

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

II B.Tech. II Semester Supplementary Examinations Jan/Feb 2014

***Environmental Science*
(Common to ME & CSE)**

Max. Marks: 70

Time: 03 Hours

Answer *any five* questions

All Questions carry equal marks (14 Marks each)

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| 1. | a) Define the multi disciplinary nature of environmental science. | 7M |
| | b) Explain the people and organizations related to environment. | 7M |
| 2. | a) Explain the environmental impacts due to over exploitation of dams. | 7M |
| | b) Write about the classification of renewable and non renewable resources. | 7M |
| 3. | a) Explain the role of individual for the conservation of natural resources. | 7M |
| | b) Discuss the mineral reserves of India and suggest some conservation measures. | 7M |
| 4. | a) What are the major effects and control measures of noise pollution? | 7M |
| | b) Give a note on the waste that is classified as hazardous waste. | 7M |
| 5. | How are carbon fixation and nitrogen fixation important for proper functioning of ecosystem? | 14M |
| 6. | Give a detailed account of India's biodiversity, substantiating the fact that India is a Mega Diversity Nation. | 14M |
| 7. | a) Write about resettlement and rehabilitation of dispersed people. | 7M |
| | b) What is Acid rain and write the impacting the same on environment? | 7M |
| 8. | a) What are the factors that affect population growth? | 7M |
| | b) Write about the variation of population growth in different nations. | 7M |

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***Fluid Mechanics and Hydraulic Machines*
(ME)**

Max. Marks: 70

Time: 03 Hours

Answer any five questions

All Questions carry equal marks (14 Marks each)

1. A U-tube manometer is used to measure the pressure of oil of specific gravity 0.82 flowing in a pipe line. Its left end is connected to the pipe and the right limb is open to the atmosphere. The centre of the pipe is 90 mm below the level of mercury (specific gravity=13.6) in the right limb. If the difference of mercury level in the two limbs is 150 mm. Determine the absolute pressure of the oil in the pipe. 14M
2. Derive the Bernoulli equation from the Eulers equation of motion. State the assumptions made during its derivation. 14M
3. a. Define the terms: (1) Hydraulic Gradient Line (2) Total Energy Line 5M
 b. A crude oil of kinematic viscosity 0.4 stoke is flowing through a pipe of diameter 250mm at the rate of 300 lit/sec. Find the head lost due to friction for a length of 40m of the pipe. 9M
4. A jet water of 60mm diameter strikes a curved vane at its centre with a velocity of 18m/s. The curved vane is moving with a velocity of 6m/s in the direction of jet. The jet is deflected through an angle of 165° . Assuming the plate to be smooth find:
 (i) Thrust on the plate in the direction of jet (ii) Power of the jet and
 (iii) efficiency of the jet. 14M
5. a. Discuss various classifications of hydropower plants. 7M
 b. Discuss the relative merits and demerits of the hydropower 7M
6. a. Derive an expression for hydraulic efficiency of a pelton wheel. 7M
 b. Give the comparison between between impulse and reaction turbines. 7M
7. a. A turbine is to operative under a head of 20m at 200r.pm. The discharge is $8\text{m}^3/\text{s}$. If the efficiency is 90% . Determine the performance of turbine under a head of 20m 7M
 b. Discuss cavitation and characteristics curves of a turbine 7M
8. Explain characteristic curves of a centrifugal pumps 14M

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Kinematics of Machinery
(ME)

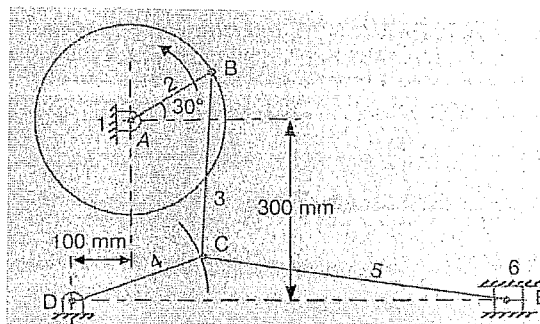
Max. Marks: 70

Time: 03 Hours

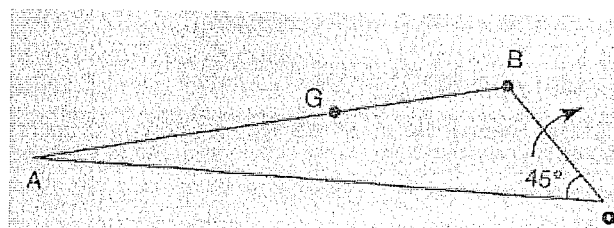
Answer any five questions

All Questions carry equal marks (14 Marks each)

1. a) What is machine? Differentiate between machine and structure. 4M
- b) Sketch and explain any two inversions of a double slider crank chain 10M
2. a) Sketch and explain any one type of exact straight line motion mechanism. 7M
- b) Derive the fundamental equation for correct steering. 7M
3. a) Explain the space and body centroid. 4M
- b) Locate all the instantaneous centers of the mechanism as shown in Fig. The lengths of various links are : $AB = 150$ mm; $BC = 300$ mm; $CD = 225$ mm ; and $CE = 500$ mm. When the crank AB rotates in the anticlockwise direction at a uniform speed of 240r.p.m. ; Find 1. Velocity of the slider E , and 2. Angular velocity of the links BC and CE . 10M



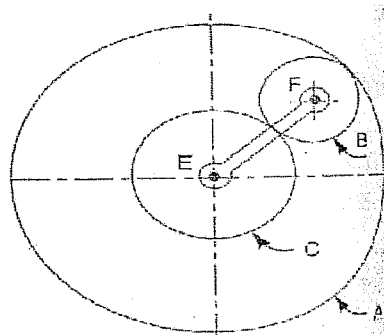
4. The engine mechanism as shown in figure , has crank $OB = 50$ mm and length of connecting rod $AB = 225$ mm. The centre of gravity of rod is at G which is 75 mm from B . The crank shaft has a speed of 75 rad/sec and angular acceleration of 1200 rad/sec². For the position shown in which OB is turned 45° from OA , find 1. The velocity of G and the angular velocity of AB . And 2. The acceleration of G and angular acceleration of AB . 14M



5. A cam is to be designed for a knife edge follower with the following data: 14M
1. Cam lift = 40 mm during 90° of cam rotation with simple harmonic motion.
 2. Dwell for the next 30° .
 3. During the next 60° of cam rotation, the follower returns to its original position with uniform acceleration.
 4. Dwell during the remaining 180° .

Draw the profile of the cam when the line of stroke is offset 20 mm from the axis of the cam shaft. The radius of the base circle of the cam is 40mm. Determine the maximum velocity and acceleration of the follower during its ascent and descent, if the cam rotates at 240 rpm.

6. a) Compare the profile of involute and cycloidal gears. 4M
- b) A pair of 20° full depth involute spur gears having 30 and 50 teeth respectively of module 4mm are in mesh. The smaller gear rotates at 1000 rpm. Determine : 10M
1. Sliding Velocities at engagement and at disengagement of pair of a teeth, and
 2. Contact ratio.
7. Determine the width of a 9.75 mm thick leather belt required to transmit 15kW from a motor running at 900 rpm. The diameter of the driving pulley of the motor is 300 mm. The driven pulley runs at 300 rpm. And the distance between the centre of two pulleys is 3 meters. The density of the leather is 1000 kg/m^3 . The maximum allowable stress in the leather is 2.5 MPa. The coefficient of friction between the leather and pulley is 0.3. Assume open belt drive and neglect the sag and slip of the belt. 14M
8. An epicyclic gear consist of three gears A, B and C as shown in Fig. The gear A has 72 internal teeth and gear C has 32external teeth . The gear B meshes with both A and C and is carried on an arm EF which rotates about the centre of A at 18 rpm,. If gear A is fixed, determine the speed of gears B and C. 14M



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II B.Tech. II Semester Supplementary Examinations Jan/Feb 2014

***Manufacturing Technology*
(ME)**

Max. Marks: 70

Time: 03 Hours

Answer *any five* questions

All Questions carry equal marks (14 Marks each)

1. a) What are the different elements of a gating system? Sketch and briefly explain about each. 7M
- b) What is gating ratio? Discuss about different gating systems based on gating ratio. 7M
2. Write short notes on 14M
 - a) Centrifugal casting process
 - b) Chills and chaplets
 - c) Cores and core prints.
3. Write notes on oxyacetylene welding process, describing also the different types of flames and equipment required. 14M
4. What is the principle of resistance welding? Explain about different resistance welding methods. 14M
5. Discuss about the terms: recovery, recrystallization and grain growth with neat sketches. 14M
6. Discuss about wire drawing and tube drawing processes. Include in your discussion the load calculations, die angles and reduction. 14M
7. a) What are the considerations in forging die design? 7M
- b) Write notes on i) impact extrusion ii) hydrostatic extrusion. 7M
8. Sketch an ECM plant and explain the process including the principle, types of electrolytes, their function and insulation. 14M

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES :: RAJAMPET
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II B.Tech. II Semester Supplementary Examinations Jan/Feb 2014

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

Max. Marks: 70

Time: 03 Hours

Answer any five questions

All Questions carry equal marks (14 Marks each)

1. a) calculate the coefficient of correlation for ranks from the following data
(x, y)-(5,8) (10,3) (6,2) (3,9) (19,12) (5,3) (6,17)(12,18) (8,22) (2,12) (10, 17) (19, 20) 7M
- b) Calculate the mean and standard deviation for the following table, given age distribution of 542 members

Age in years	20-30	30-40	40-50	50-60	60-70	70-80	80-90
No.of members	3	61	132	153	140	51	2

7M

2. a) Two cards are selected at random from 10 cards numbered 1 to 10 Find the probability that the sum is even if
- (i) The two cards are drawn together
- (ii) The two cards are drawn one after the other with replacement. 7M
- b) In a bolt factory, machines A, B and C manufacture respectively 25%, 35% and 40% of the total. If their output 5, 4 and 2 percent are defective bolts. A bolt is drawn at random from the product and is found to be defective. What is the probability that it was manufactured by machine B? 7M
3. a) If $f(x) = K e^{-|x|}$ is probability density function $-\infty < x < \infty$ find the value of K, find the variance of the random variable and also find probability between 0 and 4. 7M
- b) A random variable X has the following probability function

X	-3	-2	-1	0	1	2	3
P(x)	K	.1	K	.2	2k	.4	2k

Find mean and variance. 7M

4. a) If X is the Poisson variate such that $P(x=0) = P(x=1)$ find $P(x=0)$ and using the recurrence formula find the probability at $x = 1, 2, 3, 4$ and 5. 7M
- b) In a normal distribution, 31% of the items are under 45 and 8% are over 64. Find the mean and standard deviation of the distribution. 7M

5. Find the mean and standard deviation of the sampling distribution of the variances for the population 2,3,4,5 by drawing samples of size two
(a) with replacement (b) without replacement (sampling distribution of variances) 14M
6. a) Find 95% confidence limits for the mean of normality distributed population from which the following sample was taken 15,17,10,18,16,9,7,11,13,14. 7M
- b) To estimate the average time it takes to assemble a certain computer component, the individual engineer at an electronics firm timed 40 technicians in the performance of the task, getting mean of 12.73 minutes and a standard deviation of 2.06 minutes.
- i) What can we say with 99% confidence about the maximum error if $\bar{x} = 12.73$
- ii) Is used as point estimate of the actual average time required to do the job.
- iii) Use the given data to construct a 99% confidence interval. 7M
7. a) An ambulance service claims takes on the average less than 10 minutes To reach its destination in emergency calls. A sample of 36 calls has a mean of 11 minutes and the variance of 16 minutes. Test the significance at 0.05 level? 7M
- b) A study shows that 16 of 200 tractors produced on one assembly line required extensive adjustments before they could be shipped, while the same was true for 14 of 400 tractors produced on another assembly line. At the .01 level of significance, does this support the claim that the second production line does superior work? 7M
8. a) Four methods are under development for making discs of super conducting material. Fifty discs are made by each method and they are checked for superconductivity when closed with liquid

	First method	Second method	Third method	Fourth method
Super conductor	31	42	22	25
Failures	19	8	28	25

Test the significant difference between the proportions of conductors at 0.05 level. 14M

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***Thermal Engineering -I*
(ME)**

Max. Marks: 70

Time: 03 Hours

Answer *any five* questions

All Questions carry equal marks (14 Marks each)

1. Briefly explain the following
 - a) Time loss factor
 - b) Heat loss factor
 - c) Exhaust Blow down factor. 14M

2. a) Explain any one type of ignition system that is employed in S.I engines with neat sketch. 7M
 - b) Discuss the differences between two-stroke engine and four-stroke engine? 7M

3. a) What are different factors affecting knock in SI engine? 7M
 - b) What are knocking limited parameters in SI engine? 7M

4. Classify the CI engine combustion chambers? And explain with neat sketches? 14M

5. a) What is the use of heat balance sheet of an engine? 4M
 - b) A four cylinder, two stroke cycle petrol engine develops 30 kW brake power at 2500 rpm. The mean effective pressure on each piston is 8 bar and the mechanical efficiency is 80 %. Calculate the diameter and stroke of each cylinder if the stroke to bore ratio is 1.5. Also calculate the brake specific fuel consumption of the engine, if brake thermal efficiency is 28 %. The calorific value of the fuel is 44100 kJ/kg. 10M

6. a) Briefly explain the working of fan, blower and compressor 6M
 - b) A single stage double acting air compressor is required to deliver 14m³ of air per minute measured at 1.013 bar and 15⁰C. The delivery pressure is 7 bar and speed 300 rpm. Take clearance volume as 5% of the swept volume with the compression and expansion index of n=1.3. Calculate
 - i) swept volume of the cylinder
 - ii) The delivery temperature
 - iii) Indicated power 8M

7. a) What are different applications of vane compressor? Explain the vane blower compressor with suitable diagram along with p-v diagram. 7M
- b) A centrifugal compressor receives air at 1 bar and delivers it at 3.5 bar. Find the final temperature of air if the initial temperature of air is 310 K. The compressor compresses 2 kg of air per second. Isentropic efficiency = 84%. 7M
8. a) Explain various losses occurring in an axial flow compressor. 6M
- b) In an axial flow compressor, the overall stagnation pressure ratio achieved is 4 with overall stagnation isentropic efficiency 85%. The inlet stagnation pressure and temperature is 1bar and 300K. The mean blade speed is 180m/s. the degree of reaction is 0.5 at the mean radius with relative angles of 12° and 32° at the rotor inlet and outlet respectively. The work done factor is 0.9. Calculate
- i) actual temperature leaving the compressor
- ii) Number of stages. 8M
