable and statically determinate	
	b) stable and statically indeterminate	
	c) unstable	
	d) none of the above	
	where m is number of members, r is reaction components and j is number of	
	joints	
8	A pin-jointed plane frame is unstable if	a
	a) $(m+r) < 2j$ b) $m+r = 2j$	
	c) $(m+r) > 2j$ d) none of the above	
	where m is number of members, r is reaction components and j is number of	
	joints	
9	A rigid-jointed plane frame is stable and statically determinate if	c
	a) $(m+r) = 2j$ b) $(m+r) = 3j$	
	c) $(3m + r) = 3j$ d) $(m + 3r) = 3j$	
	where m is number of members, r is reaction components and j is number of	
	joints	
10	The number of independent equations to be satisfied for static equilibrium in	d
	a space structure is	
	a) 2 b) 3 c) 4 d) 6	
11	The degree of static indeterminacy of a pin-jointed space frame is given by	b
	a) $m+r-2j$ b) $m+r-3j$ c) $3m+r-3j$ d) $m+r+3j$	
	where m is number of unknown member forces, r is unknown reaction	
	components and j is number of joints	
12	The degree of static indeterminacy of a rigid-jointed space frame is	d
	a) $m+r-2j$ b) $m+r-3j$ c) $3m+r-3j$ d) $6m+r-6j$	
	where m, r and j have their usual meanings	

13	The deflection at any point of a perfect frame can be obtained by applying a	d
	unit load at the joint in	
	a) vertical direction b) horizontal direction	
	c) inclined direction d) the direction in which the deflection is required	
14	The number of independent displacement components at each joint of a	d
	rigid-jointed space frame is	
	a) 1 b) 2 c) 3 d) 6	
15	If in a rigid-jointed space frame, $(6m + r) < 6j$ , then the frame is	a
	a) unstable b) stable and statically determinate	
	c) stable and statically indeterminate d) none of the above	
16	The principle of virtual work can be applied to elastic system by considering	c
	the virtual work of	
	a) internal forces only b) external forces only	
	c) internal as well as external forces d) none of the above	
17	Castigliano's first theorem is applicable	c
	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	
18	Principle of superposition is applicable when	a
	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	
19	In moment distribution method, the sum of distribution factors of all the	c
	members meeting at any joint is always	
	a) zero b) less than 1 c) 1 d) greater than 1	
20	The carryover factor in a prismatic member whose far end is fixed is	b
	a) 0 b) ½ c) ¾ d) 1	

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

	1) 41	
	b) there is no settlement of supports	
	c) there is no discontinuity such as hinges within the span	
	d) the spans are equal	
27	While using three moments equation, a fixed end of a continuous beam is	a
	replaced by an additional span of	
	a) zero length b) infinite length	
	c) zero moment of inertia d) none of the above	
28	The Castigliano's second theorem can be used to compute deflections	b
	a) in statically determinate structures only	
	b) for any type of structure	
	c) at the point under the load only	
	d) for beams and frames only	
29	Bending moment at any section in a conjugate beam gives in the actual beam	c
	a) slope b) curvature c) deflection d) bending moment	
30	For a two-hinged arch, if one of the supports settles down vertically, then the	c
	horizontal thrust	
	a) is increased b) is decreased	
	c) remains unchanged d) becomes zero	
31	For a symmetrical two hinged parabolic arch, if one of the supports settles	b
	horizontally, then the horizontal thrust	
	a) is increased b) is decreased	
	c) remains unchanged d) becomes zero	
32	A single rolling load of 8 kN rolls along a girder of 15 m span. The absolute	c
	maximum bending moment will be	
	a) 8 kN.m b) 15 kN.m c) 30 kN.m d) 60 kN.m	
33	The maximum bending moment due to a train of wheel loads on a simply	b
	supported girder	
	a) always occurs at center of span	
	b) always occurs under a wheel load	
	c) never occurs under a wheel load	

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  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  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	
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<ul> <li>a) the center of gravity of the load system is midway between the center of span and wheel load under consideration</li> <li>b) the center of span is midway between the center of gravity of the load system and the wheel load under consideration</li> <li>c) the wheel load under consideration is midway between the center of span and the center of gravity of the load system</li> </ul>	36	When a series of wheel loads crosses a simply supported girder, the	b
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span and the center of gravity of the load system		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		d) none of the above	
Which of the following is not the displacement method?	37	Which of the following is not the displacement method?	b
a) Equilibrium method b) Column analogy method		a) Equilibrium method b) Column analogy method	
c) Moment distribution method d) Kani's method		c) Moment distribution method d) Kani's method	
38 Study the following statements. d	38	Study the following statements.	d
i) The displacement method is more useful when degree of kinematic		i) The displacement method is more useful when degree of kinematic	
		indeterminacy is greater than the degree of static indeterminacy.	

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

42	Effects of shear force and axial force on plastic moment capacity of a	d
	structure are respectively to	
	a) increase and decrease b) increase and increase	
	c) decrease and increase d) decrease and decrease	
43	Which of the following methods of structural analysis is a force method?	b
	a) slope deflection method b) column analogy method	
	c) moment distribution method d) none of the above	
44	Which of the following methods of structural analysis is a displacement	a
	method?	
	a) moment distribution method b) column analogy method	
	c) three moment equation d) none of the above	
45	In the displacement method of structural analysis, the basic unknowns are	a
	a) displacements b) force	
	c) displacements and forces d) none of the above	
46	The fixed support in a real beam becomes in the conjugate beam a	d
	a) roller support b) hinged support	
	c) fixed support d) free end	
47	When a load crosses a through type Pratt truss in the direction left to right,	a
	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	
48	Consider the following statements: Sinking of an intermediate support of a	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) 1 and 4 are correct b) 1 and 3 are correct	
	c) 2 and 3 are correct d) 2 and 4 are correct	
49	Muller Breslau's principle for obtaining influence lines is applicable	a
	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)	
50	For a single point load W moving on a symmetrical three hinged parabolic	a
	arch of span L, the maximum sagging moment occurs at a distance x from	
	ends. The value of x is	
	a) 0.211 L b) 0.25 L c) 0.234 L d) 0.5 L	
51	The deformation of a spring produced by a unit load is called	b
	a) stiffness b) flexibility	
	c) influence coefficient d) unit strain	
52	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	a
	model of the beam if the model is subjected to a 1 kN load at its center?	
	a) 5 mm b) 0.5 mm c) 0.05 mm d) 0.005mm	
53	The width of the analogous column in the method of column analogy is	b
23	a) 2/EI b) 1/EI c) 1/2 EI d) 1/4 EI	
54	The fixed support in a real beam becomes in the conjugate beam a	d
	a) roller support b) hinged support	
	c) fixed support d) free end	
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56	Which of the following methods of structural analysis is a displacement	a
	method	
	a) moment distribution method b) column analogy method	
	c) three moment equation d) none of the above	
57	Effects of shear force and axial force on plastic moment capacity of a	d
	structure are respectively to	
	a) increase and decrease b) increase and increase	
	c) decrease and increase d) decrease and decrease	
58	Degree of kinematic indeterminacy of a pin-jointed plane frame is given by	a
	a) $2j-r$ b) $j-2r$ c) $3j-r$ d) $2j+r$	
59	For a two-hinged arch, if one of the supports settles down vertically, then the	b
	horizontal	
	a) is increased b) is decreased	
	c) remains unchanged d) becomes zero	
60	The principle of virtual work can be applied to elastic system by considering	c
	the virtual work of	
	a) internal forces only b) external forces only	
	c) internal as well as external forces d) none of the above	
61	In moment distribution method, the sum of distribution factors of all the	c
	members meeting at any joint is always	
	a) zero b) less than 1 c) 1 d) greater than 1	

## **6.Concrete Structures**

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

8	Air entrainment in the concrete increases	a
	a) workability b) strength	
	c) the effects of temperature variations d) the unit weight	
9	Workability of concrete is inversely proportional to	a
	a) time of transit b) water-cement ratio	
	c) the air in the mix d) size of aggregate	
10	Select the incorrect statement	d
	a) Lean mixes bleed more as compared to rich ones.	
	b) Bleeding can be minimized by adding pozzuolana finer aggregate.	
	c) Bleeding can be increased by addition 'of calcium chloride.	
	d) none of the above	
11	In testing of fresh concrete to check the	c
	workability, the test which is carried out	
	with the apparatus which is shown in the	
	figure is called as-	
	(a) Flow table test	
	(b) compaction factor test	
	(c) Slump cone test	
	(d) crushing concrete test	
12	Poisson's ratio for concrete	b
	a) remains constant b) increases with richer mixes	
	c) decreases with richer mixes d) none of the above	
13	1% of voids in a concrete mix would reduce its strength by about	a
	a) 5 % b) 10 % c) 15 % d) 20 %	
14	The fineness modulus of fine aggregate is in the range of	a
	a) 2.0 to 3.5 b) 3.5 to 5.0 c) 5.0 to 7.0 d) 6.0 to 8.5	
15	The factor of safety for	b
	a) steel and concrete are same	
	b) steel is lower than that for concrete	
	c) steel is higher than that for concrete	
	I .	

	d) none of the above	
16	Examine the following statements:	b
	i) Factor of safety for steel should be based on its yield stress,	
	ii) Factor of safety for steel should be based on its ultimate stress,	
	iii) Factor of safety for concrete should be based on its yield stress,	
	iv) Factor of safety for concrete should be based on its ultimate stress.	
	The correct statements are	
	a) (i) and (iii) b) (i) and (iv) c) (ii) and (iii) d) (ii) and (iv)	
17	For a reinforced concrete section, the shape of shear stress diagram is	c
	a) wholly parabolic	
	b) wholly rectangular	
	c) parabolic above neutral axis and rectangular below neutral axis	
	d) rectangular above neutral axis and parabolic below neutral axis	
18	Diagonal tension in a beam	c
	a) is maximum at neutral axis	
	b) decreases below the neutral axis and increases above the neutral axis	
	c) increases below the neutral axis and decreases above the neutral axis	
	d) remains same	
19	If the depth of actual neutral axis in a beam is more than the depth of critical	С
	neutral axis, then the beam is called	
	a) balanced beam b) under-reinforced beam	
	c) over-reinforced beam d) none of the above	
20	If the permissible stress in steel in tension is 140 N/mm <sup>2</sup> , then the depth of	b
	neutral axis for a singly reinforced rectangular balanced section will be	
	a) 0.35 d b) 0.40 d	
	c) 0.45 d d) dependent on grade of concrete also	
21	Minimum grade of concrete to be used in reinforced concrete as per IS:456-	a
	1978 is	
	a) M15 b) M20 c) M 10 d) M25	
22	For concreting of heavily reinforced sections without vibration, the	d

	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	c
	concrete is	
	a) 28 litres b) 30 litres c) 32 litres d) 34 litres	
24	According to IS: 456-1978, the flexural strength of concrete is	c
	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	
25	According to IS: 456-1978, the column or the strut is the member whose	c
	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	
26	According to IS: 456-1978, minimum slenderness ratio for a short column	a
	is	
	a) less than 12 b) less than 18	
	c) between 18 and 24 d) more than 24	
27	The minimum cover in a slab should neither be less than the diameter of bar	b
	nor less than	
	a) 10 mm b) 15 mm c) 25 mm d) 13 mm	
28	For a longitudinal reinforcing bar in a column, the minimum cover shall	d
	neither be less than the diameter of bar nor less than	
	a) 15 mm b) 25 mm c) 30 mm d) 40 mm	
29	The ratio of the diameter of reinforcing bars and the slab thickness is	d
	a) ½ b) 1/5 c) 1/6 d) 1/8	
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?	d
	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 pro-vided in a circular column should	
	not be less than four.	
32	Which of the following statements is incorrect?	d
	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	
33	Minimum pitch of transverse reinforcement in a column is	d
	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	
34	Maximum distance between expansion joints in structures as per IS : 456 -	c
	1978 is	
	a) 20 m b) 30 m c) 45 m d) 60 m	
35	A continuous beam is deemed to be a deep beam when the ratio of effective	c
	span to overall depth (1/D) is less than	
	a) 1.5 b) 2.0 c) 2.5 d) 3.0	
36	Critical section for shear in case of flat slabs is at a distance of	b
	a) effective depth of slab from periphery of column/drop panel	
	b) d/2 from periphery of column/capital/ drop panel	

	c) at the drop panel of slab	
	d) at the periphery of column	
37	Minimum thickness of load bearing RCC wall should be	b
	a) 50 mm b) 100 mm c) 150 mm d) 200 mm	
38	In reinforced concrete footing on soil, the minimum thickness at edge should	b
	not be less than	
	a) 100 mm b) 150 mm c) 200 mm d) 250 mm	
39	The slab is designed as one way if the ratio of long span to short span is	d
	a) less than 1 b) between 1 and 1.5	
	c) between 1.5 and 2 d) greater than 2	
40	A higher modular ratio shows	b
	a) higher compressive strength of concrete	
	b) lower compressive strength of concrete	
	c) higher tensile strength of steel	
	d) lower tensile strength of steel	
41	The average permissible stress in bond for plain bars in tension is	b
	a) increased by 10 % for bars in compression	
	b) increased by 25 % for bars in compression	
	c) decreased by 10 % for bars in compression	
	d) decreased by 25 % for bars in compression	
42	The main reason for providing number of reinforcing bars at a support in a	c
	simply supported beam is to resist in that zone	
	a) compressive stress b) shear stress	
	c) bond stress d) tensile stress	
43	When shear stress exceeds the permissible limit in a slab, then it is reduced	a
	by	
	a) increasing the depth b) providing shear reinforcement	
	c) using high strength steel d) using thinner bars but more in number	
44	For a slab supported on its four edges with corners held down and loaded	a
	uniformly, the Marcus correction factor to the moments obtained by	

	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	c
	given by	
	a) 0.15 % to 2 % b) 0.8 % to 4 %	
	c) 0.8 % to 6 % d) 0.8 % to 8 %	
46	The minimum diameter of longitudinal bars in a column is	c
	a) 6 mm b) 8 mm c) 12 mm d) 16 mm	
47	The minimum cover to the ties or spirals should not be less than	c
	a) 15 mm b) 20 mm c) 25 mm d) 50mm	
48	The load carrying capacity of a helically reinforced column as compared to	c
	that of a tied column is about	
	a) 5 % less b) 10 % less c) 5 % more d) 10 % more	
49	The diameter of ties in a column should be	d
	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	
50	Due to circumferential action of the spiral in a spirally reinforced column	d
	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	
51	Which of the following R.C. retaining walls is suitable for heights beyond	c
	6m?	
	a) L-shaped wall b) T-shaped wall	
	c) counterfort type d) all of the above	
52	In counterfort type retaining walls	a
	i) the vertical slab is designed as a continuous slab	

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

	c) one end fixed and other end hinged	
	d) one end fixed and other end free	
57	According to ISI recommendations, the maximum depth of stress block for	a
	balanced section of a beam of effective depth d is	
	a) 0.43 d b) 0.55 d c) 0.68 d d) 0.85 d	
58	The effect of creep on modular ratio is	b
	a) to decrease it b) to increase it	
	c) either to decrease or to increase it d) to keep it unchanged	
59	In symmetrically reinforced sections, shrinkage stresses in concrete and steel	b
	are respectively	
	a) compressive and tensile b) tensile and compressive	
	c) both compressive d) both tensile	
60	A beam curved in plan is designed for	d
	a) bending moment and shear b) bending moment and torsion	
	c) shear and torsion d) bending moment, shear and torsion	
61	Increase in the moisture content in concrete	a
	a) reduces the strength b) increases the strength	
	c) does not change the strength d) all of these	

## 7. Steel Structures

S.N.	Question with options	Answer
1	The best arrangement to provide unified behavior in built up steel columns is	a
	by	
	a) lacing b) battening	
	c) tie plates d) perforated cover plates	
2	If the 20 mm rivets are used in lacing bars, then the minimum width of lacing	b
	bar should be	
	a) 40 mm b) 60 mm c) 80 mm d) 100 mm	
3	The use of tie plates in laced columns is	с
	a) prohibited	
	b) not prohibited	
	c) permitted at start and end of lacing system only	
	d) permitted between two parts of the lacing	
4	Lacing bars in a steel column should be designed to resist	b
	a) bending moment due to 2.5% of the column load	
	b) shear force due to 2.5% of the column load	
	c) 2.5% of the column load	
	d) both (a) and (b)	
5	Angle of inclination of the lacing bar with the longitudinal axis of the column	С
	should preferably be between	
	a) 10° to 30° b) 30° to 40° c) 40° to 70° d) 90°	
6	The effective length of a battened column is increased by	b
	a) 5 % b) 10 % c) 15 % d) 20 %	
7	Battening is preferable when the	С
	i) column carries axial load only	
	ii) space between the two main components is not very large	
	iii) column is eccentrically loaded The correct answer is	
	a) only (i) b) only (iii) c) (i) and (ii) d) (ii) and (iii)	

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

16	As per IS: 800, for compression flange, the out stand of flange plates should	b
	not exceed	
	a) 12 t b) 16 t c) 20 t d) 25 t	
	where t = thickness of thinnest flange plate	
17	Intermediate vertical stiffeners in a plate girder need be provided if the depth of	b
	web exceeds	
	a) 50 t b) 85 t c) 200 t d) 250 t	
	where t is thickness of web	
18	Bearing stiffener in a plate girder is used to	b
	a) transfer the load from the top flange to the bottom one	
	b) prevent buckling of web	
	c) decrease the effective depth of web	
	d) prevent excessive deflection	
19	The forces acting on the web splice of a plate girder are	c
	a) axial forces b) shear and axial forces	
	c) shear and bending forces d) axial and bending forces	
20	Gantry girders are designed to resist	c
	a) lateral loads	
	b) longitudinal loads and vertical loads	
	c) lateral, longitudinal and vertical loads	
	d) lateral and longitudinal loads	
21	Minimum spacing of vertical stiffeners is limited to	b
	a) d/4 b) d/3 c) d/2 d) 2d/3	
	where d is the distance between flange angles	
22	Bearing stiffeners are provided at	c
	i) the supports	
	ii) the mid span	
	iii) the point of application of concentrated loads The correct answer is	
	a) only (i) b) both (i) and (ii)	
	c) both (i) and (iii) d) (i), (ii) and (iii)	

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

32	The centrifugal force due to curvature of track is assumed to act on the bridge	c
	at a height of	
	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	
33	The effect of racking forces is considered in the design of	a
	i) lateral braces	
	ii) chord members	
	The correct answer is	
	a) only (i) b) only (ii)	
	c) both (i) and (ii) d) none of these	
34	The portal bracing in a truss bridge is used to	a
	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	
35	Study the following statements.	b
	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.	
	The correct answer is	
	a) only (i) b) both (i) and (ii)	
	c) both (i) and (iii) d) all (i), (ii) and (iii)	
36	The elastic strain for steel is about	c
	a) 1/12 of strain at the initiation of strain hardening and about 1/120 of maxi-	
	mum strain	
	b) 1/2 of strain at the initiation of strain hardening and about 1/12 of maxi-	
	mum 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	

	maximum strain	
37	The mechanism method and the statical method give	b
	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	
38	Shape factor is a property which depends	С
	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	
39	The mechanism method of plastic analysis satisfies	a
	a) equilibrium and mechanism conditions	
	b) equilibrium and plastic moment conditions	
	c) mechanism and plastic moment conditions	
	d) equilibrium condition only	
40	Load factor is	С
	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	
41	To minimise the total cost of a roof truss, the ratio of the cost of truss to the	a
	cost of purlins shall be	
	a) 1 b) 2 c) 3 d) 4	
42	Generally the purlins are placed at the panel points so as to avoid	d
	a) axial force in rafter b) shear force in rafter	
	c) deflection of rafter d) bending moment in rafter	
43	For the buildings having a low permeability, the internal wind pressure acting	b
	normal to the wall and roof surfaces is taken as	
	a) zero b) $\pm 0.2 \text{ p}$ c) $\pm 0.5 \text{ p}$ d) $\pm 0.7 \text{ p}$	

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

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

		has been divi	ded into			
		a) 4 zones	b) 5 zones	c) 6 zones	d) 7 zones	
(	61	The number of	of seismic zones in w	hich the country ha	s been divided are	b
		a) 3	b) 5	c) 6	d) 7	

## 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	С
	a) Dynamics b) Kinetics c) Hydraulics d) Pneumatics	
2	The viscosity of a gas	c
	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	
3	Newton's law of viscosity relates	b
	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	
4	Centre of buoyancy always	b
	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	
5	Metacentric height for small values of angle of heel is the distance between the	b
	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	
6	A floating body is said to be in a state of stable equilibrium	b
	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	

The increase in metacentric height	b
i) increases stability	
ii) decreases stability	
iii) increases comfort for passengers	
iv) decreases comfort for passengers	
The correct answer is	
a) (i) and (iii) b) (i) and (iv) c) (ii) and (iii) d) (ii) and (iv)	
The point in the immersed body through which the resultant pressure of the	c
liquid may be taken to act is known as	
a) center of gravity b) center of buoyancy	
c) center of pressure d) metacentre	
If a vessel containing liquid moves downward with a constant acceleration	a
equal to 'g' then	
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	
When a liquid rotates at a constant angular velocity about a vertical axis as a	b
rigid body, the pressure intensity varies	
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	
A right circular cylinder open at the top is filled with liquid and rotated about	a
its vertical axis at such a speed that half the liquid spills out, then the pressure	
intensity at the center of bottom is	
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	
	i) increases stability ii) decreases comfort for passengers iv) decreases comfort for passengers The correct answer is a) (i) and (iii) b) (i) and (iv) c) (ii) and (iii) d) (ii) and (iv) The point in the immersed body through which the resultant pressure of the liquid may be taken to act is known as a) center of gravity b) center of buoyancy c) center of pressure d) metacentre  If a vessel containing liquid moves downward with a constant acceleration equal to 'g' then 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  When a liquid rotates at a constant angular velocity about a vertical axis as a rigid body, the pressure intensity varies 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 square of the radial distance 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 a) zero b) one-fourth its value when cylinder was full c) one-half its value when cylinder was full

12	The horizontal component of force on a curved surface is equal to the	b
	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	
13	A closed tank containing water is moving in a horizontal direction along a	b
	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	
	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?	
	a) (i) and (ii) b) (i) and (iv) c) (ii) and (iii) d) (iii) and (iv)	
14	The eddy viscosity for turbulent flow is	С
	a) a function of temperature only b) a physical property of the fluid.	
	c) dependent on the flow d) independent of the flow	
15	A 20 mm Dam pipe forks one branch being	a
	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.	
	(a) $Q = 129.6 \text{ cm}3/\text{s}$ , $V = 0.413 \text{ m/s}$ (b) $Q = 192.6 \text{ cm}3/\text{s}$ , $V = 0.314 \text{ m/s}$	
	(c) $Q = 169.2 \text{ cm}3/\text{s}$ , $V = 0.134 \text{ m/s}$ (d) $Q = 291.6 \text{ cm}3/\text{s}$ , $V = 0.413 \text{ m/s}$	
16	Flow at constant rate through a tapering pipe is	b
	i) steady flow	
	ii) uniform flow	
	iii) unsteady flow	

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

	b) inversely proportional to its radial distance from the axis of rotation	
	c) inversely proportional to the square of its radial distance from the axis of	
	rotation	
	d) directly proportional to the square of its radial distance from the axis of	
	rotation	
24	Stream lines and path lines always coincide in case of	a
	a) steady flow b) laminar flow	
	c) uniform flow d) turbulent flow	
25	Equation of continuity is based on the principle of conservation of	a
	a) mass b) energy c) momentum d) none of these	
26	In steady flow of a fluid, the total acceleration of any fluid particle	a
	a) can be zero b) is never zero	
	c) is always zero d) is independent of coordinates	
27	The pitot tube is used to measure	b
	a) velocity at stagnation point b) stagnation pressure	
	c) static pressure d) dynamic pressure	
28	Hot wire anemometer is used to measure	b
	a) discharge b) velocity of gas	
	c) pressure intensity of gas d) pressure intensity of liquid	
29	The theoretical value of coefficient of contraction of a sharp edged orifice is	a
	a) 0.611 b) 0.85 c) 0.98 d) 1.00	
30	Which of the following is used to measure the discharge?	b
	a) current meter b) venturimeter	
	c) pitot tube d) hotwire anemometer	
31	Select the incorrect statement.	С
	a) The pressure intensity at vena contracta is atmospheric.	
	b) Contraction is least at vena contracta.	
	c) Stream lines are parallel throughout the jet at vena contracta.	
	d) Coefficient of contraction is always less than one.	
32	Size of a venturimeter is specified by	a

	a) pipe diameter	
	b) throat diameter	
	c) angle of diverging section	
	d) both pipe diameter as well as throat diameter	
33	Due to each end contraction, the discharge of rectangular sharp crested weir is	a
	reduced by	
	a) 5 % b) 10 % c) 15 % d) 20 %	
34	Which of the following is an incorrect statement?	d
	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.	
35	Coefficient of velocity of venturimeter	С
	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	
36	The pressure at the summit of a syphon is	b
	a) equal to atmospheric b) less than atmospheric	
	c) more than atmospheric d) none of the above	
37	A.V between two stream lines represents	b
	a) velocity b) discharge c) head d) pressure	
38	Coefficient of velocity for Borda's mouth piece running full is	b
	a) 0.611 b) 0.707 c) 0.855 d) 1.00	
39	Coefficient of discharge for a totally submerged orifice as compared to that for	a
	an orifice discharging free is	
	a) slightly less b) slightly more	
	c) nearly half d) equal	
40	The major loss of energy in long pipes is due to	d

	a) sudden enlargement	
	b) sudden contraction	
	c) gradual contraction or enlargement	
	d) friction	
41	Coefficient of contraction for an external cylindrical mouthpiece is	a
	a) 1.00 b) 0.855 c) 0.70 d) 0.611	
42	Which of the following has highest coefficient of discharge?	b
	a) sharp edged orifice b) venturimeter	
	c) Borda's mouthpiece running full d) Cipoletti weir	
43	Which of the following statements is correct?	a
	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.	
44	For a sphere of radius 15 cm moving with a uniform velocity of 2 m/sec	d
	through a liquid of specific gravity 0.9 and dynamic viscosity 0.8 poise, the	
	Reynolds number will be	
	a) 300 b) 337.5 c) 600 d) 675	
45	The shear stress distribution for a fluid flowing in between the parallel plates,	c
	both at rest, is	
	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	
46	If x is the distance from leading edge, then the boundary layer thickness in	a
	laminar flow varies as	
	a) x b) x c) x d) x/7	
47	Stanton diagram is a	a

	a) log-log plot of friction factor against Reynolds number	
	b) log-log plot of relative roughness against Reynolds number	
	c) semi-log plot of friction factor against Reynolds number	
	d) semi-log plot of friction factor against relative roughness	
48	The depth 'd' below the free surface at which the point velocity is equal to the	b
	average velocity of flow for a uniform laminar flow with a free surface, will be	
	a) 0.423 D b) 0.577 D c) 0.223 D d) 0.707 D	
	where D is the depth of flow.	
49	The distance y from pipe boundary, at which the point velocity is equal to	a
	average velocity for turbulent flow, is	
	a) 0.223 R b) 0.423 R c) 0.577 R d) 0.707 R	
	where R is radius of pipe.	
50	If a sphere of diameter 1 cm falls in castor oil of kinematic viscosity 10 stokes,	c
	with a terminal velocity of 1.5 cm/sec, the coefficient of drag on the sphere is	
	a) less than 1 b) between 1 and 100	
	c) 160 d) 200	
51	In case of an airfoil, the separation of flow occurs	a
	a) at the extreme rear of body	
	b) at the extreme front of body	
	c) midway between rear and front of body	
	d) anywhere between rear and front of body depending upon Reynolds	
	number	
52	When an ideal fluid flows past a sphere,	d
	a) highest intensity of pressure occurs around the circumference at right	
	angles to flow	
	b) lowest pressure intensity occurs at front stagnation point	
	c) lowest pressure intensity occurs at rear stagnation point	
	d) total drag is zero	
53	With the same cross-sectional area and immersed in same turbulent flow, the	a
	largest total drag will be on	

	a) a circular disc of plate held normal to flow	
	b) a sphere	
	c) a cylinder	
	d) a streamlined body	
54	In which of the following the friction drag is generally larger than pressure	d
	drag?	
	a) a circular disc or plate held normal to flow b) a sphere	
	c) a cylinder d) an airfoil	
55	For hydro-dynamically smooth boundary, the friction coefficient for turbulent	b
	flow is	
	a) constant	
	b) dependent only on Reynolds number	
	c) a function of Reynolds number and relative roughness	
	d) dependent on relative roughness only	
56	The value of friction factor 'f' for smooth pipes for Reynolds number 106 is	b
	approximately equal to	
	a) 0.1 b) 0.01 c) 0.001 d) 0.0001	
57	For laminar flow in a pipe of circular cross-section, the Darcy's friction factor f	с
	is	
	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	
58	Separation of flow occurs when	c
	a) the pressure intensity reaches a minimum	
	b) the cross-section of a channel is reduced	

	c) the boundary layer comes to rest	
	d) all of the above	
59	The ratio of average velocity to maximum velocity for steady laminar flow in	a
	circular pipes is	
	a) ½ b) 2/3 c) 3/2 d) 2	
60	The distance from pipe boundary, at which the turbulent shear stress is one-	a
	third die wall shear stress, is	
	a) 1/3 R b) 1/2 R c) 2/3 R d) 3/4R	
	Where R is the radius of pipe.	
61	The velocity distribution for laminar flow through a circular tube	c
	a) is constant over the cross-section	
	b) varies linearly from zero at walls to maximum at centre	
	c) varies parabolically with maximum at the centre	
	d) none of the above	

## 9. Geotechnical Engineering

S.N.	Question with options	Answer
1	One of the following scientists is associated with theory in soil Mechanics	b
	a) Marcel Dekker b) Karl Terzaghi	
	c) Finnemore d) Oosthuizen	
2	If the voids of a soil mass are full of air only, the soil is termed as	c
	a) air entrained soil b) partially saturated soil	
	c) dry soil d) dehydrated soil	
3	Select the correct statement.	d
	a) Unit weight of dry soil is greater than unit weight of wet soil.	
	b) For dry soils, dry unit weight is less than total unit weight.	
	c) Unit weight of soil increases due to submergence in water.	
	d) Unit weight of soil decreases due to submergence in water.	
4	Voids ratio of a soil mass can	С
	a) never be greater than unity b) be zero	
	c) take any value greater than zero d) take values between 0 and 1 only	
5	If the volume of voids is equal to the volume of solids in a soil mass, then the	c
	values of porosity and voids ratio respectively are	
	a) 1.0 and 0.0 b) 0.0 and 1.0 c) 0.5 and 1.0 d) 1.0 and 0.5	
6	When the degree of saturation is zero, the soil mass under consideration	b
	represents	
	a) one phase system	
	b) two phase system with soil and air	
	c) two phase system with soil and water	
	d) three phase system	
7	If the degree of saturation of a partially saturated soil is 60 %, then air content	a
	of the soil is	
	a) 40 % b) 60 % c) 80 % d) 100 %	
8	If the water content of a fully saturated soil mass is 100%, then the voids ratio	b

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

17	In hydrometer analysis for a soil mass	c
	a) both meniscus correction and dispersing agent correction are additive	
	b) both meniscus correction and dispersing agent correction are subtractive	
	c) meniscus correction is additive and dispersing agent correction is	
	subtractive	
	d) meniscus correction is subtractive and dispersing agent correction is	
	additive	
18	Which of the following is a measure of particle size range?	b
	a) effective size b) uniformity coefficient	
	c) coefficient of curvature d) none of the above	
19	Which of the following statements is correct?	d
	a) Uniformity coefficient represents the shape of the particle size distribution	
	curve.	
	b) For a well graded soil, both uniformity coefficient and coefficient of	
	curvature are nearly unity.	
	c) A soil is said to be well graded if it has most of the particles of about the	
	same size	
	d) none of the above	
20	Uniformity coefficient of a soil is	d
	a) always less than 1 b) always equal to 1	
	c) equal to or less than 1 d) equal to or greater than 1	
21	If the natural water content of soil mass lies between its liquid limit and plastic	1
	if the natural water content of son mass hes between its figure first and prastic	b
	limit, the soil mass is said to be in	b
		b
22	limit, the soil mass is said to be in	b
22	limit, the soil mass is said to be in  a) liquid state b) plastic state c) semi-solid state d) solid state	
22	limit, the soil mass is said to be in  a) liquid state b) plastic state c) semi-solid state d) solid state  When the plastic limit of a soil is greater than the liquid limit, then the	
22	limit, the soil mass is said to be in  a) liquid state b) plastic state c) semi-solid state d) solid state  When the plastic limit of a soil is greater than the liquid limit, then the plasticity index is reported as	
	limit, the soil mass is said to be in  a) liquid state b) plastic state c) semi-solid state d) solid state  When the plastic limit of a soil is greater than the liquid limit, then the plasticity index is reported as  a) negative b) zero c) non-plastic d) 1	b

	c) liquidity index to flow index	
	d) consistency index to liquidity index	
24	If the plasticity index of a soil mass is zero, the soil is	a
	a) sand b) silt c) clay d) clayey silt	
25	The admixture of coarser particles like sand or silt to clay causes	С
	a) decrease in liquid limit and increase in plasticity index	
	b) decrease in liquid limit and no change in plasticity index	
	c) decrease in both liquid limit and plasticity index	
	d) increase in both liquid limit and plasticity index	
26	Select the correct statement.	b
	a) A uniform soil has more strength and stability than a non-uniform soil.	
	b) A uniform soil has less strength and stability than a non-uniform soil.	
	c) Uniformity coefficient does not affect strength and stability.	
	d) Uniformity coefficient of a poorly graded soil is more than that of a well	
	graded soil.	
27	The water content of soil, which represents the boundary between plastic state	a
	and liquid state, is known as	
	a) liquid limit b) plastic limit	
	c) shrinkage limit d) plasticity index	
28	Which of the following soils has more plasticity index?	С
	a) sand b) silt c) clay d) gravel	
29	At liquid limit, all soils possess	a
	a) same shear strength of small magnitude	
	b) same shear strength of large magnitude	
	c) different shear strengths of small magnitude	
	d) different shear strengths of large magnitude	
30	If the material of the base of the Casagrande liquid limit device on which the	a
	cup containing soil paste drops is softer than the standard hard rubber, then	
	a) the liquid limit of soil always increases	
	b) the liquid limit of soil always decreases	

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

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

	c) coarse sand d) clay	
46	The gas formed by the reaction of calcium carbide with water is	d
	a) CO2 b) SO2 c)ethane d)acetylene	
47	The seepage pressure is proportional to	d
	a) hydraulic gradient b) unit wt of water	
	c) length of specimen d) all	
48	The hydraulic head that would produce a quick condition in a sand stratum of	b
	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	
49	Physical properties of a permeant which influence permeability are	С
	a) viscosity only b) unit weight only	
	c) both viscosity and unit weight d) none of the above	
50	Select the correct statement.	b
	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.	
51	The behavior of clay is governed by	b
	a) mass energy b) surface energy	
	c) both a & b d) none	
52	The weakest bond in soil is	b
	a) hydrogen bond b) secondary valanced bond	
	c) covalent bond d) ionic bond	
53	Honey combed structure is found in	d
	a) clay b) coarse sand c) gravel d)fine sand & silts	
54	Effective stress on soil	С
	a) increases voids ratio and decreases permeability	
	b) increases both voids ratio and permeability	
	c) decreases both voids ratio and permeability	

	d) decreases voids ratio and increases permeability	
55	If the permeability of a soil is 0.8 mm/sec, the type of soil is	b
	a) gravel b) sand c) silt d) clay	
56	Which of the following methods is more suitable for the determination of	b
	permeability of clayey soil?	
	a) constant head method b) falling head method	
	c) horizontal permeability test d) none of the above	
57	Which of the following methods is best suited for determination of	a
	permeability of coarse grained soils?	
	a) constant head method b) falling head method	
	c) both the above d) none of the above	
58	Due to a rise in temperature, the viscosity and the unit weight of the	b
	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 %	
59	Coefficient of permeability of soil	b
	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	
60	The average coefficient of permeability of natural deposits	a
	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	
61	The total discharge from two wells situated near to each other is	b

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

	a) 0.028 b) 0.28 c) 036 d) 0.036	
70	A normally consolidated clay settled 10 mm when effective stress was	a
	increased from 100 kN/m <sup>2</sup> to 200 kN/ m <sup>2</sup> . If the effective stress is further	
	increased from 200 kN/ m <sup>2</sup> to 400 kN/ m <sup>2</sup> , then the settlement of the same clay	
	is	
	a) 10 mm b) 20 mm c) 40 mm d) none of these	
71	A cylindrical specimen of saturated soil failed under an axial vertical stress of	b
	100 kN/m <sup>2</sup> 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 <sup>2</sup> and 30° b) 0.05 N/mm <sup>2</sup> and 0°	
	c) 0.2 N/mm <sup>2</sup> and 0° d) 0.05 N/mm <sup>2</sup> and 45°	
72	A 300 mm square bearing plate settles by 15 mm in a plate load test on a	С
	cohesive soil when the intensity of loading is 0.2 N/mm <sup>2</sup> . 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	
73	In a deposit of normally consolidated clay	С
	a) effective stress increases with depth but water content of soil and un-	
	drained 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	
74	The most accurate method for the determination of water content in the	b
	laboratory is	
	a)Sand bath method b)oven drying method	
	c)pycnometer method d)calcium carbide method	
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	b
	a) straight line b) parabolic c) circular d) Elliptical	

## **10.Environmental Engineering**

S.N.	Question with options	Answer
1	The pathogens can be killed by	b
	a) Sedimentation b) U. V. rays and ozone treatment.	
	c) aeration d) none of the above	
2	In Air pollution RSPM stands for	С
	a) reversible soluble particulate material	
	b) reflected suspended poor matter	
	c) respirable suspended particulate matter	
	d) retained suspended packed material	
3	Which of the following is not a water borne disease?	d
	a) dysentery b) cholera c) typhoid d) malaria	
4	Ground water is usually free from	a
	a) suspended impurities	
	b) dissolved impurities	
	c) both suspended and dissolved impurities	
	d) none of the above	
5	Dissolved oxygen in streams is	a
	a) maximum at noon b) minimum at noon	
	c) maximum at midnight d) same throughout the day	
6	Which of the following is water disinfectant method?	d
	a) Oxidation b) Aeration c) Sedimentation d) Chlorination	
7	Which of the following is not a unit of city water treatment plant?	d
	a) Coagulation unit b) Sedimentation unit	
	c) Chlorination unit d) Boiling unit	
8	As compared to geometrical increase method of forecasting population,	a
	arithmetical increase method gives	
	a) lesser value b) higher value	
	c) same value d) accurate value	

	The population of a town in three consecutive years are 5000, 7000 and 8400	d
	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	
10	The suitable method of forecasting population for a young and rapidly	b
	increasing city is	
	a) arithmetical increase method b) geometrical increase method	
	c) incremental increase method d) graphical method	
11	In water treatment for removal of solids	c
	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  Influent Sludge	
12	BOD in portable water may be	a
	a) 0 b) 5 c) 10 d) none	
13	Fresh and septic sewage are respectively	b
	10 - 11 - 11 - 11 - 11 - 11 - 11 - 11 -	
	a) acidic and alkaline b) alkaline and acidic	
	c) both acidic d) both alkaline	
14		b
14	c) both acidic d) both alkaline	b
14	c) both acidic  d) both alkaline  The depression of water table in a well due to pumping will be maximum	b
	c) both acidic  d) both alkaline  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
14	c) both acidic  d) both alkaline  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  The devices which are installed for drawing water from the sources are called	b
15	c) both acidic d) both alkaline  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  The devices which are installed for drawing water from the sources are called a) aquifers b) aquiclude c) filters d) intakes	
	c) both acidic d) both alkaline  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  The devices which are installed for drawing water from the sources are called  a) aquifers b) aquiclude c) filters d) intakes  The type of valve, which is provided on the suction pipe in a tube-well, is	
15	c) both acidic d) both alkaline  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  The devices which are installed for drawing water from the sources are called a) aquifers b) aquiclude c) filters d) intakes  The type of valve, which is provided on the suction pipe in a tube-well, is a) air relief valve b) reflux valve	d
15	c) both acidic d) both alkaline  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  The devices which are installed for drawing water from the sources are called a) aquifers b) aquiclude c) filters d) intakes  The type of valve, which is provided on the suction pipe in a tube-well, is	d

	determine the	
	a) hardness in water b) turbidity in water	
	c) dissolved oxygen in water d) residual chlorine in water	
18	Turbidity is measured on	a
	a) standard silica scale b) standard cobalt scale	
	c) standard platinum scale d) platinum cobalt scale	
19	On standard silica scale, the turbidity in drinking water should be limited to	a
	a) 10 ppm b) 20 ppm c) 30 ppm d) 50 ppm	
20	Residual chlorine in water is determined by	c
	a) starch iodide method b) orthotolidine method	
	c) both (a) and (b) d) none of the above	
21	If the total hardness of water is greater than its total alkalinity, the carbonate	a
	hardness will be equal to	
	a) total alkalinity b) total hardness	
	c) total hardness - total alkalinity d) non carbonate hardness	
22	The design period for a water supply project is taken as	d
	a) 10 yr b) 10-15yr c) 15-20yr d) 20-30yr	
23	Floating debris from water is removed through	d
	a) sedimentation b) filtration c) coagulation d) screening	
24	The rain is generally termed as acidic if pH value of rain water falls below	b
	a) 3 b) 5 c) 7 d) 8	
25	The amount of residual chlorine left in public water supply for safety against	b
	pathogenic bacteria is about	
	a) 0.01 to 0.05 ppm b) 0.05 to 0.5 ppm	
	c) 0.5 to 1.0 ppm d) 1.0 to 5.0 ppm	
26	The major disadvantage of lime soda process of water softening is that	b
	a) it is unsuitable for turbid and acidic water	
	b) huge amount of precipitate is formed which creates a disposal problem	
	c) the effluent cannot be reduced to zero hardness	
	d) it is unsuitable for softening the water of excessive hardness	

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

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

	d) none of the above	
45	The effect of increasing diameter of sewer on the self cleansing velocity is	b
	a) to decrease it b) to increase it	
	c) fluctuating d) nil	
46	The most commonly used sewer under culverts is	a
	a) circular brick sewer b) circular cast iron sewer	
	c) semi-elliptical sewer d) horse-shoe type sewer	
47	The type of sewer which is suitable for both combined and separate system is	b
	a) circular sewer b) egg shaped sewer	
	c) horse-shoe type sewer d) semi-elliptical sewer	
48	The characteristics of fresh and septic sewage respectively are	b
	a) acidic and alkaline b) alkaline and acidic	
	c) both acidic d) both alkaline	
49	Which of the following retards the self purification of stream?	d
	a) higher temperature b) sunlight	
	c) satisfying oxygen demand d) none of the above	
50	Sewage treatment units are normally designed for	b
	a) 5-10 years b) 15-20 years	
	c) 30-40 years d) 40-50 years	
51	Settling velocity increases with	c
	a) specific gravity of solid particles b) size of particles	
	c) depth of tank d) temperature of liquid	
52	Standard BOD is measured at	c
	a) 20°C - 1day b) 25°C- 3day	
	c) 20°C - 5day d) 30°C- 5day	
53	The correct relation between theoretical oxygen demand (TOD), Biochemical	b
	oxygen demand (BOD) and Chemical	
	oxygen demand (COD) is given by	
	a) TOD>BOD>COD b) TOD>COD>BOD	
	c) BOD>COD>TOD d) COD>BOD>TOD	

54	Select the correct statement.	c
	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.	
55	If Biochemical oxygen demand (BOD) of a town is 20000 kg/day and BOD	d
	per capita per day is 0.05 kg, then population equivalent of town is	
	a) 1000 b) 4000 c) 100000 d) 400000	
56	The rate of BOD exerted at any time is	b
	a) directly proportional to BOD satisfied	
	b) directly proportional to BOD remaining	
	c) inversely proportional to BOD satisfied	
	d) inversely proportional to BOD remaining	
57	The ratio of 5 day BOD to ultimate BOD is about	b
	a) 1/3 b) 2/3 c) 3/4 d) 1.0	
58	The minimum dissolved oxygen which should always be present in water in	b
	order to save the aquatic life is	
	a) 1 ppm b) 4 ppm c) 10 ppm d) 40 ppm	
59	Facultative bacteria are able to work in	С
	a) presence of oxygen only b) absence of oxygen only	
	c) presence as well as in absence of oxygen d) presence of water	
60	Sewerage system is designed for	d
	a) maximum flow only b) minimum flow only	
	c) average flow only d) maximum and minimum flow	
62	Sewage treatment units are designed for	С
	a) maximum flow only b) minimum flow only	
	c) average flow only d) maximum and minimum flow	
63	Laying of sewers is usually done with the help of	С
	a) a theodolite b) a compass	
	c) sight rails and boning rods d) a plane table	

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

	d) death	
72	Effect of over exposure to ozone on human being if one of the following	a
	a) Affects respiratory system and lungs b) Brain tumor	
	c) Skin disease d) Hair fall	
73	Percentage of Argon by volume in atmosphere is	d
	a) 78 % b) 21 % c) 0.03 % d) 0.93 %	
74	The dead storage in a reservoir is provided for storage of	b
	a) water from firm water b) sand and silt	
	c) water from water supplies d) none	
75	pH value of water indicates its	С
	a) acidity b) alkalinity c) (a) and (b) d) None of these	
76	Which of the following will contain water with the maximum amount of	С
	turbidity	
	a) lakes b) wells c) river d) ocean	

## 11. Highway and Railway Engineering

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

	a) to increase it on descending grades and to decrease it on ascending grades	
	b) to decrease it on descending grades and to increase it on ascending grades	
	c) to increase it on both descending and ascending grades	
	d) to decrease it on both descending and ascending grades	
10	The ruling design speed on a National Highway in plain terrain as per IRC	c
	recommendations is	
	a) 60 kmph b) 80 kmph c) 100 kmph d) 120 kmph	
11	The terrain may be classified as rolling terrain if the cross slope of land is	b
	a) upto 10 % b) between 10 % and 25 %	
	c) between 25 % and 60 % d) more than 60 %	
12	Transverse slope provided to road as shown	d
	in figure is known as-	
	a) Carriage way	
	b) shoulder	
	c) Formation level	
	d) Camber Road Structure	
13	If b is the wheel track of a vehicle and h is the height of centre of gravity	b
	above road surface, then to avoid overturning and lateral skidding on a	
	horizontal curve, the centrifugal ratio should always be	
	a) less than b/2h and greater than co-efficient of lateral friction	
	b) less than b/2h and also less than co-efficient of lateral friction	
	c) greater than b/2h and less than co-efficient of lateral friction	
	d) greater than b/2h and also greater than coefficient of lateral friction	
14	The transition curve used in the horizontal alignment of highways as per IRC	a
	recommendations is	
	a) spiral b) lemniscate	
	c) cubic parabola d) any of the above	
15	For design, that length of transition curve should be taken which is	c
	a) based on allowable rate of change of centrifugal acceleration	
	b) based on rate of change of super elevation	

	c) higher of (a) and (b)					
	d) smaller of (a) and (b)					
16	The maximum design gradient for vertical profile of a road is					
	a) ruling gradient b) limiting gradient					
	c) exceptional gradient d) minimum gradient					
17	The percentage compensation in gradient for ruling gradient of 4 % and	d				
	horizontal curve of radius 760 m is					
	a) 0.1 % b) 1 % c) 10% d) no compensation					
18	If ruling gradient is 1 in 20 and there is also a horizontal curve of radius 76 m,	b				
	then the compensated grade should be					
	a) 3 % b) 4 % c) 5 % d) 6 %					
19	The camber of road should be approximately equal to	d				
	a) longitudinal gradient					
	b) two times the longitudinal gradient					
	c) three times the longitudinal gradient					
	d) half the longitudinal gradient					
20	Which of the following shapes is preferred in a valley curve?					
	a) simple parabola b) cubic parabola					
	c) spiral d) lemniscate					
21	The value of ruling gradient in plains as per IRC recommendation is	d				
	a) 1 in 12 b) 1 m 15 c) 1 in 20 d) 1 in 30					
22	The formation width of a double lane National Highway in embankment is	d				
	a) 11m b) 0.10m c) 7.5m d) 12m or more					
23	On the recommendation of Nagpur conference, the minimum width of a					
	village road may be					
	a) 3m b) 2.45m c) 2.75m d) 3.50m					
24	Maximum safe speed on roads depends on the	d				
	a) Sight distance b) Type of road surface					
	c) Type of highway d) All of these					
25	In case of summit curves, the deviation angle will be maximum when	b				

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

	b) less than the pressure on inner wheels						
	c) equal to the pressure on inner wheels						
	d) zero						
33	For a constant value of coefficient of lateral friction, the value of required	d					
	super-elevation increases with						
	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						
34	To calculate the minimum value of ruling radius of horizontal curves in plains,	c					
	the design speed is given by						
	a) 8 kmph b) 12 kmph c) 16 kmph d) 20 kmph						
35	Minimum thickness of the base of a flexible pavement is	a					
	a) 10cm b) 15cm c) 20cm d) 30cm						
36	Design of highway is based on	d					
	a) Axle load b) Axle spacings c) Wheel bases d) All of these						
37	For water bound macadams the camber should be	c					
	a) 1-2% b) 2-2.5% c) 2.5-3% d) 3-4%						
38	The absolute minimum radius of curve for safe operation for a speed of 110	c					
	kmph is						
	a) 110 m b) 220 m c) 440 m d) 577 m						
39	The attainment of super elevation by rotation of pavement about the inner edge	С					
	of the pavement						
	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						
40	Select the correct statement.	d					
	a) Psychological extra widening depends on the number of traffic lanes.						
	b) Mechanical extra widening depends on the speed of vehicle.						

	c) Psychological extra widening depends on the length of wheel base.					
	d) Psychological extra widening depends on the speed of vehicle.					
41	The maximum width of a vehicle as recommended by IRC is					
	a) 1.85 m b) 2.44 m c) 3.81 m d) 4.72 m					
42	Desire lines are plotted in					
	a) traffic volume studies b) speed studies					
	c) accident studies d) origin and destination studies					
43	Which of the following methods is preferred for collecting origin and	b				
	destination data for a small area like a mass business center or a large					
	intersection?					
	a) road side interview method b) license plate method					
	c) return postcard method d) home interview method					
44	The diagram which shows the approximate path of vehicles and pedestrians	d				
	involved in accidents is known as					
	a) spot maps b) pie charts					
	c) condition diagram d) collision diagram					
45						
	a) increases					
	b) decreases					
	c) first decreases and then increases after reaching a minimum value at					
	optimum speed					
	d) first increases and then decreases after reaching a maximum value at					
	optimum speed					
46	Which of the following is known as design capacity?	a				
	a) basic capacity b) theoretical capacity					
	c) possible capacity d) practical capacity					
47	If the average center to center spacing of vehicles is 20 meters, then the basic	С				
	capacity of a traffic lane at a speed of 50 kmph is					
	a) 2500 vehicles per day b) 2000 vehicles per hour					
	c) 2500 vehicles per hour d) 1000 vehicles per hour					

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						
49	Equivalent factor of passenger car unit (PCU) for a passenger car as per IRC is	a					
	a) 1.0 b) 2.0 c) 0.5 d) 10						
50	If the stopping distance and average length of a vehicle are 18 m and 6 m	a					
	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						
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						
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						
53	For improvement road carrying fast traffic an average level of illumination	d					
	recommended by IRC is						
	a) 4 lux b) 8 lux c) 15 lux d) 30 lux						
54	The top height of route marker above crown level is						
	a) 1.50m b) 2.2m c) 2.25m d) None of these						
55	The diagram which shows all important physical conditions of an accident	c					
	location like roadway limits, bridges, trees and all details of roadway						
	conditions is known as						
	a) pie chart b) spot maps						

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

65	Bitumen of grade 80/100 means	c					
	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						
66	The shape of the transition curve used by the Indian railway is						
	a) cubic parabola b) spiral c) sine curve d) laminscate						
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						
68	When two road with two lane, two way traffic, cross at an uncontrolled	a					
	intersection the number of potential major conflict point would be						
	a) 32 b) 24 c) 16 d) 4						
69	RC-2, MC-2 and SC-2 correspond to	a					
	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						
70	The recommended grade of tar for grouting purpose is						
	a) RT-1 b) RT-2 c) RT.3 d) RT-5						
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						
72	For rapid curing cutbacks, the oil used is	a					
	a) gasoline b) kerosene oil						
	c) light diesel d) heavy diesel						
73	The method of design of flexible pavement as recommended by IRC is	b					
	a) group index method b) CBR method						
	c) Westerguard method d) Benkelman beam method						
74	For developing thinly populated areas, the correct choice of gauge is	c					
	a) Broad Gauge b) Meter Gauge						

	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	b					
	down and are deflected at ends. These rails are called						
	a) roaring rails b) hogged rails						
	c) corrugated rails d) buckled rails						
76	The slipping of driving wheels of locomotives on the rail surface causes	a					
	a) wheel burns b) hogging of rails						
	c) scabbing of rails d) corrugation of rails						
77	The width of foot for 90 R rail section is	c					
	a) 100 mm b) 122.2 mm c) 136.5 mm d) 146.0 mm						
78	The height of the rail for 52 kg rail section is	b					
	a) 143 mm b) 156 mm c) 172 mm d) 129mm						
79	The formation width for a railway track depends on the	b					
	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)						
80	The formation width for a single line meter gauge track in embankment as	b					
	adopted on Indian Railways is						
	a) 4.27 m b) 4.88 m c) 5.49 m d) 6.10 m						
81	The side slope of embankments for a railway track is generally taken as	c					
	a) 1:1 b) 1.5:1 c) 2:1 d) 1:2						
82	The formation width for a double line Broad Gauge track in cutting (excluding	c					
	drains) as adopted on Indian Railways is						
	a) 6.10 m b) 8.84 m c) 10.21m d) 10.82 m						
83	The total gap on both sides between the inside edges of wheel flanges and	d					
	gauge faces of the rail is kept as						
	a) 10mm b) 13mm c) 16mm d) 19 mm						
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						
86	Study the following statements regarding creep.	b					
	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)						
87	The maximum degree of curvature for Meter Gauge is limited to	b					
	a) 10° b) 16° c) 30° d) 40°						
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						
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						
90	Which of the following types of sleepers is preferred on joints?	c					
	a) CST-9 sleeper b) steel trough sleeper						
	c) wooden sleeper						
	d) concrete sleeper						
91	Minimum depth of ballast cushion for a Broad Gauge wooden sleeper of size	c					
	275x25x13 cm with 75cm sleeper spacing is						
	a) 15 cm b) 20 cm c) 25 cm d) 30cm						
92	Sleeper density in India is normally kept as	a					
	a) M + 2 to M + 7 b) M to M+2						

	c) M + 5 to M+10 d) M					
	where M is the rail length in meters.					
93	For a Broad Gauge route with M+7 sleeper density, number of sleepers per rail					
	length is					
	a) 18 b) 19 c) 20 d) 21					
94	Standard size of wooden sleeper for Broad Gauge track is	a				
	a) 275x25x13cm b) 180x20x11.5 cm					
	c) 225x23x13 cm d) 250x26x12 cm					
95	Composite sleeper index is the index of	a				
	a) hardness and strength b) strength and toughness					
	c) toughness and wear resistance d) wear resistance and hardness					
96	Minimum composite sleeper index pres-cried on Indian Railways for a track	b				
	sleeper is					
	a) 552 b) 783 c) 1352 d) 1455					
97	Dog spikes are used for fixing rail to the	a				
	a) wooden sleepers b) CST-9 sleepers					
	c) steel trough sleepers d) concrete sleepers					
98	Number of dog spikes normally used per rail seat on curved track is	b				
	a) one on either side b) two outside and one inside					
	c) one outside and two inside d) two outside and two inside					
99	The type of bearing plate used in all joints and on curves to give better bearing	b				
	area to the rails is					
	a) flat mild steel bearing plate b) mild steel canted bearing plate					
	c) cast iron anti creep bearing plate d) none of the above					
100	Flat mild steel bearing plates are used	a				
	a) for points and crossings in the lead portion					
	b) with wooden sleepers at locations where creep is likely to be developed					
	c) on all joints and curves					
	d) on all the above					
101	The nominal size of ballast used for points and crossings is	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	c				
	Broad Gauge is					
	a) 51 b) 62 c) 70 d) 78					
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					
104	The type of spike used for fixing chairs of bull headed rails to wooden sleepers	d				
	is					
	a) dog spike b) rail screw c) elastic spike d) round spike					
105	The sleepers resting directly on girder are fastened to the top flange of girder	a				
	by					
	a) hook bolts b) dog spikes c) fang bolts d) rail screws					
106	Number of keys used in CST-9 sleeper is	a				
	a) 2 b) 3 c) 4 d) none of the above					
108	Pandrol clips cannot be used with	С				
	a) wooden sleepers b) concrete sleepers					
	c) CST-9 sleepers d) steel trough sleepers					
109	Loose jaws of steel trough sleepers are made of	С				
	a) cast steel b) mild steel c) cast iron d) spring steel					
110	Number of cotters used in CST-9 sleepers is	С				
	a) 2 b) 3 c) 4 d) 5					
111	The desirable rate of change of cant deficiency in case of Meter Gauge is	b				
	a) 20 mm/sec b) 35 mm/sec c) 55 mm/sec d) 65 mm/sec					
112	The limiting value of cant excess for Broad Gauge is	c				
	a) 55 mm b) 65 mm c) 75 mm d) 100 mm					
113	A Broad Gauge branch line takes off as a contrary flexure from a main line If	d				
	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					
114	Switch angle depends on	a				

	i) heel diverg	i) heel divergence				
	ii) length of tongue rail					
	iii) flangeway clearance					
	iv) throw of sw	vitch				
	The correct answ	ver 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		
116	Super elevation	is provided			d	
	a) on straight roa	a) on straight roads				
	c) at level crossing on curves d) on curves					
117	Normally the limiting value of cant is				С	
	a) G/8	b) G/10	c) G/12	d) G/15		

## 12.Airport Engineering

Sr.	Question with options	Answer
1	The threshold markings are	d
	a) 4 m wide and 45 m in length	
	b) 1 m clear space between adjacent	
	c) placed symmetrically on either side of the runway centre line	
	d) all the above.	
2	An airport has 4 gates. If the weighted average gate occupancy time is 30	c
	minutes and gate utilisation factor is 0.5, then the capacity of the gate will be	
	a) 1 aircraft per hour b) 2 aircrafts per hour	
	c) 4 aircrafts per hour d) 16 aircrafts per hour	
3	The capacity of parallel runway pattern depends upon	d
	a) weather conditions and navigational aids available	
	b) lateral spacing between two runways and weather conditions	
	c) lateral spacing between two runways and navigational aids available	
	d) lateral spacing between two runways, weather conditions and navigational	
	aids available.	
4	The engine failure case for determining the basic runway length may require	d
	a) only clearway b) only stop way	
	c) either a clearway or a stopway d) either a clearway or a stopway or both	
5	The minimum width of clearway is	с
	a) 50 m b) 100 m c) 150 m d) 250 m	
6	If the monthly mean of average daily temperature for the hottest month of the	С
	year is 25° C and the monthly mean of the maximum daily temperature of the	
	same month of the year is 46° C, the airport reference temperature is	
	a) 32°C b) 35.5°C c) 48°C d) 25°C	
7	Consider the following statements regarding ICAO recommendation for	a
	correction to basic runway length	
	1. The basic runway length should be increased at the rate of 7 percent per 300	

	m rise in elevation above the mean sea level.	
	2. The basic runway length after having been corrected for elevation should be	
	further increased at the rate of 1 percent for every 1°C rise in airport	
	reference temperature above the standard atmospheric temperature at that	
	elevation.	
	3. The runway length after having been corrected for elevation and	
	temperature should be further increased at the rate of 20% for every 1	
	percent of effective gradient.	
	Of these statements	
	a) 1 and 2 are correct b) 2 and 3 are correct	
	c) 1 and 3 are correct d) 1,2 and 3 are correct	
8	The total length of a runway is 1000 m. The elevation at distance 0,200 m, 400	b
	m, 600 m, 800 m and 1000 m are 100.0 m, 99.2 m, 101.0 m, 101.8 m, 101.4 m	
	and 101.0 m respectively. The effective gradient of runway will be.	
	a) 0.10 % b) 0.26 % c) 0.43 % d) 0.65 %	
9	13. The length of runway under standard conditions is 2000 m. The elevation of	
	airport site is 300 m. Its reference temperature is 33.05°C. If the runway is to be	
	constructed with an effective gradient of 0.25 percent, the corrected runway	
	length will be	
	a) 2500 m b) 2600 m c) 2700 m d) 2800 m	
10	As per ICAO, the minimum basic runway length for A and E type of airport	d
	will be	
	a) 1500 m and 600 m b) 2100 m and 750 m	
	c) 1500 m and 750 m d) 2100 m and 600 m	
11	Zero fuel weight of an aircraft is:	d
	a) equal to empty operating weight	
	b) equal to maximum landing weight	
	c) less than empty operating weight	
	d) equal to sum of empty operating weight and the maximum pay load.	
12	The cruising speed of the aircraft is 500 kmph. If there is a head wind of 50	a

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

	a) 3 m and 30 m b) 4.2 m and 30 m	
	c) 4.2 m and 50 m d) 3 m and 45 m	
22	In Instrumental landing system, the middle markers are located	b
	a) along the extended centre line of runway end	
	b) about 1 km. ahead of the runway threshold	
	c) at the runway threshold	
	d) about 7 km. ahead of the runway threshold	
23	The size of landing area for multiengined helicopters operating under 1FR	d
	conditions is	
	a) 22.5 m x 22.5 m b) 30 m x 30 m	
	c) 22.5 m x 30 m d) 60 m x 120 m	
24	The centre to centre spacing of heliport lighting along the periphery of landing	c
	and take off area should be	
	a) 2.5 m b) 5.0 m c) 7.5 m d) 10.0 m	
25	The slope of the obstruction clearance line from the boundary of the heliport	С
	should be	
	a) 1:2 b) 1:5 c) 1:8 d) 1:40	
26	Assertion A: Airport capacity during IFR conditions is usually less than that	a
	during VFR conditions.	
	Reason R: During clear weather condition (VFR), the aircrafts on final	
	approach to runway can be spaced closer during poor	
	visibility conditions.	
	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	
27	Assertion A: The width of a taxiway is smaller than the runway width. Reason	c
	R: The speed of the aircraft on a taxiway is greater than that on runway. Select	
	your answer based on 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	
28	For supersonic transport aircraft, the minimum turning radius of taxiway is	С
	a) 60 m b) 120 m c) 180 m d) 240 m	
29	As per UK design criteria, if LCN of aircraft is between 1.25 to 1.5 times the	b
	LCN of pavement, then the number of	
	movements allowed are	
	a) Zero b) 300 c) 3000 d) Unrestricted	
30	Which of the following is an example of failure in flexible pavements?	a
	a) Alligator cracking b) Mud pumping	
	c) Warping cracks d) Shrinkage cracks	
31	The main disadvantage of angle nose out parking configuration of aircraft is	b
	that the	
	a) aircraft rear loading door is far away from terminal building.	
	b) hot blast is directed towards the terminal building	
	c) overall apron area required is more	
	d) all the above	
32	Which of the following is used for servicing and repairs of the aircraft?	b
	a) Apron b) Hanger	
	c) Terminal building d) holding apron	
33	The slope of the transitional surface for A, B and C type of runway shall be	b
	a) 1:5 b) 1:7 c) 1:10 d) 1:12	
2.4		
34	The length of clear zone for none instrument runway of a small aircraft is	b
<i>3</i> 4	The length of clear zone for none instrument runway of a small aircraft is a) 150 m b) 300 m c) 600 m d) 750 m	b
35		b b
	a) 150 m b) 300 m c) 600 m d) 750 m	
	a) 150 m b) 300 m c) 600 m d) 750 m  In approach areas of runways equipped with instrumental landing facilities any	

36	Maximum gross take-off weight of an aircraft is	c
	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	
37	Consider the following statements: Wind rose diagram is used for the purposes	d
	of	
	1. runway orientation	
	2. estimating the runway capacity	
	3. geometric design of holding apron Of these statements	
	a) 1 and 2 are correct b) 2 and 3 are correct	
	c) 1 and 3 are correct d) 1 alone is correct	
38	Which of the following factors are taken into account for estimating the runway	d
	length required for aircraft landing?	
	1. Normal maximum temperature	
	2. Airport elevation	
	3. Maximum landing weight	
	4. Effective runway gradient	
	Select the correct answer using the codes given below Codes:	
	a) 1,2,3 and b) 1,3, and c) 2 and 3 d) 1,2 and 4	
39	In an airport, if 4 gr oups of 5 gates each located well-separated are considered	b
	for traffic and the future to present traffic ratio is 3, then the total requirement	
	of future gates will be	
	a) 32 b) 36 c) 44 d) 68	
40	Castor angle is defined as the angle	a
	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	

41	The runway length after	er correcting for elevation and	temperature is 2845 m. If	c
	the effective gradient of	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	

## 13.Docks and Harbour Engineering

S.N.	Question with options	Answer
1	Which of the following are repair docks?	С
	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	
2	Which of the following structures protects the shore by trapping of littoral	a
	drift?	
	a) groynes b) sea walls c) revetments d) moles	
3	Which of the following conditions of loading imposes the greatest load on the	С
	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	
4	For designing the dock, the proportion of ship load assumed to be borne by	a
	keel blocks is	
	a) 5/8 b) 3/8 c) 3/16 d) 5/16	
5	A ship strikes the berth generally at an angle	d
	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	
6	Consider the following statements.	d
	(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	

	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	c	
	chamber is called.		
	a) Dry dock b) Wet dock c) Floating dock d) Refuge dock		
8	Assertion A: Depth and width required at the entrance to a harbour are more	a	
	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.		
9	When a ship floats at its designed water line, the vertical distance from water	d	
	line to the bottom of the ship is known as		
	a) beam b) depth c) freeboard d) draft		
10	The maximum harbour depth below lowest low water is generally equal to	d	
	(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		
11	The minimum diameter of turning besin, where ships turn by going ahead and	d	
	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		
12	Dead weight tonnage of a ship	c	
1	i) varies with latitude and season		

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

	(ii) Higher Beaufort number indicates higher speed of wind,	
	(iii) Beaufort number for calm is smallest and for hurricane is highest Of these	
	statements	
	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	
18	At a given port, the fetch is 400 nautical miles, the maximum height of storm	c
	wave will be	
	a) 2.073 m b) 8.169 m c) 9.144 m d) 6.8 m	
19	Minimum width of ship clearance shall be	a
	a) B or 30 m b) 1.5 B or 50 m c) 1.5 B d) 50 m	
	where "B" is beam of the design vessel	
20	Select the incorrect statement.	b
	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.	
21	Assertion A: Marine structures are made specially bulky and strong.	a
	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:	
	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.	
22	As compared to wall type breakwater, mound type breakwater	d
	a) requires skilled labour b) requires low maintenance cost	
	c) requires less material d) results in less damage due to gradual failure	
23	The difference in height between highest high water and lowest low water is	b
	called	

	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,	d
	then the breakwater height above the datum will be	
	a) 2.5 m b) 4 m c) 5 m d) 7 m	
25	If H is the height of the wave expected, then the height of the breakwater is	С
	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	
26	Assertion A: Basin walls have to be of much greater height than dock walls.	a
	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.	
27	In multiple point mooring system, vessel is secured to minimum of	b
	a) two points b) four points c) six points d) eight points	
28	By increasing the rise of lock gates,	a
	(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	
29	Which of the following is a fixed type mooring accessory?	a
	a) bollard b) buoys c) cables d) anchors	
30	The significant wave height is defined is the average height of the	a

	a) one - third highest waves b) one - fourth highest waves	
	c) one - fifth highest waves d) one - tenth highest waves	
31	If Hs is the significant wave height, then the average wave height and highest	b
	wave height respectively are given by	
	a) 0.6 Hs and 1.67 Hs b) 0.6 Hs and 1.87 Hs	
	c) 1.27 Hs and 1.87 Hs d) 1.27 Hs and 1.67 Hs	
32	When a wave strikes a vertical breakwater in deep water, it is reflected back	b
	and on meeting another advancing wave of similar amplitude merges and rises	
	vertically in a wall of water. This phenomenon is called	
	a) Surf b) Clapotis c) Fetch d) Swell	
33	Which of the following structures are constructed parallel to shore line to	b
	develop a demarcating line between land area and water area?	
	a) sea walls, bulk heads and groynes	
	b) sea walls, bulk heads and revetments	
	c) sea walls, revetments and groynes	
	d) bulk heads, revetments and groynes	
34	Which of the following type of sea walls results in greatest protection of shore	d
	structures?	
	a) vertical sea wall b) sea wall with batter	
	c) stepped sea wall d) sea wall with concave face	
35	Assertion A: Large size stones are required in stone revetment in shore	a
	protection.	
	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.	
	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 a correct explanation of A.	
	c) A is true but R is false.	
	d) A is false but R is true.	

## **14.Tunnel Engineering**

S.N.	Question with options	Answer
1	In Tunneling, for drilling holes horizontal, up or down following equipments	С
	are used-	
	a) Dozers b) Power Shovels c) Drifters d) Trucks	
2	The correct sequence of drilling equipment for increasing size of holes in	a
	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	
3	Which of the following is not a component of the shield?	b
	a) propelling jacks b) liner plate c) hood d) tail	
4	Which of the following are percussion drills?	b
	(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	
5	Assertion A: English method of tunneling requires more time as compared to	a
	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.	
6	American method of tunneling	a
	i) is suitable for large sized tunnels	
	ii) is no,' suitable for railway or highway tunnel's	

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

	c) Austrian method d) English method	
14	In Belgium method of tunnelling	b
	a) construction of side walls is completed before invert and roof arch are	
	built.	
	b) construction of roof arch is completed before side walls and invert are	
	built.	
	c) construction of invert is completed before side walls and roof arch are	
	built.	
	d) construction of invert and side walls is completed before roof arch is built.	
15	What is the correct sequence of the following events in rock tunnelling?	d
	1. marking tunnel profile	
	2. loading explosives and blasting	
	3. checking misfire	
	4. mucking	
	5. removing foul gas	
	6. setting up and drilling	
	7. guniting	
	Select the correct answer using the codes given below.	
	Codes:	
	a) 1,6,5,3,4,2,7 b) 1,2,6,3,5,4,7	
	c) 1, 6,2, 5,4, 3, 7 d) 1,6,2,5,3,4,7	
16	Drift method of tunnelling is used to construct tunnels in	b
	a) soft grounds b) rock	
	c) self supporting grounds d) broken grounds	
17	Consider the following situations.	c
	1. Soil is soft.	
	2. Volume of existing surface traffic on the alignment is heavy.	
	3. Track is at a deeper level.	
	4. Water table is high.	
	In the construction of Metro Railways, "Cut and Cover" method of	

	construction is suitable in situations listed at	
	a) 1 and 2 b) 1 and 3 c) 1 and 4 d) 2 and 3	
18	Which one of the following is considered to be an advantage of the heading	c
	and benching method of tunnel construction?	
	a) It is suitable for construction in unstable rocks.	
	b) In this method, it is easy to install timber support.	
	c) Tunnelling can be continuous and the work can be expedited.	
	d) In case of excessive water, it is easy to take correct steps.	
19	In "full face" method of constructing tunnels, the first operation relates to	d
	a) removal of bottom portion	
	b) excavation of one drift in the center	
	c) removal of top portion	
	d) excavation being done along the periphery	
20	Which one of the following is a component of a shield for tunneling?	d
	a) liner plate b) trench jack c) stiffener d) cutting edge	
21	Assertion A: When rock conditions are favorable, it will not be necessary to	c
	take up concrete lining concurrently with the driving operations till the full	
	length of the tunnel has been driven through rock.	
	Reason R: A tunnel through rock, hard or soft, does not need any concrete	
	lining.	
	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.	
22	Circular section of tunnels is not suitable for	d
	a) carrying water b) non-cohesive soils	
	c) tunnels driven by shield method d) placement of concrete lining	
23	What is the correct sequence of the following events of construction of a shaft	b
	in rock?	

	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	b
	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	
25	As compared to a single free face, if a charge of explosive is placed equidistant	c
	from two faces, then the yield	
	a) remains same b) decreases	
	c) increases by 2.25 times d) increases by 3.5 times	

## **15.Water Resources Engineering**

S.N.	Question with options	Answer
1	Irrigation engineering mainly deals with supplying water for –	a
	a) Nourishment of crops b) Navigation	
	c) Fire fighting d) Industries.	
2	For supplying water to rabi crop, kharif crop and sugarcane, the channel is	С
	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	
3	The ratio of the quantity of water stored in the root zone of the crops to the	b
	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	
4	The water utilizable by plants is available in soils mainly in the form of	b
	a) gravity water b) capillary water	
	c) hydroscopic water d) chemical water	
5	The amount of irrigation water required to meet the evapotranspiration needs	С
	of the crop during its full growth is called	
	a) effective rainfall b) consumptive use	
	c) consumptive irrigation requirement d) net irrigation requirement	
6	With the increase in the quantity of water supplied, the yield of most crops	d
	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	
7	Hydrograph is the graphical representation of	a
	a) runoff and time b) surface runoff and time	

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

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

	give the highest rate of evaporation?	
	a) flat water surface b) convex water surface	
	c) concave water surface d) independent of shape of water surface	
24	Assertion A: To estimate the rainfall over a catchment, the number of	a
	raingauges required per unit area is large for hilly areas.	
	Reason R: Rainfall gradient is steep. Select your correct answer according to	
	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	
25	The depth of flow at which specific energy is minimum is called	С
	a) Normal depth b) alternate depth	
	c) critical depth d) none	
26	In MLT system the dimension for specific volume would be	d
	a) L3 b) L-3 c) ML-3 d) M-1L3	
27	A Turbine is called reaction turbine, if at the inlet of the turbine the total	b
	energy is	
	a) Kinetic energy only b) kinetic energy & pressure energy	
	c) pressure energy only d) none of these	
28	When surface of transpiration is submerged under water, then potential	a
	evapotranspiration is	
	a) much more than evapotranspiration	
	b) much less than evapotranspiration	
	c) equal to evapotranspiration	
	d) equal to or less than evapotranspiration	
29	Unit of runoff in M.K.S. system is	a
	a) cubic metre/sec b) metre/sec	
	c) cubic metre d) square metre	
30	The runoff increases with	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	c
	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	
32	A current meter is used to measure the	a
	a) velocity of flow of water b) depth of flow of water	
	c) discharge d) none of the above	
33	If it rains between 2 P.M. and 3 P.M. and the entire basin area just starts	d
	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	
34	The rainfalls of five successive days were measured as 100 mm, 80 mm, 60	С
	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	
35	The normal annual precipitation at stations X, A, B and C are 700 mm, 1000	a
	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	
36	The best unit duration of storm for a unit hydrograph is	b
	a) 1 hour b) one-fourth of basin lag	
	c) one-half of basin lag d) equal to basin lag	
37	The unit hydrograph due to a storm may be obtained by dividing the ordinates	a
	of the direct runoff hydrograph by	
	a) direct runoff volume b) period of storm	
	c) total rainfall d) none of the above	
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	b
	a) shorter duration from longer duration	
	b) longer duration from shorter duration	
	c) both (a) and (b)	
	d) none of the above	
40	An artesian aquifer is the one where	b
	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	
41	The velocity distribution in turbulent flow follows	b
	a) parabolic law b) logarithmic law c) linear law d) hyperbolic law	
42	The flow in a open channel is turbulent, if the Reynolds no is	b
	a) $2000$ b) $> 2000$ c) $> 4000$ d) $4000$	
43	If the Froude no in open channel is less than 1 the flow is called	С
	a) critical b) super critical c) sub critical d) None of these	
44	A deep well	b
	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)	
45	A multipurpose reservoir is the one which is	b
	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	
46	The useful storage is the volume of water stored in the reservoir between	b

	a) minimum pool level and maximum pool level	
	b) minimum pool level and normal pool level	
	c) normal pool level and maximum pool level	
	d) river bed and minimum pool level	
47	The water stored in the reservoir below the minimum pool level is called	b
	a) useful storage b) dead storage	
	c) valley storage d) surcharge storage	
48	For a flood control reservoir, the effective storage is equal to	d
	a) useful storage - valley storage	
	b) useful storage + surcharge storage	
	c) useful storage + surcharge storage + valley storage	
	d) useful storage + surcharge storage -valley storage	
49	Trap efficiency of a reservoir is a function of	a
	a) capacity/inflow ratio b) capacity/outflow ratio	
	c) outflow/inflow ratio d) none of the above	
50	The total capacity of a reservoir is 25 million cubic metres and dead storage is	a
	5 million cubic metres. If the average volume of sediment deposition is 0.10	
	million cubic metre per year, then the usefulness of the reservoir will start	
	reducing after	
	a) 50 years b) 150 years c) 200 years d) 250 years	
51	If the head over the triangular notch is doubled, discharged will increase to	С
	a) 2Q b) 2.828Q c) 5.657Q d) 4Q	
52	Velocity distribution profile for laminar flow between parallel plates is	b
	a) constant b) parabolic c) linear d) logarithmic	
53	Momentum correction factor $\beta$ for laminar flow in a circular pipe is	a
	a) 1.33 b) 1.50 c)1.0 d) 1.34	
54	The uplift pressure on a dam can be controlled by	d
	i) constructing cutoff under upstream face	
	ii) constructing drainage channels between the dam and its foundation	
	iii) by pressure grouting in foundation	

	The correct answer is	
	a) only (i) b) both (i) and (ii)	
	c) both (i) and (iii) d) (i), (ii) and (iii)	
55	The uplift pressure on the face of a drainage gallery in a dam is taken as	c
	a) hydrostatic pressure at toe	
	b) average of hydrostatic pressure at toe and heel	
	c) two-third of hydrostatic pressure at toe plus one-third of hydrostatic	
	pressure at heel	
	d) none of the above	
56	Horizontal acceleration due to earthquake results in	c
	a) hydrodynamic pressure	
	b) inertia force into the body of the dam	
	c) both (a) and (b)	
	d) none of the above	
57	The major resisting force in a gravity dam is	С
	a) water pressure b) wave pressure	
	c) self-weight of dam d) uplift pressure	
58	When the reservoir is full, the maximum compressive force in a gravity dam is	a
	produced	
	a) at the toe b) at the heel	
	c) within the middle third of base d) at centre of base	
59	Presence of tail water in a gravity dam	d
	i) increases the principal stress ii) decreases the principal stress	
	iii) increases the shear stress iv) decreases the shear stress	
	The correct answer is	
	a) (i) and (iii) b) (i)and(iv)	
	c) (ii) and (iii) d) (ii) and (iv)	
60	Coefficient of discharge of an ogee spillway	d
	a) depends on depth of approach and upstream slope	
	b) depends on downstream apron interference and downstream submergence	

	c) remains constant	
	d) both (a) and (b)	
61	If there are two canals taking off from each flank of a river, then there will be	d
	a) one divide wall and one undersluice	
	b) one divide wall and two undersluices	
	c) two divide walls and one undersluice	
	d) two divide walls and two undersluices	
62	The main function of a divide wall is to	c
	a) control the silt entry in the canal	
	b) prevent river floods from entering the canal	
	c) separate the undersluices from weir proper	
	d) provide smooth flow at sufficiently low velocity	
63	Silt excluders are constructed on the	a
	a) river bed upstream of head regulator	
	b) river bed downstream of head regulator	
	c) canal bed upstream of head regulator	
	d) canal bed downstream of head regulator	
64	As per Lacey's theory, the silt factor is	c
	a) directly proportional to average particle size	
	b) inversely proportional to average particle size	
	c) directly proportional to square root of average particle size	
	d) not related to average particle size	
65	Wetted perimeter of a regime channel for a discharge of 64 cumecs as per	b
	Lacey's theory will be	
	a) 19 m b) 38 m c) 57 m d) 76 m	
66	Which of the following canal structures is used to remove surplus water from	c
	an irrigation channel into a natural drain?	
	a) canal fall b) canal outlet c) canal escape d) canal regulator	
67	Which of the following can be used as a meter fall?	a
	a) vertical drop fall b) flumed glacis fall	

	c) unflumed glacis fall d) all of the above	
68	The aqueduct or superpassage type of works are generally used when	a
	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	
69	An aggrading river is a	a
	a) silting river b) scouring river	
	c) both silting and scouring river d) neither silting nor scouring river	
70	The meander pattern of a river is developed by	b
	a) average discharge b) dominant discharge	
	c) maximum discharge d) critical discharge	
71	Select the correct statement.	a
	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.	
72	Study the following statements.	b
	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)	
73	Variability of rainfall is	С
	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)	
74	Model analysis of free surface flows are based on	С

	a) Reynolds's nun	nber	b) Froude's no		
	c) Mach no		d) Euler no		
75	The horizontal to	vertical side slope	in case of cippolete v	weir is	d
	a) 1:1	b) 1:√2	c) 1:2	d) 1:4	
76	For measuring ver	ry low pressure wh	ich of the following	you will use?	d
	a) barometer	b) piezometer	c) manometer	d) none of these	

## 16. Construction Management and Equipments

S.N.	Question with options	Answer
1	The performance of a specific task in CPM is known as	c
	a) dummy b) event c) activity d) constant	
2	The final technical authority of a project is	d
	a) Assistant Engineer b) Executive Engineer	
	c) Superintending Engineer d) Chief Engineer	
3	Time and progress chart of a construction is also known as	d
	a) Bar chart b) Gantt chart	
	c) Modified milestone chart d) any of the above	
4	Whenever an activity has zero total float, then	c
	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	
5	Total float for any activity is defined as the difference between	b
	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	
6	In the network shown in Fig. independent float for the activity 3-5 will be (the	b
	number on the arrow shows the duration of activity)	
	a) 0 b) 1 c) 2 d) none of these	
7	Select the incorrect statement.	d
	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.	
8	Free float for any activity is defined as the difference between	a

	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	Critical path	a
	a) is always longest b) is always shortest	
	c) may be longest d) may be shortest	
10	The independent float affects only	c
	a) preceding activities b) succeeding activities	
	c) the particular activity involved d) none of the above	
11	According to Fulkerson's rule, what are	b
	the correct event numbers corresponding	
	to events A, B, C, D,E, F and G of the	
	network shown in Fig. ?	
	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	
12	In India, are prefabricated components costlier than those of traditional cast-in-	c
	situ items that the prefabricated components replace?	
	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	
13	The time by which a particular activity can be delayed without affecting the	d
	preceding and succeeding activities is known as	
	a) total float b) free float	
	c) interfering float d) independent float	
14	The time with which direct cost does not reduce with the increase in time is	b

	known as	
	a) crash time b) normal time	
	c) optimistic time d) standard time	
15	The reduction in project time normally results in	b
	a) decreasing the direct cost and increasing indirect cost	
	b) increasing the direct cost and decreasing the indirect cost	
	c) increasing the direct cost and indirect cost both	
	d) decreasing the direct cost and indirect cost both	
16	Economic saving of time results by crashing	a
	a) cheapest critical activity b) cheapest non-critical activity	
	c) costliest critical activity d) costliest non-critical activity	
17	The process of incorporating changes and rescheduling or replanning is called	c
	a) resource leveling b) resource smoothening	
	c) updating d) critical path scheduling	
18	Slack time refers to	b
	a) an activity b) an event	
	c) both event and activity d) none of the above	
19	The normal time required for the completion of project in the above problem is	c
	a) 9 days b) 13 days c) 14 days d) 19 days	
20	The constraints in case of resource smoothening operation would be	b
	a) resources b) project duration time	
	c) both resources and project duration time d) none of the above	
21	Updating may result in	d
	a) change of critical path	
	b) decrease of project completion time	
	c) increase of project completion time	
	d) all of the above	
22	Crash project duration is obtained by summing the	d
	a) normal durations for all the activities	
	b) crash durations for all activities	

	c) crash durations for all the activities along the critical path obtained by			
	taking into account the normal duration for all the activities			
	d) crash durations for all the activities along the critical path obtained by			
	taking into account the crash duration for all the activities.			
23	Interfering float is the difference between	a		
	a) total float and free float b) total float and independent float			
	c) free float and independent float d) none of the above			
24	A tractor whose weight is 20 tonnes has a drawbar pull of 2500 kg, when	a		
	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			
	a) reduce by 200 kg b) increase by 200 kg			
	c) increase by 250 kg d) reduce by 250 kg			
25	Which of the following earth moving machines has the shortest cycle time?	d		
	a) Drag line b) Hoe c) Clam shell d) Dipper shovel			
26	The part of a derrick crane include	d		
	(i) Mast			
	(ii) Boom			
	(iii) Bull wheel			
	(iv) Jack			
	Of these statements			
	a) (i), (ii) and (iv) are correct b) (ii), (iii) and (iv) are correct			
	c) (i), (iii) and (iv) are correct d) (i), (ii) and (iii) are correct			
27	A machine costs Rs. 20000 and its useful life is 8 years. The money is	b		
	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			
	a) Rs.1740 b) Rs.3480 c) Rs.5220 d) Rs.6960			
28	The probability of completion of any activity within its expected time is	a		
	a) 50 % b) 84.1 % c) 99.9 % d) 100 %			
	l ·			

29	If the scheduled completion time of a project is more than the earliest expected	c
	time for completion of the project, then the probability of completion of the	
	project within the scheduled completion time will be	
	a) 50 % b) less than 50 %	
	c) more than 50 % d) 100 %	
30	If the expected time for completion of a project is 10 days with a standard	d
	deviation of 2 days, the expected time of completion of the project with 99.9%	
	probability is	
	a) 4 days b) 6 days c) 10 days d) 16 days	
31	A tractor shovel has a purchase price of Rs. 4.7 lacs and could save the	b
	organization an amount of rupees one lac per year on operating costs. The	
	salvage value after the amortization period is 10% of the purchase price. The	
	capital recovery period will be	
	a) 3.7 years b) 4.23 years c) 5 years d) 7.87 years	
32	Consider the following statements:	b
	In the bar chart planning	
	1. interdependence of the operations cannot be portrayed.	
	2. progress of work can be measured.	
	3. spare time of the activities can be determined.	
	4. schedule cannot be updated.	
	Of these statements	
	a) 1,2 and 3 are correct b) 1 and 4 are correct	
	c) 2, 3 and 4 are correct d) 1,2 and 4 are correct	
33	Consider the following statements:	b
	In the critical path method of construction planning, Free Float can be.	
	1. greater than Total Float.	
	2. greater than Independent Float	
	3. equal to Total Float.	
	4. less than Independent Float. Of these statements	
	a) 1 and 4 are correct b) 2 and 3 are correct	

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

	d) cost of project is controlled	
39	The original cost of an equipment is Rs.10,000/ Its salvage value at the end of	c
	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	
	a) Rs. 8,800/- b) Rs. 7,600/- c) Rs. 6,400/- d) Rs. 5,000/-	
40	Consider the following features/factors:	a
	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.	
	PERT is preferred for planning because of	
	a) 1,2 and 4 b) 3,4 and 5 c) 1,3 and 4 d) 1,2 and 5	
41	Consider the following activities in a building construction:	с
	1. Concreting of roof slabs	
	2. Brick-jelly lime concrete terracing	
	3. Erection of formwork for slab	
	4. Construction of parapet wall in terrace	
	The correct sequence of these activities is	
	a) 1,3,2,4 b) 3,1,4,2 c) 3,1,2,4 d) 1,3,4, 2	
42	Consider the following operations:	c
	1. Drilling	
	2. Blasting	
	3. Mucking	
	4. Placing steel	
	5. Placing concrete	
	The correct sequence of these operations in tunnel construction is	
	a) 1,2,4,3,5 b) 1,3,2,4,5 c) 1,2,3,4,5 d) 1,3,4,2,5	
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	d
	a) trimming and finishing b) shaping and trimming	
	c) finishing and shaping d) finishing, shaping and trimming	
45	Which one of the following is not an excavating & moving type of equipment?	d
	a) Bulldozer b) Clam shell c) Scraper d) Dump truck	
46	The most suitable type of equipment for compaction of cohesive soils is	c
	a) Smooth-wheeled rollers b) Vibratory rollers	
	c) Sheep foot rollers d) Tampers	
47	For excavating utility trenches with precise control of depth, the excavation	a
	equipment used is	
	a) Hoe b) Shovel c) Drag line d) None of these	
48	The basic action involved in sheep foot rolling is	a
	a) Kneading b) Pressing c) Tamping d) Vibration	
49	Batching refers to	c
	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	
50	Consider the following statements:	c
	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	

51	The rated loads of lifting cranes, as percentage of tipping load at specified	d
	radius, for crawler-mounted, and pneumatic tyre-mounted machines would be	
	respectively	
	a) 80 and 90 b) 90 and 80 c) 85 and 75 d) 75 and 83	
52	Sensitivity analysis is a study of	c
	a) comparison of profit and loss	
	b) comparison of assets and liabilities	
	c) change in output due to change in input	
	d) economics of cost and benefits of the project	
53	In the time-cost optimization, using CPM method for network analysis, the	c
	crashing of the activities along the critical path is done starting with the activity	
	having	
	a) longest duration b) highest cost slope	
	c) least cost slope d) shortest duration	
54	Consider the following statements for a power shovel:	b
	(i) Output can be increased by reducing the angle of swing for a given depth	
	of cut.	
	(ii) For a given angle of swing, output will be maximum at optimum depth of	
	cut.	
	(iii) Output can be increased by keeping the depth of cut less than optimum	
	depth,	
	(iv) Output can be increased by increasing the size of shovel. Of these	
	statements	
	a) (ii), (iii) and (iv) are correct b) (i), (ii) and (iv) are correct	
	c) (i), (iii) and (iv) are correct d) (i) and (iv) are correct	
55	Assertion A: For a given depth of cut, the output of a power shovel can be	a
	increased by decreasing the angle of swing.	
	Reason R: If the angle of swing is decreased, the cycle time will be decreased.	
	Select the correct answer.	
	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.	
56 If the output of a dragline for 90° angle of swing at optimum depth of cut is X,	c
then the output for 120° angle of swing at 120 % of optimum depth of cut will	
be	
a) equal to X b) more than X	
c) less than X d) any of the above	
57 Output of a bulldozer is	b
(i) increased if drawbar HP of the tractor is increased for a given hauling	
distance	
(ii) decreased if drawbar HP of the tractor is increased for a given hauling	
distance	
(iii) increased if the hauling distance is increased for a given drawbar HP of the	
tractor	
(iv) decreased if the hauling distance is increased for a given drawbar HP of	
the tractor Of these statement	
a) (i) and (iii) are correct b) (i) and (iv) are correct	
c) (ii) and (iii) are correct d) (ii) and (iv) are correct	
58 A machine is purchased for Rs. 10,000,00/- and has an estimated life of 10	b
years. The salvage value at the end of 10 years is Rs. 1,50,000/ The book	
value of the machine at the end of 5 years using general straight line method of	
evaluation of depreciation is	
a) Rs. 4,75,000/- b) Rs. 5,75,000/-	
c) Rs. 6,50,000/- d) Rs. 8,50,000/-	
59 Which one of the following surfaces will give highest coefficient of traction	d
while using crawler track tractors?	
a) Ice b) Concrete c) Loose sand d) Earth	
60 Rolling resistance of a wheel depends upon	c
(i) Vehicle load (ii) Grade	

	(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	b
	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	

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