Bharatiya Vidya Bhavan's

Sardar Patel College of Engineering

(A Government Aided Autonomous Institute)

Munshi Nagar, Andheri (West), Mumbai – 400058.

November 2016

Max. Marks:100
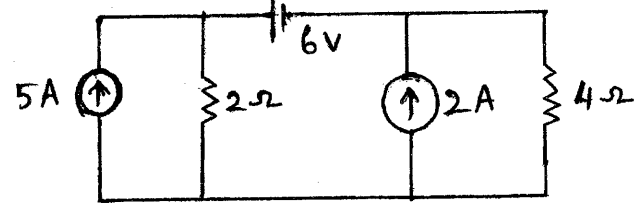Class: FE(C/M/E)   Semester: I   Duration: 3 hours
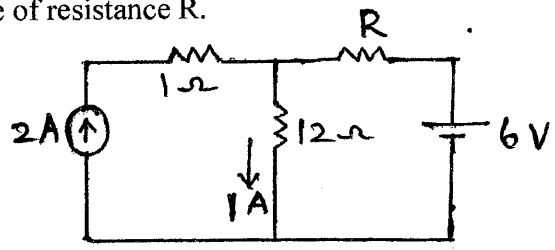Name of the Course: **BEE I**   Program: B.Tech
                                                        Course Code :BT102
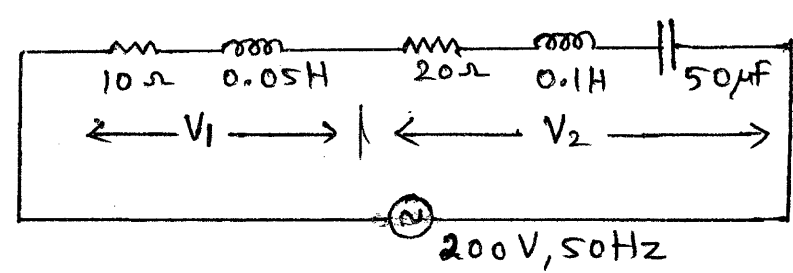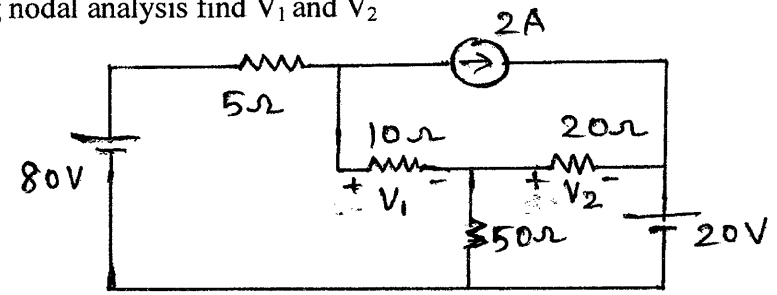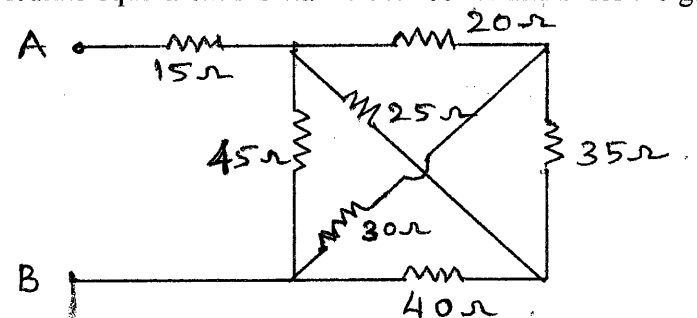
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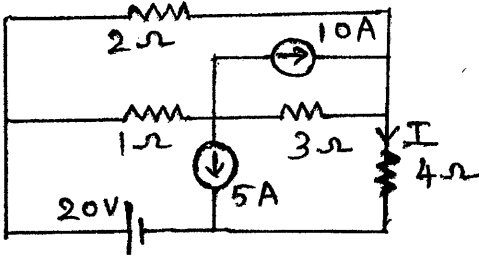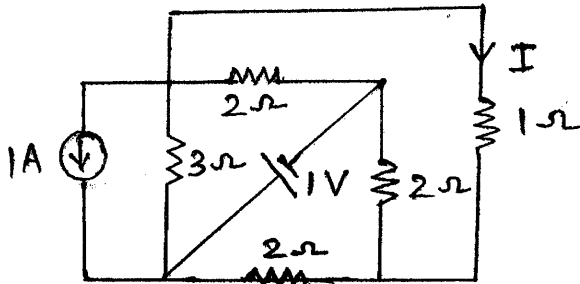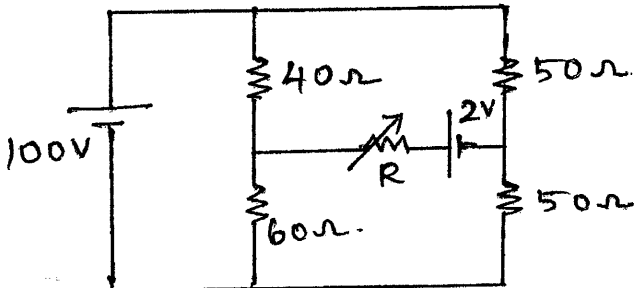
Instructions:

- Question no 1 is compulsory
- Attempt any FOUR questions out of the remaining SIX questions
- Answers to all sub questions should be grouped together
- Figures to the right indicates full marks
- Any assumptions must be specified clearly.

Q No		Marks	Course outcomes	Module No.
1.a	Using source transformation find the current in the 4Ω resistor.	4	1	1
b.	Draw and explain the power triangle for a three phase lagging load.	4	2	4
c.	If the 12Ω resistor draws a current of 1A as shown in the figure,find the value of resistance R.	4	1	1
d.	Explain the behaviour of ac through pure capacitor. Show the average power consumed here is zero..	4	1,3	3
e	Explain the losses that takes place in a transformer.	4	4	5

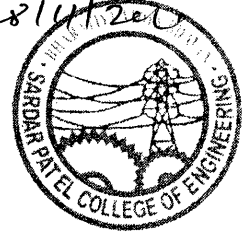|		10	3	4
2.a.	Prove that for a three phase balanced delta connected load ,line current is √3 times the phase current (with neat phasor diagrams).	10	3	4
b.	Calculate the current in the 4Ω resistor of the circuit by superposition theorem.	10	2	2
3a.	Three identical coils each having a resistance of 10 Ωand inductive reactance of 10 Ω are connected in i)star, and ii)delta connection,across 400V three phase ac supply. find in each case the line current and readings on each of the two wattmeters connected to measure power.	10	3	4,7
b.	Using Nortons theorem find I	7	2	3
c.	Explain slip in three phase induction motors.	3	4	6
4a	Obtain the equivalent circuit of a 200/400V,50Hz single phase transformer from the following test data. OC test: 200V 0.7A 70W (on lv side) SC test : 15V 10A 85W (on hv side)	10	3	5
b.	For the circuit given below determine R for maximum power transfer .Also calculate the maximum power.	10	2	2

5a	For the given circuit find circuit current ,voltage drops V_1, V_2 and power factor.	10	3	3

Circuit: $10\,\Omega$, $0.05H$, V_1; $20\,\Omega$, $0.1H$, $50\mu F$, V_2; source $200V, 50Hz$

b.	By using nodal analysis find V_1 and V_2	10	1	1

Circuit: $80V$, $5\,\Omega$, $2A$, $10\,\Omega$, $20\,\Omega$, V_1, V_2, $50\,\Omega$, $20V$

6a.	Why single phase induction motors are not self starting? Explain any two types single phase induction motors with phasor diagram.	10	4	6
b.	Two impedances 14+j5 Ω and 18+j10 Ω are connected in parallel across 200V,50Hz supply .Determine i) Admittance of each branch and of the entire circuit. ii) Current in each branch and total current iii) power and power factor of each branch. iv) total power factor iv) draw the phasor diagram	10	1,3	3

7a.	Explain the working of a dc motor and significance of back emf.	6	4	6
b.	Explain the working principle of a transformer .Draw the phasor diagram of a single phase transformer having lagging power factor load.	8	4	5
c.	Calculate equivalent resistance between A and B for the given circuit.	6	1	1

Circuit: A, $15\,\Omega$, $20\,\Omega$, $25\,\Omega$, $45\,\Omega$, $35\,\Omega$, $30\,\Omega$, $40\,\Omega$, B

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28/11/20

Program: F.Y.B.Tech. (Civil/Mechanical/Electrical)
Course code: BT104
**Name of the Course: Engineering Mechanics-I**
Semester: I

Date: 28 /11/ 2016
**Duration : 3 Hr**
Maximum Marks : 100

Master File.

Instructions:

1) Question **No.1** is compulsory.

2) Out of remaining questions, attempt any **FOUR** questions.

3) In all **FIVE** questions to be attempted.

4) All questions carry equal marks.

5) Answers to each question to be started on fresh page.

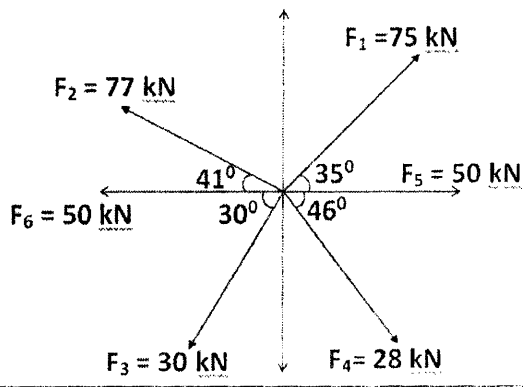| Q. No.		Maximum Marks	Course Outcome Number	Module No.
Q.1	Attempt any **five**:-			
a)	Explain Moment and Couple.	4	1, 2, 3	1
b)	State and prove Varignon's Principle.	4	1	2
c)	Explain various types of loading.	4	1, 2, 3	3
d)	Explain rectangular components of force in space. Also prove that $\cos^2\theta x + \cos^2\theta y + \cos^2\theta z = 1$	4	1, 2	4
e)	Explain Perfect truss, Imperfect truss, Deficient truss and Redundant truss.	4	1, 2	5
f)	Explain Coefficient of friction, Angle of friction, Angle of Repose and Cone of friction.	4	2	6
g)	Explain the work done by a force and state the principle of virtual work for a particle.	4	3	7
Q.2 a)	The 295 N pipe is supported at A by a system of five cords as shown in figure. Determine the force in each cord for equilibrium.	10	2	3
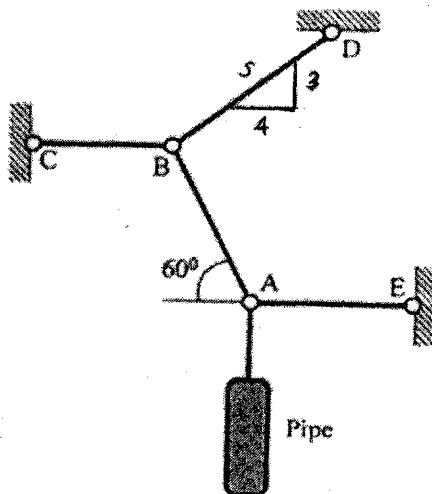
Q.2 b)	By the principle of virtual work, determine the reactions for the beam as shown:	10	3	7

30 kN

25 kN/m

35 kN·m

A   B   C   D   E   F

1m   1m   3m   2m   2m
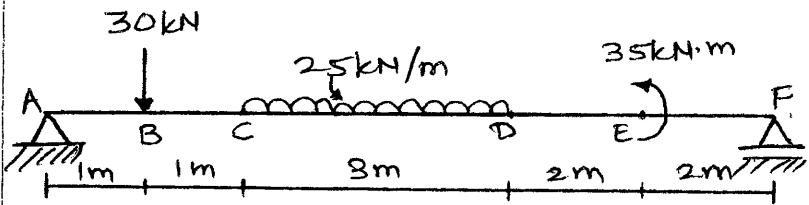
Q.3 a)	Find the range of weight of the W_B if the W_A = 20kN is to be kept in equilibrium with rod AB in horizontal position. And thus determine the range of values of axial force in the rod AB.	12	2	6

W_A = 20 kN

W_B = ?

A   B

$\mu = 0.2$ $\mu = 0.2$

30° 45°
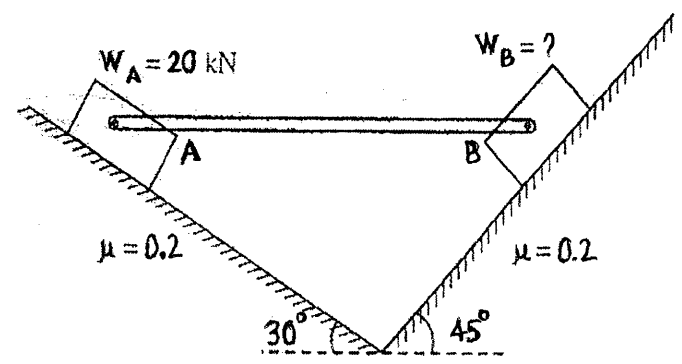
Q.3 b)	Find the resultant of the force system shown below:	08	1	2

F_1 = 75 kN

F_2 = 77 kN

41° 35° F_5 = 50 kN

F_6 = 50 kN 30° 46°

F_3 = 30 kN F_4 = 28 kN

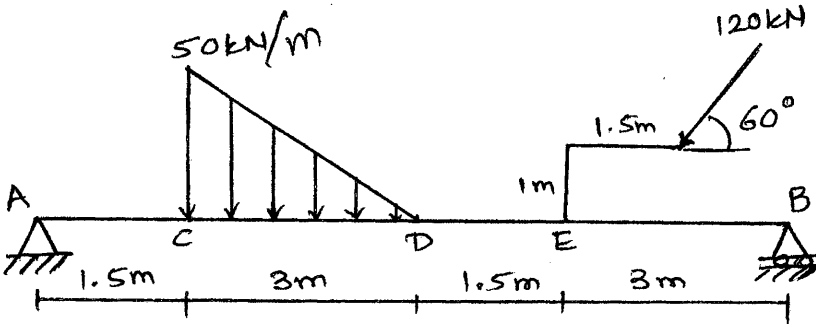| Q.4 a)	The tower is held in place by three cables. If the force of each cable acting on the tower is shown in figure, determine the resultant.	10	1	4

Z

O

600N   400N   800N

24m

16m

A   y

18m   15m   D   C

B   20m   6m   x
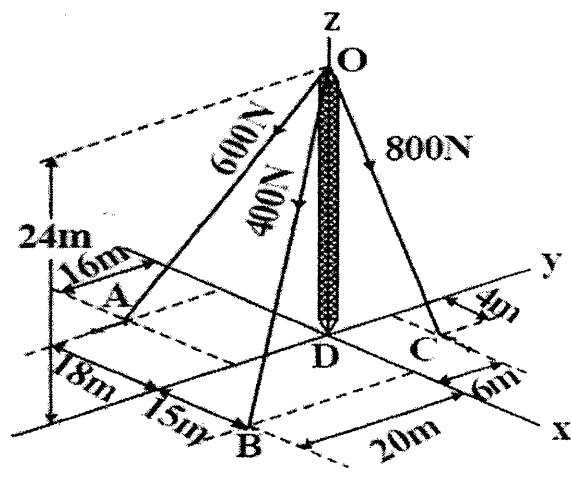
Q.4 b)	Determine reactions at support A and B.	10	2	3

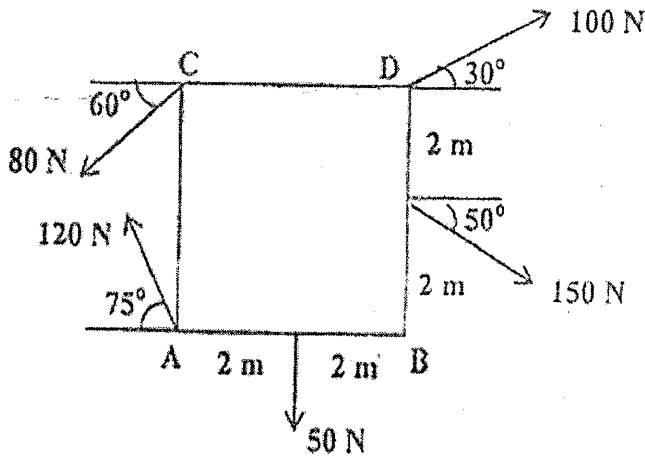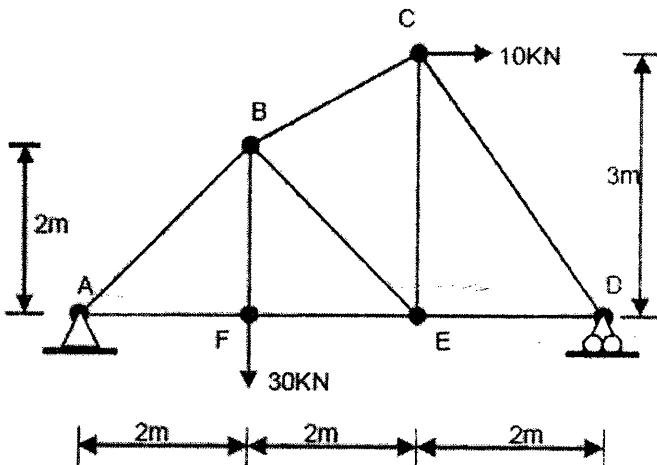| Q.5 a)	Determine magnitude and direction of resultant and locate it with respect to point C for the following force system	10	1	2

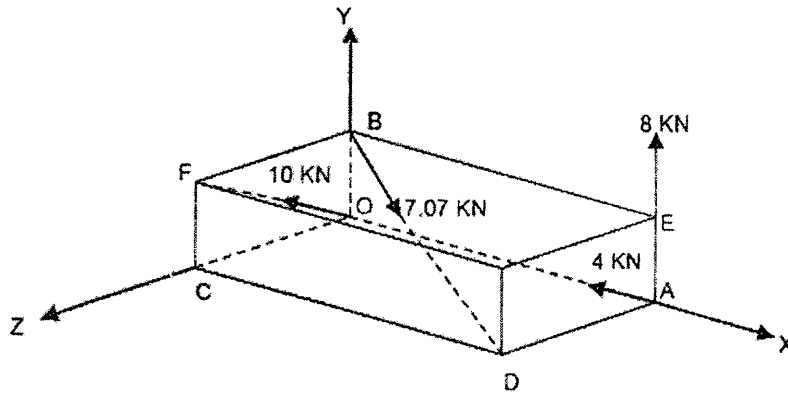| Q.5 b)	Find forces in all member by using method of joints.	10	2	5

Q.6 a)	An effort of 200N is required to move a certain body up in an inclined plane of angle 15^0, the force is acting parallel to the plane. If the angle of inclination at the plane is made 20^0, the effort required again applied parallel to the plane, is found to be 230N. Find the weight of the body and coefficient of friction.	08	2	6

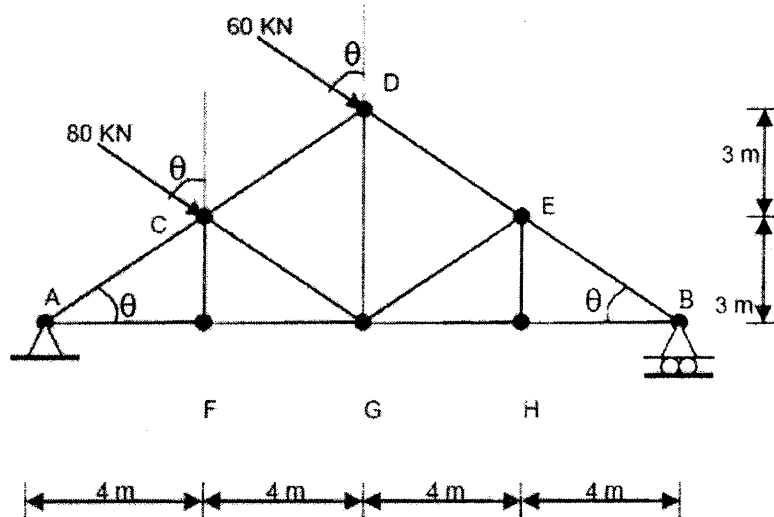| Q.6 b)	A rectangular parallel piped carries 4 forces as shown in the figure. Reduce the force system to a resultant force applied at the origin and a moment around origin. OA= 6 m, OB = 2.5m, OC = 4.5 m.	12	1	4
Q.7 a)	A simply supported pin jointed truss is loaded and supported as shown in the following figure:- (i) Identify the members carrying zero force. (ii) Find support reactions. (iii) Find forces in the members CD, FG and CF using method of section.	12	2	5
Q.7 b)	Enlist various system of forces along with neat sketches.	08	1, 2, 3	1