

FIRST YEAR KGCE EXAMINATION IN CIVIL ENGINEERING**CIVIL ENGINEERING-I (TRADE THEORY)****MODEL QUESTION PAPER SET 1– ANSWER KEY**

(Time : 3 hours)

(Maximum Marks: 60)

PART-A

(Maximum Marks: 20x1 Marks = 20 Marks)

- I. Answer the following questions by choosing the correct answer from the options given below.
Each question carries 1 mark.

Q No	Question	Answer
1	Workability of concrete is measured by _____	c) Slump test
2	Most important ingredient in brick earth is _____	b) Silica
3	Ordinary Portland cement has been classified into _____ grades	a) 3
4	Seasoning of timber is the process of	a) Removing water
5	Which of the following is not a type of paint ?	d) Ceramic Paint
6	Bottom most part of a building is _____	d) Foundation
7	The purpose of providing window in a building is :	d) Both A & C
8	Which of the following type of brick bond is the strongest?	b) English Bond
9	Load carrying capacity of soil is known as :	a) Bearing capacity
10	Aggregate size greater than 4.75 mm is generally termed as :	c) Coarse aggregate
11	Vertical portion between each tread on the stair is called	d) riser
12	Temporary mould to hold fresh concrete is	c) Formwork
13	The underside of roof slab is	a) Ceiling
14	The term used to denote the finishing of mortar joints in masonry is called	d) Pointing
15	A 20 m chain has _____ number of links	b) 100
16	The process of location of intermediate points:	b) Ranging
17	The first reading taken from the levelling instrument to a point of known elevation is _____	a) Back sight
18	The least count of a levelling staff is:	a) 0.005 m

Q No	Question	Answer
19	In reduced bearing system, bearings is measured from	c) Nearest north or south
20	_____ instrument is used to sight an object in plane table survey	d) Alidade

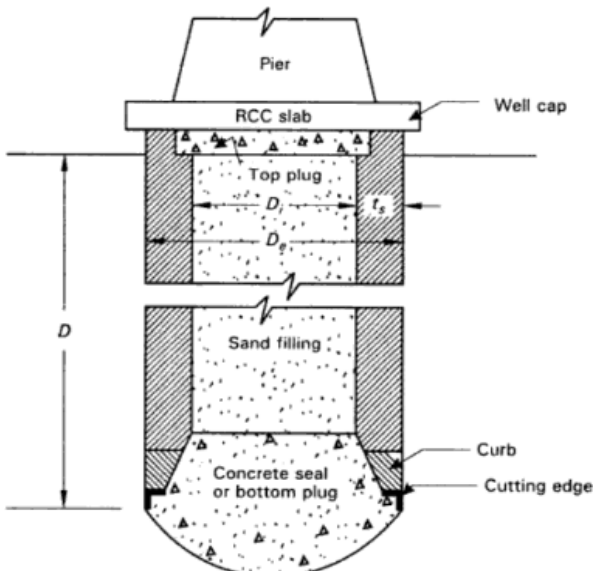
PART-B

(Maximum Marks: 8x5 Marks = 40 Marks)

II. Answer *any eight* questions from the following. Each question carries marks.5 Marks.

Q No	Question
1	<p>Write the characteristics of good stones</p> <p>Answer: The following are the characteristics of good stones:</p> <ol style="list-style-type: none"> Strength: the strength of the stone must be able to resist the applying load or overcoming load. Durability: stone must stay in all in all climatic conditions and resist all the the natural destructive effects. It lasts for a long time. Cost-effective: if stones are locally available, it reduces the transportation cost. Also, the dressing and polishing cost of stone should not be high. Appearance: Thee appearance of stone must be aesthetic and could so that a requirement of polish and interesting not needed. Which decreases the cost of operation. Hardness and toughness: it should be enough strong and hard to withstand all the stresses applied due to seismic forces, wind loads, and a load of the superstructure. Self-weight and specific gravity: the self-weight of stone should be less enough two not increase any load in superstructure or dead load. Property of absorption and porosity: stones should not be porous and not allow rainwater or any type of acidic water to pass through it. It is impermeable to any type of liquid. Also, the stone must not show any absorption characteristics for liquid
2	<p>Describe the major ingredients of cement and their functions</p> <p>Answer: Functions of Cement Ingredients</p> <ol style="list-style-type: none"> Lime: Lime is calcium oxide or calcium hydroxide. <ul style="list-style-type: none"> The presence of lime in a sufficient quantity is required to form silicates and aluminates of calcium. Deficiency in lime reduces the strength of the <u>property to the cement</u>. Deficiency in lime causes the cement to set quickly. Excess lime makes cement unsound. The excessive presence of lime causes the cement to expand and

Q No	Question
	<p>disintegrate</p> <ol style="list-style-type: none"> 2. Silica: Silicon dioxide is known as silica, chemical formula SiO_2. <ul style="list-style-type: none"> ○ A sufficient quantity of silica should be present in cement to form dicalcium and tricalcium silicate. ○ Silica imparts strength to cement. ○ Silica usually presents to the extent of about 30 percent 3. Alumina: Alumina is Aluminium oxide. The chemical formula is Al_2O_3. <ul style="list-style-type: none"> ○ Alumina imparts quick setting property to the cement. ○ Clinkering temperature is lowered by the presence of the requisite quantity of alumina. ○ Excess alumina weakens the cement. 4. Magnesia: Magnesium Oxide. The chemical formula is MgO. <ul style="list-style-type: none"> ○ Magnesia should not be present more than 2% in cement. ○ Excess magnesia will reduce the strength of the cement. 5. Iron oxide: Chemical formula is Fe_2O_3. <ul style="list-style-type: none"> ○ Iron oxide imparts color to cement. ○ It acts as a flux. ○ At a very high temperature, it imparts into the chemical reaction with calcium and aluminum to form tricalcium alumino-ferrite. ○ Tricalcium alumino-ferrite imparts hardness and strength to cement. 6. Calcium Sulphate: Chemical formula is CaSO_4 <ul style="list-style-type: none"> ○ This is present in cement in the form of gypsum($\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$) ○ It slows down or retards the setting action of cement. 7. Sulfur Trioxide: Chemical formula is SO_3 <ul style="list-style-type: none"> ○ It should not be present for more than 2%. ○ Excess Sulfur Trioxide causes the cement to unsound. 8. Alkaline: <ul style="list-style-type: none"> ○ It should not be present more than 1%. ○ Excess Alkaline matter causes efflorescence
3	<p>Write short note on Plaster of Paris</p> <p>Answer:</p> <ul style="list-style-type: none"> ○ Plaster of Paris is calcined gypsum. ○ Mixed with ordinary lime it is used for repairing holes and cracks in wooden or plastered surfaces, and for making moulds and ornamental works. ○ When mixed with water its swells slightly and sets rapidly. ○ Gypsum is natural calcium sulphate and occurs as a soft stone which is from white to dark in colour. ○ It is used mainly in the manufacture of cement.
4	<p>Explain well foundation and pile foundation</p> <p>Answer:</p> <p>Well Foundation:</p> <ul style="list-style-type: none"> ○ Well foundation is a type of deep foundation which is generally provided below the water level for bridges. ○ generally used to support bridge piers and abutments since they offer a number of

Q No	Question
	<p>advantages over other types of deep foundations for such large jobs.</p> <ul style="list-style-type: none"> ○ It's a monolithic and massive foundation and is relatively rigid in its engineering behavior. ○ A single circular well becomes uneconomical to support a bridge pier since it must encircle the pier. In these cases, rectangular, twin-circular, twin-octagonal, or double-D sections might be used to advantage. ○ A well foundation, because of its large cross-sectional area and rigidity, can withstand the effect of scouring better. ○ The depth can be decided as sinking progresses, since the nature of the strata can be inspected and tested, if necessary, at any desired stage. ○ A well foundation can withstand large lateral loads and moments that occur in the case of bridge piers, tall chimneys, and towers. ○ There is no danger of damage to adjacent structures since the sinking of a well does not cause any vibrations <div style="text-align: center;">  </div> <p>Pile Foundation</p> <ul style="list-style-type: none"> ○ A pile foundation is defined as a series of columns constructed or inserted into the ground to transmit loads to a lower level of subsoil. ○ A pile is a long cylinder made up of a strong material, such as concrete. ○ Piles are pushed into the ground to act as a steady support for structures built on top of them. ○ Piles transfer the loads from structures to hard strata, rocks, or soil with high bearing capacity. The piles support the structure by remaining solidly placed in the soil. ○ As pile foundations are set in the soil, they are more tolerant to erosion and scour.
5	<p>Compare English bond and Flemish bond Answer:</p>

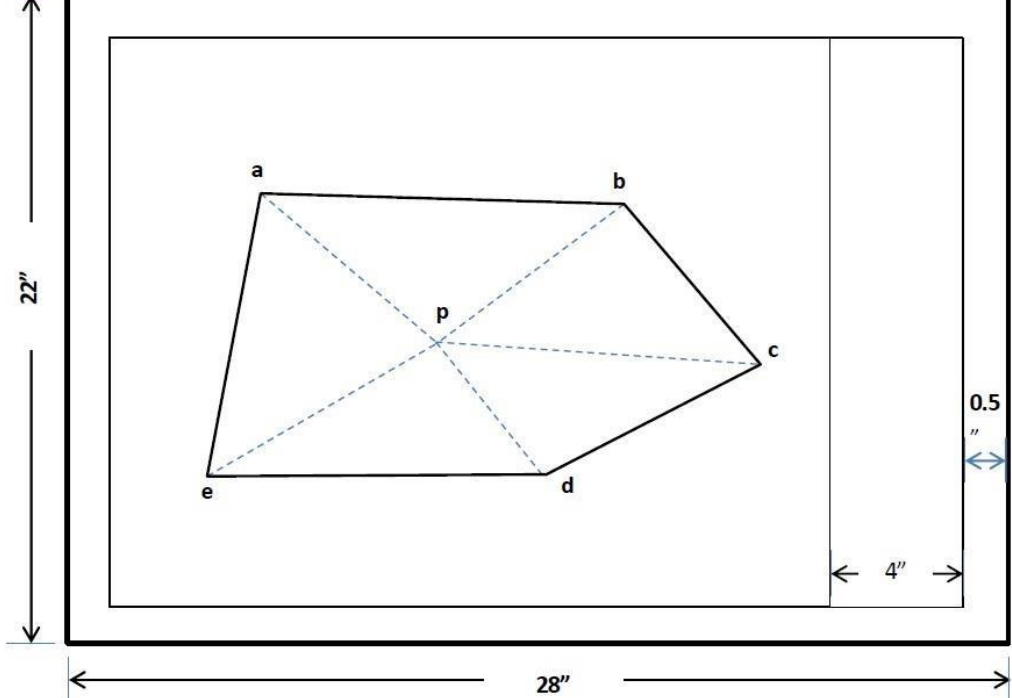
Q No	Question					
	<table border="1" data-bbox="315 262 1451 814"> <thead> <tr> <th data-bbox="315 262 883 338">English Bond</th> <th data-bbox="883 262 1451 338">Flemish Bond</th> </tr> </thead> <tbody> <tr> <td data-bbox="315 338 883 814"> <ul style="list-style-type: none"> a) Bond pattern with alternate header and stretcher course b) More strength given for bricks with thickness greater than one & half brick c) Less pleasing appearance d) Expensive e) No strict supervision and skill is demanded </td> <td data-bbox="883 338 1451 814"> <ul style="list-style-type: none"> a) Bond Pattern with each course having alternate header and stretcher b) Less strong and compact compared to English bond c) Appearance is more attractive and pleasing d) Economical e) Requires good workmanship and careful supervision </td> </tr> </tbody> </table>		English Bond	Flemish Bond	<ul style="list-style-type: none"> a) Bond pattern with alternate header and stretcher course b) More strength given for bricks with thickness greater than one & half brick c) Less pleasing appearance d) Expensive e) No strict supervision and skill is demanded 	<ul style="list-style-type: none"> a) Bond Pattern with each course having alternate header and stretcher b) Less strong and compact compared to English bond c) Appearance is more attractive and pleasing d) Economical e) Requires good workmanship and careful supervision
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6	<p data-bbox="315 905 883 940">Explain any 5 component parts of a building</p> <p data-bbox="315 957 431 993">Answer:</p> <p data-bbox="315 1026 506 1062">1. Foundation</p> <p data-bbox="315 1087 1451 1241">The Foundation is a structural unit that uniformly distributes the load from the superstructure to the underlying soil. This is the first structural unit to be constructed for any building construction. A good foundation prevents settlement of the building.</p> <p data-bbox="315 1316 431 1352">2. Plinth</p> <p data-bbox="315 1377 1451 1472">The plinth is constructed above the ground level. It is a cement-mortar layer lying between the substructure and the superstructure.</p> <p data-bbox="315 1547 431 1583">3. Stairs</p> <p data-bbox="315 1608 1451 1764">A stair is a sequence of steps that connects different floors in a building structure. The space occupied by a stair is called as the stairway. There are different types of stairs like a wooden stair, R.C.C stair etc.</p> <p data-bbox="315 1839 431 1875">4. Floors</p> <p data-bbox="315 1900 1451 1982">The floor is the surface laid on the plinth level. Flooring can be done by a variety of materials like tiles, granites, marbles, concrete, etc. Before flooring, the ground has to be</p>					

Q No	Question
	<p>properly compacted and leveled.</p> <p>5. Walls</p> <p>Walls are vertical elements which support the roof. It can be made from stones, bricks, concrete blocks, etc. Walls provide an enclosure and protect against wind, sunshine, rain etc. Openings are provided in the walls for ventilation and access to the building.</p> <p>6 .Columns</p> <p>Columns are vertical members constructed above the ground level</p> <p>7. Beams and slabs</p> <p>Beams and slabs form the horizontal members in a building. For a single storey building, the top slab forms the roof. In case of a multi-storey building, the beam transfers the load coming from the floor above the slab which is in turn transferred to the columns. Beams and slabs are constructed by reinforced cement concrete (R.C.C).</p> <p>8.Roof</p> <p>The roof forms the topmost component of a building structure. It covers the top face of the building. Roofs can be either flat or sloped based on the location and weather conditions of the area.</p> <p>9.Doors</p> <p>Provide access to various rooms in a building</p> <p>10.Windows</p> <p>Provide ventilation and lighting for rooms</p>
7	<p>Describe the objectives of plastering</p> <p>Answer:</p> <p>The objectives of plastering are as following</p>

Q No	Question
	<ul style="list-style-type: none"> ○ Plastering conceals defective workmen ship and covers up unsound and cheap quality material. ○ Plastering on external walls is done with the object of improving the resistance of the surface to rain <u>water</u> penetration and other atmospheric influences. ○ Plastering protects surfaces against vermin. ○ Plastering is required to provide a satisfactory base for decorating the surface by white – washing, color washing, <u>distempering</u> or painting
8	<p>Comparing shoring and scaffolding</p> <p>Answer:</p> <p><u>Scaffolding</u></p> <ul style="list-style-type: none"> ○ a temporary elevated or suspended work unit and its supporting structure used for supporting worker(s) or materials, or both ○ It is a temporary system built alongside a structure for the purpose of elevating workers, materials, and equipment so that construction, renovation, repair, or demolition work may be performed. ○ If the primary purpose of the deck is for workers to stand on it while performing tasks, it's a scaffold <p><u>Shoring</u></p> <ul style="list-style-type: none"> ○ Shoring is the vertical supporting members in a formwork system. ○ Shoring is a temporary system that supports a structure during construction, renovation, repair, or demolition work. ○ If the deck is mainly in place as part of the formwork that shapes and supports the structure being built or worked on, it's shoring.
9	<p>List and explain different types of stairs</p> <p>Answer:</p> <p>The types of stairs are as follows</p> <ul style="list-style-type: none"> • Straight Stair, • Dogged-legged Stair, • Open Newel Stair, • Geometrical Stair, • Circular Stair, • Spiral Stair, • Quarter-turn Stair, • Bifurcated Stair <p><u>1. Straight Stair:</u></p> <ul style="list-style-type: none"> ○ In these types of stairs, all the steps are arranged continuously along in one

Q No	Question
	<p>direction.</p> <ul style="list-style-type: none"> ○ One flight may be split into one or more than one flight by interposing a landing. ○ This stair can be used where narrow and long space is available for a staircase such as entrance, porch etc. <p><u>2. Dog-legged Stair:</u></p> <ul style="list-style-type: none"> ○ This stair types consist of two straight flights of steps with direct turns between them. ○ Dog-legged stair is very useful where the total width of the stair is just twice the width of the steps. <p><u>3. Open Newel Stair:</u></p> <ul style="list-style-type: none"> ○ This type of stairs consists of two or more flights arranging a well or opening between the backward and forward flights. ○ When all the steps are difficult to arrange in two flights, a short third flight of 3 to 6 steps may be provided along the direction perpendicular to the hall. Open newel stair is mostly adopted in the lift. <p><u>4. Geometrical Stair:</u></p> <ul style="list-style-type: none"> ○ This is another type of open newel stair where the open well between the forward and the backward flight is curved. ○ This stair may contain different geometrical shapes. ○ Here the change in direction is achieved by using winders <p><u>5. Circular Stair:</u></p> <ul style="list-style-type: none"> ○ In these types of stairs, all the steps radiate from a newel or well hole, in the form of winders. ○ The circular stair is adopted at the backside of a building to access its various floors <p><u>6. Spiral Stair:</u></p> <ul style="list-style-type: none"> ○ The spiral stair is very similar to a circular stair.

Q No	Question
	<ul style="list-style-type: none"> ○ It consists of individual steps or treads, connecting to a center column. ○ The overall diameter of the stair may range from 1 to 2.5 m. <p><u>7. Quarter-turn Stair:</u></p> <ul style="list-style-type: none"> ○ The quarter-turn stair can be defined as the stairs that are turned at 90 degrees with the help of level landing. <p><u>8. Bifurcated Stair:</u></p> <ul style="list-style-type: none"> ○ These types of stairs are provided in modern public buildings as well as residential buildings. ○ In this stair, the flight is so arranged that there is a wide flight at the start which is sub-divided into narrow flights at the mid-landing. The narrow flights start from either side of the mid-landing.
10	<p>Describe radiation method of plane table survey</p> <p>Answer:</p> <ol style="list-style-type: none"> 1. Select a suitable point P on the ground such that all the details are visible from it 2. Center and level the plane table over P 3. Mark the direction of the North on the sheet by using compass 4. Locate instrument station p on the sheet by using plumbing fork, such that p on sheet is exactly over P on ground 5. Centering the alidade on point p sight various details step by step and draw a ray from each detail along the fiducial edge of the alidade 6. Let the details be named as A, B, C, D, E etc. 7. Now measure the distances of each point from P i.e. PA, PB, PC, PD, PE and plot them to scale on the sheet as pa, pb, pc, pd, pe respectively 8. Joint a, b, c, d, and e to give the outline of the details

Q No	Question
	 <p>The diagram shows a traverse polygon with vertices labeled a, b, c, d, and e. A central point p is connected to each vertex by dashed lines. The polygon is contained within a rectangular frame. The total width of the frame is 28 inches, and the total height is 22 inches. A vertical line is drawn 4 inches from the right edge of the frame. A horizontal line is drawn 0.5 inches from the bottom edge of the frame. The intersection of these two lines is point p.</p>
11	<p>Define local attraction. Explain how it can be eliminated</p> <p>Answer:</p> <ul style="list-style-type: none"> ○ Local attraction is the phenomenon by which the magnetic needle is constantly prevented to point towards the magnetic north at a place. ○ This is because that these magnetic compass is influenced by other magnetic objects at that locality such as wires carrying electric current, rails, steel and iron structures, steel tapes etc. ○ The occurrence of local attraction can be detected by observing the difference between the fore and back bearings. ○ If there is no influence of local attraction and other error, this difference will be 180. So we can then conclude that both stations are free from local attraction <p><u>Elimination of local attraction</u></p> <p>Method 1</p> <ul style="list-style-type: none"> ○ This method is based on the difference of fore and back bearings. ○ the difference between fore and back bearing of a line will be 180° if there is no errors in <u>measurement</u>. So based on this error free observation of bearings, corrections for other lines can be calculated. ○ However if there is no two bearing has a difference of 180°, we can calculate the correction from the mean value of that bearings which may have least error. <p><u>Method 2</u></p> <ul style="list-style-type: none"> ○ This is based on the interior angles of the closed traverse formed. ○ The interior angles measured will be correct on the basis of the fact that these angles are not affected by the local attraction whereas the stations are. So the sum

Q No	Question
	<p>of total interior angles for a closed traverse will be $(2n-4) 90^\circ$.</p> <ul style="list-style-type: none"> ○ If there is any error exists both sum will not be same. ○ The total error can be distributed among the angles equally because equal error will occur on each interior angle. ○ So starting from the correct observation of bearing which has a difference in fore and back bearing is 180°, all other corrected bearings can be calculated
12	<p>The following consecutive readings were taken with a dumpy level along a chain line at a common interval of 15 m. The first reading was at a chainage of 165 m where the RL is 98.085. The instrument was shifted after the fourth and ninth readings 3.150, 2.245, 1.125, 0.860, 3.125, 2.760, 1.835, 1.470, 1.965, 1.225, 2.390, and 3.035 m. Find the reduced levels of all points in Height of Collimation method</p> <p>Answer:</p> <p>HI = RL +BS</p> <p>RL= HI- FS/IS</p> <p>HI = Height of instrument</p> <p>RL = Reduced level</p> <p>BS = Back sight</p> <p>FS = Fore sight</p> <p>IS = Intermediate sight</p> <p>Construct the page of a level book</p>

Q No	Question						
	Station	BS	IS	FS	HI	RL	Remarks
	A	3.150				98.085	Benchmark
	B		2.245			98.990	
	C		1.125			100.110	
	D	3.125		0.860		100.375	Change point 1
	E		2.760			100.740	
	F		1.835			101.665	
	G		1.470			102.030	
	H	1.225		1.965		101.535	Change Point 2
	I		2.390			100.370	
	J			3.035		99.725	
		Σ BS = 7.5		Σ FS= 5.86			
	<p>Arithmetic Check</p> <p>ΣBS – ΣFS = 7.500 – 5.860 = 1.64</p> <p>Last RL – First RL = 99.275 -98.085 = 1.64</p>						