IV B.Tech. I Semester Supplementary Examinations Nov/Dec 2017
Automobile Engineering
(Mechanical Engineering)

Max. Marks: 70   Time: 3 Hours

Answer any **five** questions
All Questions carry equal marks (**14 Marks each**)
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1. Explain front wheel drive, rear wheel drive and all-wheel drive with suitable examples. On a hilly track, the performance of a rear wheel driven vehicle is superior compared to front wheel drive vehicle. Give the reasons. 14M

2. a) With the help of a neat sketch, explain the working of mechanical fuel pump. 7M

   b) Explain Common Rail Diesel Injection system with a sketch. 7M

3. a) How Pressure sealed cooling system is different from conventional water cooling system. Give the differences. 7M

   b) Explain Electronic Ignition system. What is the role of ECU in this system? 7M

4. a) Give the list of pollutants from an automobile and explain the reasons for the formation. 7M

   b) Explain different techniques used to control the pollutants coming from an automobile. 7M

5. a) Explain how bendix drive system used as a starting system in automobile 7M

   b) What is the role of current-voltage regulator, Explain? 7M

6. a) Which type of clutch is suitable in heavy vehicles? Explain with a sketch. 7M

   b) How torque converter is different from fluid flywheel? Explain. 7M

7. a) Explain Davis steering gear mechanism with a neat sketch. 7M

   b) Give the list of steering gears used in automobile and explain any one of them. 7M

8. a) Give the differences between hydraulic braking system and Pneumatic braking system. 7M

   b) Rigid suspension system will not give comfort and smooth suspension will not give stability of the vehicle. Justify the statement with suitable examples 7M

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Hall Ticket Number :

Code: 1G574

IV B.Tech. I Semester Supplementary Examinations Nov/Dec 2017
Automation and Robotics
(Mechanical Engineering)

Max. Marks: 70

Time: 3 Hours

Answer any **five** questions
All Questions carry equal marks (**14 Marks each**)
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1.	Discuss the need for automation and explain the types of automation.	14M
2.	With neat diagrams, explain the different configurations of automated flow lines.	14M
3.	Explain a manual assembly line with three different levels of pacing and describe the method of calculating the Takt-time.	14M
4.	Sketch and explain the four basic robot configurations classified according to the coordinate system.	14M
5. a)	With an example differentiate forward and inverse kinematics.	7M
b)	Write down about Jacobians differential transformation	7M
6.	Define Trajectory Planning and discuss how it is done in case of a robot having modified constant velocity motion.	14M
7.	Explain the various types of sensors used in industrial robots with necessary examples.	14M
8.	Discuss the applications of robots in material transfer, loading and unloading.	14M

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IV B.Tech. I Semester Supplementary Examinations Nov/Dec 2017
Finite Element Methods
(Mechanical Engineering)

Max. Marks: 70   Time: 3 Hours

Answer any **five** questions
All Questions carry equal marks (**14 Marks each**)
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1. a) What is Finite Element Method? List its advantages and applications.   6M

   b) Discuss **i**) Global, **ii**) Local, **iii**) Natural and **iv**) Area co-ordinate system with suitable sketch.   8M

2. Starting with shape functions, derive the element stiffness matrix for 1D quadratic element.   14M

3. For the two bar truss shown in Fig. Q3. Determine the nodal displacement, element stresses and reactions. Take E = 210 GPa and A = 600 mm^2.

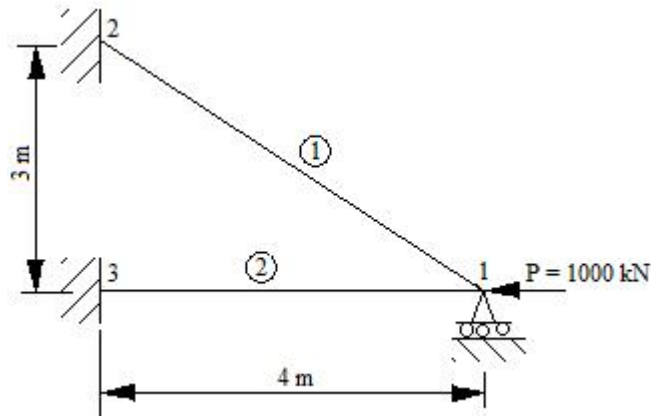Fig. Q3   14M

4. Derive the Hermits shape functions and element stiffness matrix for a 2 noded 1D beam element.   14M

5. Obtain the strain displacement Matrix [B] for a 3 noded CST element.   14M

6. a) Define Iso-parametric, Super-parametric and Sub-parametric elements in FE analysis.   6M

   b) Evaluate $\int_{0}^{3} x^2 dx$ using two-point Gauss quadrature method and verify by direct integration.

                                                                                8M

7. a) Explain the functional approach for 1D steady state heat conduction formula.   7M

   b) A composite wall consists of three materials as shown in Fig. The outer temperature is T_o= 20^{0}C. Convection heat transfer takes place on the inner surface of the wall with T_∞ = 800^{0}C and h = 25 W/m^2 ^{0}C. Determine the temperature distribution in the wall.

                                                                                7M
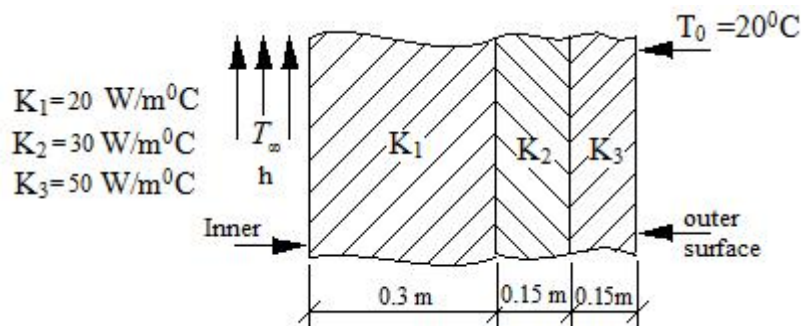
8. Derive the Eigen values and Eigen vectors for the stepped bar shown in Figure. Take E=200 GPa, = 7000 Kg/m^3, A$_1$= 600 mm^2, A$_2$ = 300 mm^2, l$_1$ = 250 mm and l$_2$= 125 mm.
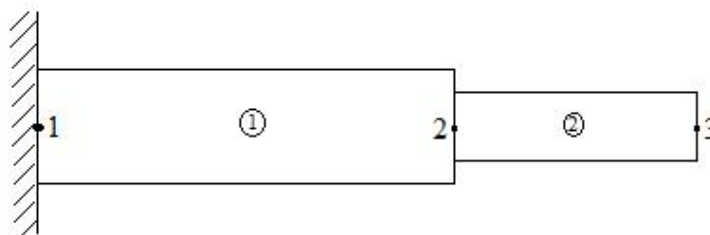
Fig.   14M

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Hall Ticket Number :

Code: 1G571

IV B.Tech. I Semester Supplementary Examinations Nov/Dec 2017
Operations Research
(Mechanical Engineering)

Max. Marks: 70   Time: 3 Hours

Answer any **five** questions
All Questions carry equal marks (**14 Marks each**)
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1. a) What are the different types of models used in OR? Mention general methods of solving Operation Research models   7M

   b)   Solve Min Z = 12 X_1 + 20 X_2

           S.T.   6X_1+ 8 X_2 100

               7X_1 + 12X_2 120

              X_1 0, X_2 0   by Big M Method.   7M

2. a) What is meant by degeneracy in T.P. How do you resolve it?   7M

   b) Find optimal solution to the following TP using VAM-MODI method each cell value being the Unit cost

	D_1	D_2	D_3	D_4	D_5	supply
C_1	35	41	28	16	20	285
C_2	14	21	28	30	15	145
C_3	45	18	17	29	26	165
Demand	125	125	100	100	175	

        7M

3.   Machine A cost Rs.9,000. Annual operating cost are Rs.200 for the first year, and then Increased   by Rs. 2000 every year. Determine the best age at which to replace the machine. If the   optimum   replacement   policy   is   followed, what will be the average yearly cost of owning and operating the machine? Machine B costs Rs.10,000. Annual operating costs are Rs.400 for the first year, and then increased by Rs.800 every year. You know have a machine of type A which is one year old. Should you replace it with B, if so, when?   14M

4. a) write short notes on

   (i) Applications of game theory in business system.   4M

   (ii) Distinguish between games with saddle points and without saddle points.

   b) Determine the best strategy for the player A in the following game

   Player B

	I	II
I	3	-5
II	1	-1
III	2	-3
IV	-1	3
V	0	1

        10M

5.	Arrival at a telephone booth are considered to be Poisson with an average time of 10 minutes between one arrival to the next. The length of the phone call is assumed to be distributed Exponentially, with mean 3 minutes.

(i)	What is the probability that a person arriving at the booth will have to wait.

(ii)	The telephone department will install a second booth when convinced that an arrival would expect waiting at least 3 minutes for a phone call. By how much the flow of arrival should increase in order to justify a second booth.

(iii)	What is the average length of Queue that forms time to time?

(iv)	What is the probability that it will take him more than 10 minutes all together to wait for the phone call and complete his call.	14M

6. a)	Describe the basic characteristics of inventory system	7M

b)	A company uses Rs. 10,000 worth of an item during the year. The ordering costs are Rs.25 per order and carrying charges are 12.5% of the average inventory value. Find the economic order quantity, number of orders per year, time period per order and the total cost.	7M

7. a)	Define the following terms in dynamic programming

(i) State (ii) State variable (iii) Immediate return (iv) Optimal return	7M

b)	Find the Maximum value of $x_1^2 + 2x_2^2 + 4x_3^2$

S.T. $x_1 + 2x_2 + x_3$ 8, x_1, x_2, x_3 0.	7M

8. a)	What are the advantages and disadvantages of Simulation?	7M

b)	What are the factors that affect the selection of simulation language?	7M

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IV B.Tech. I Semester Supplementary Examinations Nov/Dec 2017
Un Conventional Machining Process
(Mechanical Engineering)

Max. Marks: 70   Time: 3 Hours

Answer any **five** questions
All Questions carry equal marks (**14 Marks each**)
****

1.	a)	What are the needs of Unconventional Machining Processes(UCMP)?	7M
	b)	Construct a table for classification of UCMP based on different energy used for machining.	7M
2.	a)	With a neat sketch explainabout general arrangement of Ultrasonic Machine.	8M
	b)	Mention variables affecting on material removal rate inUltrasonic Machining Process.	6M
3.		Explain the working principle, elements and applications of Abrasive Jet Machining process with a neat sketch.	14M
4.	a)	Explain the electro chemistry and working principle of Electro Chemical Machining with a neat sketch.	10M
	b)	Mention tool materials and Electrolytes used in Electro Chemical Machining process.	4M
5.	a)	Define Electric discharge machining. Discuss role of Dielectric fluid in EDM.	7M
	b)	Describe Wire cut electric discharge machining method with a neat sketch.	7M
6.	a)	Explain construction of Electron beam gun with neat sketch.	7M
	b)	Explain Characteristics and applications of Laser Beam Machining.	7M
7.	a)	Define plasma arc machining and Explain working principle and plasma arc machining.	8M
	b)	Mention the process parameters of Plasma Arc Machining process.	6M
8.	a)	Explain working of shaped tube Electrolytic machining process.	7M
	b)	Define and classify rapid prototyping process. Mention applications of rapid prototyping.	7M

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