Group B

Answer the following question: (8x540) .

2. State and prove parallelogram law of vector addition. [3]
3. The magnitude of two vectors are equal and angle between them is 0. Show that their resultant divides the angle equally.[2]
4. State zeroth law of thermodynamics. [1]
5. A student claims that 'thermometers are useless because a thermometer always registers its own temperature". How would you respond? [2]
6. At what point of temperature does the Fahrenheit scale and centigrade scale coincide? [2]
7. Establish the relation between linear and superficial expansivity. [2]
8. A glass flask with volume 200cm' is filled to the brim with mercury at 20°C. How much mercury overflows when the temperature of the system is raised to 100°C? [take a for glass = and y for mercury [3]
9. Consider the diagram of the bridge over a stream near Bhimphedi.
10. Explain why you think one end is constructed on rollers? [1]
11. When would you expect the gap indicated in diagram to be bigger- in winter or summer time? [2]
12. If the bridge was constructed in winter at temperature 20 °C'hand les length 400m, the gap was 20em. What will be the gap during summer at temperature 40°C? [take a for steel = 12x10K [2] 5. An experiment to determine the real expansivity of liquid is shown in the diagram below. Stercors Water 2. 3. Ice Water D a. Name the principte on which the experiment is based on? [1]

. Establish suitable formula to calculate the real expansivity of liquid. [2] c. In the above experiment the height of the cold and hot columns of mercury are found to be 99.5cm and 101.2cm respectively. If the cold column was kept at 0 deg \* C\_{s} calculate the temperature of hot column. [take y for mercury 8 \* 10 ^ - 4 \* K ^ - 1 ][2] a. Define electrostatic induction. How would you charge a body negatively by method of induction? [3] h. A glass rod rubbed with silk acquires a charge of magnitude 7.5nC. what is the change in mass of the rod. [2] 7 a. Draw the electric field lines pattern for an electric dipole. [1] b. Write two properties of electric lines of force. [1] c. Two electric charges +2 µC and -8 C are separated by a distance of 2m. Determine the position of null point. [3] a. State Gauss theorem in electrostatics. Use this theorem to find the electric field intensity at surface and inside of hollow charged conducting sphere. [3] b. An electron of charge 1.6x10 C is situated in a uniform electric field of intensity 12000V/m Find the time it takes to travel lem from rest. (2)

Group C

Give long answer to the following question (3 \* 8 = 24)

1. The diameter of a steel rod is given by what does it mean? [1]
2. Distinguish between precision and accuracy? [2]
3. The force is given in terms of displacement x and time t by the equation: What is the dimension of AB and D/B? [2]
4. Convert 100J into erg by dimensional analysis? [3]
5. Define null vector. [1]
6. A force in newton is expressed in vector notation as is applied to a body and produce a displacement in meter in 4 seconds. Estimate the power. [2]
7. The resultant of two vectors and is perpendicular to and magnitude R is equal to half of magnitude of . Find the angle between and . [2]
8. A spelunker is surveying a cave. She follows a passage 180m straight. west, then 210m in direction 45° east of south, and then 280m at 30 east of north. After fourth unmeasured displacement, she finds herself back where she started. Use component method to find the magnitude and direction of the fourth displacement. [3]

11. nuclear reaction is given as 02 U^ 213 + 02 M 36 Ba^ 141 + 36 K \* r ^ 102 + 3r \* t ^ 1 + Q Mass of 1.0087, alpha\_{2} \* U ^ 235 = 235.0457u Mass of ssB \* a ^ 141 = 140.9177u mass of 36 K \* r ^ 92 = 91.8854u

1. Mention the type of reaction [1]
2. Calculate mass defect of this reaction [2]
3. What is the energy release when 20 g of uranium is completely used in the reaction? [2]
4. What is fission chain reaction. Give one practical examples each for controlled and uncontrolled fission. [2]
5. Define critical size. [1]