

*II B.Tech II Semester Regular April 2013**Environmental Science*  
( Common to ME & CSE)

Max. Marks: 70

Time: 03 Hours

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Answer *any five* questions

All Questions carry equal marks (14 Marks each)

1. a) Explain the importance of Environmental Education. 7M  
b) Give a note brief account on components of environment. 7M
2. a) What are the causes and effects of deforestation? Suggest some conservation measures? 7M  
b) Write about the various applications and advantages of alternate energy resources. 7M
3. a) Give a detailed account on land conservation measures. 7M  
b) Write about the environmental effects of over exploitation of mineral resources. Suggest some conservation measures. 7M
4. Define the term solid waste management and write about various methods of solid waste treatments in detail. 14M
5. a) Give a detailed account of the process of succession in forest ecosystem. 7M  
b) Write a short note on food chain and food web with examples. 7M
6. a) What are the various causes for loss of biodiversity? 7M  
b) Write about the values of biodiversity. 7M
7. a) What are the salient provisions of wild life act? 7M  
b) Write about the greenhouse gases and their impact on global temperature. 7M
8. a) Write a note on role of information technology on human health and environment. 7M  
b) Value education has an important effect on environmental conservation. Justify. 7M

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**II B.Tech II Semester Regular Examinations April – 2013****Fluid Mechanics and Hydraulic Machines  
( ME)****Max. Marks: 70****Time: 03 Hours**

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

1. a. A plate 0.025 mm distant from a fixed plate, moves at a speed of 51 cm/sec and requires a force of  $1.571\text{N/m}^2$  to maintain this speed. Determine the fluid viscosity between the plates in poise 6M
- b. Define the following: 8M  
(1) Atmospheric pressure (2) Gauge pressure (3) Vacuum pressure (4) Buoyancy
2. a. Difference between (1) Steady flow and Unsteady flow (2) Compressible flow and Incompressible flow (3) one, two and three dimensional flow 9M
- b. A pipe, through which water is flowing, is having diameters, 25 cm and 15 cm at the cross-sections 1 and 2 respectively. The velocity of water at section 1 is given as 6.0 m/s. Find the velocity head at sections 1 and 2 and also rate of discharge 5M
3. a. Derive the Darcy-Weisbach equation for the loss of head due to friction in a pipe. 9M
- b. What do you understand by separation of boundary layer. 5M
4. a. Obtain an expression for the force exerted by a jet of water on stationary inclined flat plate 7M
- b. A jet of water of diameter 70mm moving with a velocity of 20m/s strikes a fixed plate in such a way that the angle between the jet and plate is  $60^\circ$ . Find the force exerted by the jet on the plate (i) in the direction normal plate and (ii) in the direction of the jet 7M
5. Where will you provide pumped-storage plant? Explain the working of a pumped-storage plant. 14M
6. A pelton wheel is to be designed to the following specifications:  
power = 11948kW , Head = 381m, Speed = 750 r.p.m, overall efficiency = 86%, jet diameter not exceed 1/8 times the wheel diameter. Determine: (i) The wheel diameter (ii) The number of jets required. (iii) The diameter of the jet. 14M
7. Explain what do you understand by governing of a hydraulic turbine with a neat sketch 14M
8. Derive an expression for the work done by the impeller of a centrifugal pump on liquid per second per unit weight of liquid 14M

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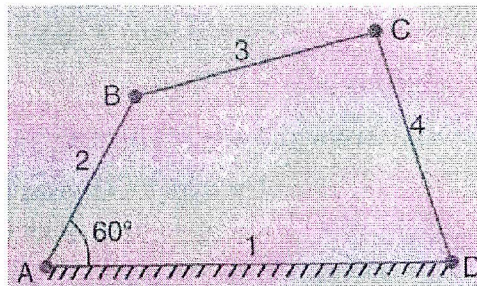


*II B.Tech II Semester Regular April 2013***Kinematics of Machinery  
( ME )****Max. Marks: 70****Time: 03 Hours**

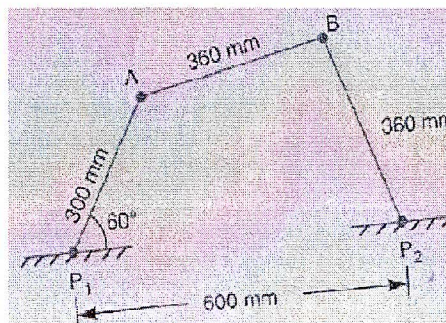
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**Answer any five questions****All Questions carry equal marks (14 Marks each)**

1. a) Explain the terms. 4M  
 i) Lower pair    ii) Higher pair    iii) Kinematic chain    iv) Inversion.
- b) Sketch and explain crank and slotted lever quick return motion mechanism. 10M
2. a) Sketch and explain 'Pantograph' 7M  
 b) Explain the Hart's mechanism to produce the straight line motion. 7M
3. a) State and prove Kennedys theorem of three instantaneous centres? 4M  
 b) Locate all the instantaneous centers for a four bar mechanism as shown in the figure. 10M  
 The lengths of various links are:  $AD = 125\text{mm}$ ;  $AB = 62.5\text{mm}$ ;  $BC = CD = 75\text{mm}$ . If the link AB rotates at a uniform speed of 10 rpm in clockwise direction, find the angular velocity of the links BC and CD.



4. The dimensions and configuration of the four bar mechanism, shown in fig.; are as follows: 14M  
 $P_1A = 300\text{mm}$   $P_2B = 360\text{mm}$ , and  $P_1P_2 = 600\text{mm}$ . The angle  $AP_1P_2 = 60^\circ$ . The crank  $P_1A$  has an angular velocity of  $10\text{rad/s}$  and an angular acceleration of  $30\text{rad/s}^2$ , both clockwise. Determine the angular velocities and angular accelerations of  $P_2B$ , and AB and the velocity and acceleration of the joint B.



5. A cam with a minimum radius of 25mm, rotating clockwise at a uniform speed is to be designed to give a roller follower, at the end of a valve rod, motion described below : 14M

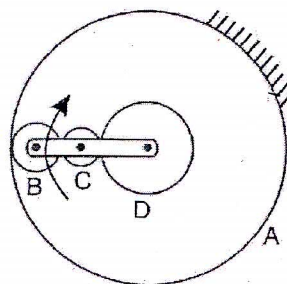
1. To raise the valve through 50mm during  $120^{\circ}$  rotation of the cam ;
2. To keep the valve fully raised through the next  $30^{\circ}$  ;
3. To lower the valve during next  $60^{\circ}$  ; and
4. To keep the valve closed during rest of the revolution i.e.  $150^{\circ}$  ;

The diameter of the roller is 20mm and the diameter of the cam shaft is 25mm.

Draw the profile of the cam when, the line of the stroke of the valve rod passes through the axis of the cam shaft.

The displacement of the valve, while being raised and lowered, is to take place with simple harmonic motion. Determine the maximum acceleration of the valve rod when the cam shaft rotates at 100 rpm.

6. a) State and prove the law of gearing. 4M
- b) Two gears of module 4mm have 24 and 33 teeth. The pressure angle is  $20^{\circ}$  and each gear has a standard addendum of one module. Find the length of arc of contact and the maximum velocity of sliding if the pinion rotates at 120 rpm. 10M
7. A flat belt is required to transmit 35 kW from a pulley of 1.5m effective diameter running at 300 rpm. The angle of contact is spread over  $11/24$  of the circumference and the coefficient of friction between belt and pulley surface is 0.3. Determine, taking centrifugal tension in to account , width of the belt required. It is given that the belt thickness is 9.5 mm, density of its material is  $1.1 \text{ Mg/m}^3$  and the related permissible working stress is 2.5 MPa 14M
8. An epicyclic gear train, as shown in figure. Is composed of a fixed annular wheel A having 150 teeth. The wheel A is meshing with wheel B which drives wheel D through an idle wheel C, D being concentric with A. The wheels B and C are carried on an arm which revolves clockwise at 100 rpm. About the axis of A and D. If the wheels B and D have 25 teeth and 40 teeth respectively, find the number of teeth on C and the speed and sense of rotation of C. 14M



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**II B.Tech II Semester Regular Examinations April – 2013****Manufacturing Technology  
(ME)**

Max. Marks: 70

Time: 03 Hours

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

1. a) Why allowances are required on patterns? What are the different allowances provided? Explain how each allowance is applied. 7M  
b) What are the requirements of an efficient gating system design? Sketch elements of a gating system and briefly the explain the function of each element. 7M
2. a) What are the functions of a riser? State the Chvorinov's rule pertaining to solidification of a casting. 7M  
b) Compare the solidification time of two risers of same volume, one being cylindrical in shape while other in the shape of square prism 7M
3. a) What are the functions of coatings on electrodes in arc welding? 7M  
b) What is submerged arc welding? What are its advantages? 7M
4. Compare the following a) Brazing and Welding. 14M  
b) Arc welding and Gas welding  
c) Gas welding and Gas cutting.
5. a) Differentiate between cold working and hot working of metals. 7M  
b) Explain the following terms with respect to a rolling process: 7M  
i) Angle of bite ii) Neutral plane iii) Roll separating force
6. a) Sketch a typical die set used for blanking. Briefly explain the function of each part. 7M  
b) Explain the terms die - punch clearance and angular clearance. 7M
7. a) Write a note on forging defects. 7M  
b) Discuss about Forward and Backward extrusion processes. 7M
8. a) What are the problems faced in machining materials of modern days? How are they over come using non traditional methods of machining? 7M  
b) Explain the mechanics of material removal in abrasive jet machining. 7M

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**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES :: RAJAMPET  
(AUTONOMOUS)**

**II B.Tech II Semester Regular April 2013**

**Probability & Statistics  
( Common to ME & IT )**

Max. Marks: 70

Time: 03 Hours

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Answer any five questions

All Questions carry equal marks (14 Marks each)

1. a) Find the mean, median and mode for the following distribution

x	1	2	3	4	5	6	7	8
y	4	9	6	25	22	18	7	3

7M

- b) Find the rank correlation coefficient to the following data:

X	65	63	67	64	68	62	70	66	68	67	69	71
Y	68	66	68	65	69	66	68	65	71	67	68	70

7M

2. a) Among 150 students 80 are studying Math's, 40 are studying Physics and 30 are studying Math's and Physics. If a student is chosen at random find the probability that the student

(i) Studying Math's or Physics

(ii) Student studying neither Math's nor Physics.

7M

- b) State and prove BAYE'S theorem.

7M

3. a) If X and Y are discrete random variables and K is constant then prove that

(i)  $E(X+K) = E(X) + k$ (ii)  $E(X+Y) = E(X) + E(Y)$ 

7M

- b) Find the probability density of random variable is given by

$$f(x) = k(1-X^2) \text{ for } 0 < x < 1$$

$$= 0 \text{ elsewhere}$$

find the value of k and the probabilities that a random variable will take on a value

(i) between .1 and .2

(ii) greater than .5.

7M

4. a) If mean and variance of a binomial distribution are 4 and 2 find the probability of

(i) Exactly two successes (ii) less than two successes (iii) at least two successes.

7M

- b) Pipes for tobacco are being packed in fancy plastic boxes. The length of the pipes is normally distributed with
- $\mu = 5$
- and
- $\sigma = 0.1$
- , the internal length of the boxes is 5.2. What is the probability that they would be small for the pipe?

7M

5. A population consists of six numbers 4,8,12,16,20,24. consider all samples of size two which can be drawn without replacement from this population .find
- population mean
  - Population S.D
  - Mean of the sampling distribution of means
  - S.D of the sampling distribution of means.
- 14M

6. a) The following are the average weekly losses of the worker hours due to accidents in 10 industrial plants before and after a certain safety program were put into the operation. 45 and 36, 73 and 60, 46 and 44, 124 and 119, 33 and 35, 57 and 51, 83 and 77, 34 and 29, 26 and 24, & 17 and 11. Use 0.05 level of significance to test whether the safety program is effective.
- 7M

- b) A random sample of size 81 was taken whose variance is 20.25 and mean 32. Construct 90% confidence interval.
- 7M

7. a) Samples of students were drawn from two universities and from their weights in kgm and standard deviations are calculated. Make a large sample test to test significance of the difference between the means

	Mean	S.D	Size of the sample
University A	55	10	400
University B	57	15	100

7M

- b) Find maximum difference that we can expect with probability 0.95 between the means of samples of sizes 10 and 12 from a normal population if their standard deviations are found to be 2 and 3 respectively.
- 7M

8. Decide on the basis of following data (observed frequencies ) shown in the following table whether the number of errors a compositor makes in the setting a galley of type is a random variable having Poisson distribution:

Number of errors (Xi)	0	1	2	3	4	5	6	7	8	9
Observed frequencies (fi)	18	53	103	107	82	46	18	10	2	1

14M

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**Thermal Engineering -I  
(ME)****Max. Marks: 70****Time: 03 Hours**

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

1. a) Briefly discuss pumping and rubbing friction losses? 7M  
b) Explain the loss due to gas exchange process? 7M
2. a) Explain the working principle of a simple carburetor with neat diagram? 7M  
b) Discuss the differences between spark ignition engine and compression ignition engine? 7M
3. a) What is abnormal combustion in S.I. Engine? Compare the abnormal combustion with normal combustion. 7M  
b) Explain the desirable characteristics of a good combustion chamber for S.I.Engine. 7M
4. a) Explain briefly the combustion phenomenon in C.I engine with pressure- crank angle diagram. 7M  
b) State the factors on which delay period depends in C.I engine. 7M
5. In a Morse test of a four-cylinder, four-stroke petrol engine of 75 mm bore and 100 mm stroke, the following results were obtained at full throttle at a constant speed and with a fixed setting of the fuel supply of 0.082 kg/min.  
bp with all cylinders working = 15.24 kW  
bp with cylinder number 1 cut-off = 10.45 kW  
bp with cylinder number 2 cut-off = 10.38 kW  
bp with cylinder number 3 cut-off = 10.23 kW  
bp with cylinder number 4 cut-off = 10.45 kW  
Estimate the indicated power of the engine under these conditions. If the calorific value of the fuel is 44 MJ/kg. Find the indicated thermal efficiency and mechanical efficiency of the engine. 14M



6. a) Draw the schematic diagram of single cylinder reciprocating air compressor and derive the equation for the estimation of work required to compress the air. 7M
- b) A single stage single acting reciprocating air compressor with 0.3 m bore and 0.4 m stroke runs at 400 rpm. The suction pressure is 1 bar at 300 K and the delivery pressure is 5 bar. Find the power required to run it, if the compression is isothermal, adiabatic and compression follow  $p v^{1.3} = C$ . 7M
7. a) Derive an expression for the efficiency of roots blower in terms of pressure ratio and ratio of specific heats based on p-v and T-s diagrams. 7M
- b) A rotary vane compressor compresses  $4.5 \text{ m}^3$  of air per minute from 1 bar to 2 bar when running at 450 rpm. Find the power required to drive the compressor when.
- the ports are so placed that there is no internal compression and.
  - the ports are so placed that there is 50% increase in pressure due to compression before the back flow occurs. 7M
8. a) Draw the schematic diagram of axial flow air compressor and explain its working along with velocity triangles. 7M
- b) An axial flow compressor having eight stages and with 50% reaction design compresses air in the pressure ratio of 4:1. The air enters the compressor at  $20^\circ\text{C}$  and flows through it with a constant speed of 90m/s. The rotating blades of compressor rotate with a mean speed of 180m/s. Isentropic efficiency of the compressor may be taken as 82%. Calculate:
- Work done by the machine
  - Blade angles
- Assume  $\gamma = 1.4$  and  $C_p = 1.005 \text{ KJ/Kg K}$  7M

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