

Code: 9A01404

R9

B.Tech II Year II Semester (R09) Supplementary Examinations November/December 2012

FLUID MECHANICS AND HYDRAULIC MACHINERY

(Mechanical Engineering)

Time: 3 hours

Max. Marks: 70

Answer any FIVE questions

All questions carry equal marks

1. (a) Explain manometers in detail.
(b) The pressure between two points A and B in a pipe conveying oil of $G = 0.8$ is measured by an inverted U-tube. The column connected to point B stands 1.6 m higher than that at point A. A commercial pressure gage attached directly to the pipe at A reads 1.125 kg(f)/cm^2 , find its reading when attached directly to the pipe at B.
2. (a) Derive the continuity equation for one dimensional flow.
(b) What are the applications of momentum equation? Explain any one in detail.
3. Explain orifice meter in detail.
4. A jet of water 75 mm diameter having a velocity of 25 m/s, strikes normally a flat smooth plate. Find the thrust on the plate if the plate is at rest and is moving in the same direction as the jet with a velocity of 6 m/s. Also find the work done per second and efficiency for each case.
5. Explain the various types of hydroelectric power plants.
6. Explain Pelton wheel in detail.
7. Explain characteristic curves of turbines in detail.
8. A centrifugal pump delivers water against a net head of 14.5 m and a design speed of 1000 rpm. The vanes are curved back to an angle of 30° with the periphery. The impeller diameter is 300 mm and outlet width 50 mm. Find the discharge of the pump if manometric efficiency is 95%.

KINEMATICS OF MACHINERY

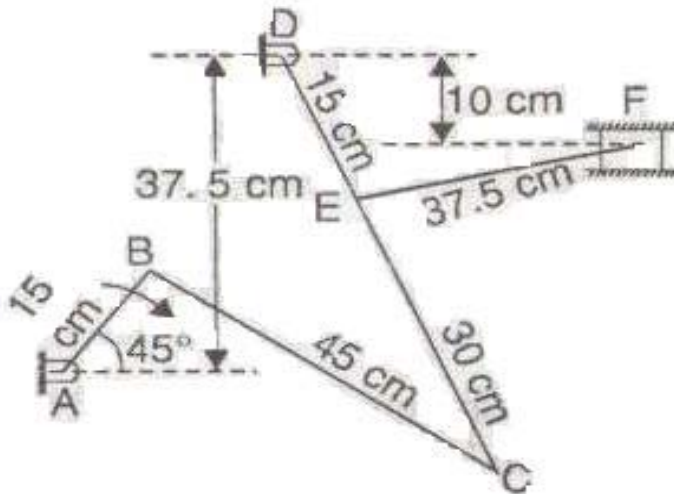
(Mechanical Engineering)

Time: 3 hours

Max. Marks: 70

Answer any FIVE questions
All questions carry equal marks

- 1 (a) Write a short note on the classification of kinematic pair.
(b) In a quick return motion mechanism of crank and slotted level type, the ratio of maximum velocities is 2. If the length of stroke is 25 cm, find: (i) the length of the slotted lever, (ii) the ratio of times of cutting and return strokes, (iii) the maximum cutting velocity per second if the crank rotates at 30 r.p.m.
- 2 (a) Describe Watt's straight line mechanism. What are the practical uses of straight line mechanism?
(b) What do you mean by a pantograph and what are its uses? Describe with a neat sketch the principal and working of the pantograph.
- 3 In the mechanism shown in figure the crank AB rotates about A at uniform speed of 120 r.p.m in the clockwise direction. The lever DC oscillates about the fixed points D, which is connected to AB by the coupler BC. The block F moves in the horizontal guides. Being driven by the link EF. Determine: (i) velocity of the block F; (ii) Angular velocity of lever DC; (iii) Rubbing velocity at the pin C which is 5 cm in diameter. The lengths of various links are: AB = DE = 15 cm; BC = CD = 45 cm and EF = 37.5 cm.



- 4 Two inclined shafts are connected by means of a universal joint. The speed of the driving shaft is 1000 r.p.m. if the total fluctuation of speed of the driven shaft is not to exceed 12.5% of this, what is the maximum possible inclination between the two shafts. With this angle, what will be the maximum acceleration to which the driven shaft is subjected and when this will occur.

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- 5 Determine the profile of cam to give oscillatory motion to the follower, with uniform angular velocity about its pivot. One oscillation is completed in one revolution of the cam. The distance between the cam centre and the pivot of the follower is 50 mm. The base circle diameter is 40 mm. Angle of oscillation is 30° . The length of the oscillating lever is 50 mm with roller of 5 mm diameter at the end.
- 6 (a) Define and explain the terms: path of approach, path of recess and path of contact between two mating gears.
(b) The number of teeth on each of the two equal spur gears in mesh is 30. The teeth have 20° involute profile and the module is 8 mm. If arc of contact is 1.3125 times the circular pitch, find the addendum.
- 7 (a) Derive an expression for the length of a crossed belt.
(b) The maximum permissible stress in a belt is 1.4 N/mm^2 and ratio of tensions is 2.0 find the maximum power transmitted by a belt 150 mm x 10 mm if the density of leather is 1 Mg/m^3 .
- 8 Explain the working principle of any two of the following with good line diagrams :
(i) Differential gears; (ii) Reverted gear; (iii) Epicyclic gear train;

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THERMAL ENGINEERING - I

(Mechanical Engineering)

Time: 3 hours

Max. Marks: 70

Answer any FIVE questions
All questions carry equal marks

- 1 (a) Explain in detail the effect of time loss in the mixing of fuel and air and also in combustion in case of I.C engine.
(b) Explain in detail the effect of heat loss from gases to cylinders in case of I.C engines.
- 2 (a) Explain any one method of spark ignition system that is employed in S.I engines with neat sketch.
(b) Explain different ignition systems employed in S.I engine.
- 3 (a) With the help of pressure-crank angle diagram, explain the normal combustion in spark ignition engines.
(b) Define homogeneous mixture.
- 4 Explain in detail the stages of combustion in C.I engine.
- 5 (a) Briefly explain the measurement of brake power of IC engine by using rope brake dynamometer.
(b) Determine the dimensions of cylinder, brake thermal efficiency and indicated mean effective pressure for the single cylinder four stroke diesel engines producing 100 kW of brake power. Engine runs at speed of 400 rpm, brake mean effective pressure of 850 kPa, brake specific fuel consumption of 0.335 kg/kW hr. The mechanical efficiency is 0.8 and stroke to bore ratio is 1.25. The calorific value of fuel may be taken as 43.5 MJ/kg.
- 6 (a) Briefly explain the working of fan, blower and compressor.
(b) A three stage single acting reciprocating air compressor delivers 2.5 m³ of free air per minute from 1 bar to 72 bar. Calculate the power required to operate compressor if $n = 1.3$. The mean piston speed is 140 m/min. Find the piston area, neglecting the clearance volume.
- 7 (a) What are different types of rotary compressors and explain briefly the working of any two rotary compressors?
(b) With the help of h-s diagram, compare actual and isentropic compressions.
- 8 (a) Explain very briefly why work done factor needs to be considered in a multi stage axial compressor and how it is applied.
(b) An axial flow air compressor is designed to provide an overall total-to-total pressure ratio of 8 to 1. At inlet and outlet the stagnation temperatures are 300 K and 586.4 K, respectively. Determine the overall total-to-total efficiency and the polytropic efficiency for the compressor. Assume that γ for air is 1.4.

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MANUFACTURING TECHNOLOGY

(Mechanical Engineering)

Time: 3 hours

Max. Marks: 70

Answer any FIVE questions
All questions carry equal marks

- 1 (a) What are the objectives of a gating system? Explain.
(b) Explain the top gate and bottom gate with sketch.
- 2 (a) Explain the cold chamber die casting process with sketch.
(b) What are the product applications of investment casting process?
- 3 (a) What are the two polarities of DC supply used in arc welding? Explain with sketch.
(b) The voltage length characteristics of a DC arc is given by $V=20+30 L$, where 'V' is the arc voltage and 'L' is the length of arc in cm. The power source characteristic is approximated by a straight line with an open circuit voltage is 60 V and short circuit current is 200 amp. Determine the optimum arc length and the corresponding arc power.
- 4 (a) What are the shielding gases that are most commonly used in the inert gas shielded arc welding process? Write their applications.
(b) What are the differences between TIG and MIG welding process?
- 5 (a) Explain the term mechanical working and plastic deformation of metals.
(b) Explain the working principle of blow moulding process with neat diagram, state its limitations.
- 6 (a) Distinguish between shallow drawing and deep drawing.
(b) Explain the bending operation. What are the different types of bending dies?
- 7 (a) What is hot extrusion? In how many ways it can perform.
(b) Classify the methods of forging. Explain in detail any one of them.
- 8 (a) Explain how multiple depths can be produced by chemical milling.
(b) What is the principal advantage of using moving wire electrode in EDM?

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B. Tech II Year II Semester (R09) Supplementary Examinations, November/December 2012

ENVIRONMENTAL SCIENCE

(Common to CE, ME, IT, CSE, AE, BT and MCT)

Time: 3 hours

Max. Marks: 70

Answer any FIVE questions
All questions carry equal marks

- 1 Discuss about the need for public awareness regarding environmental science.
- 2 (a) Discuss the classification of natural resources with examples.
(b) Write about deforestation and associated problems.
- 3 (a) Explain the concept of an ecosystem with the help of an example.
(b) Write about the structure and functions of an aquatic ecosystem.
- 4 (a) Discuss India as a mega diversity nation.
(b) Explain in-situ and ex-situ conservation of biodiversity.
- 5 (a) Define noise pollution. Give the causes, effects and control measures of noise pollution.
(b) Write about disaster management in respect of an earthquake.
- 6 (a) Explain the sustainability principle. What do you mean by sustainable development?
(b) Write notes on ozone layer depletion.
- 7 (a) Write about population explosion and its effects on human population and environment.
(b) What is the role of government in "women and child welfare"?
- 8 (a) What are the measures to be adopted for control of HIV/AIDS by the government?
(b) Write notes on consumerism and waste products.

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II B. Tech II Semester (R09) Supplementary Examinations, November/December 2012

PROBABILITY & STATISTICS

(Common to CE, ME, CSS & IT)

Time: 3 hours

Max. Marks: 70

Answer any FIVE questions
All questions carry equal marks

- 1 (a) A fair coin is tossed 5 times. What is the probability of having at least one head?
(b) In a team of communication engineers, 80% know probability theory, 75% know information theory and 70% know both probability theory and information theory. Calculate the percentage of engineers who know neither probability theory nor information theory.

- 2 A random variable x has the following probability function

X=x	0	1	2	3	4	5	6	7
P(X=x)	0	K	2k	2k	3k	k ²	2k ²	7k ² +k

- (i) Find the value of k (ii) $P(x \leq 5)$ and $P(x > 5)$ (iii) $P(0 < x < 6)$

- 3 Two dice are thrown X assign to each point if S the sum of the variables on the faces. Find the mean and variance of the random variable.

- 4 Samples of size 2 are taken the population 1, 2, 3, 4, 5, 6 (i) With replacement and without replacement. Find: (i) The mean of population. (ii) Standard deviation of the population. (iii) Means of sampling distribution. (iv) Standard deviation of the means of sampling distribution. Verify that means of sampling distribution is equal to the mean of population and standard deviations of the means of sampling distribution are not equal to the standard deviation of the population.

- 5 (a) Define estimate, estimator and estimation.
(b) In how many ways the estimation can be done and what are they. Explain in detail.

- 6 (a) A social worker believes that fewer than 25% of the couples in a certain area have ever used any form of birth control. A random sample of 120 couples was contacted. Twenty of them said they have used. Test the belief of the social worker at 0.05 level.
(b) A sample of 64 students has a mean weight of 70 kgs. Can this be regarded as a sample from a population with mean weight of 56 kgs. and S.D. 25 kgs at $\alpha = 0.01$.

- 7 Scores obtained in a shooting competition by 10 soldiers before and after intensive training are given below:

Before	67	24	57	55	63	54	56	68	33	43
After	70	38	58	58	56	67	68	75	42	38

Test whether the intensive training is useful at 0.05 level of significance.

- 8 (a) Explain about Poisson distribution in the queuing system.
(b) Explain about exponential distribution in the queuing system.
