Code: 9A01404

R9

II B. Tech II Semester (R09) Supplementary Examinations, November/December 2011
FLUID MECHANICS & HYDRAULIC MACHINERY
(Mechanical Engineering)

Time: 3 hours

Max Marks: 70

Answer any FIVE questions
All questions carry equal marks
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1   (a)   What is meant by surface tension? Also derive the expression for surface tension in a liquid jet.
    (b)   The left leg of a U-tube mercury manometer is connected to a pipe-line conveying water the level of mercury in the leg being 0.6 m below the centre of pipe-line and the right leg is open to atmosphere. The level of mercury in the right leg is 0.45 m above that in the left leg and the space above mercury in the right leg contains benzene (G = 0.88) to a height of 0.3 m. Find the pressure in the pipe.

2   (a)   Derive Euler's & Bernoulli's equations.
    (b)   Define the terms stream line, path line and streak line.

3   A venturimeter is to be fitted in a pipe 0.25 m diameter where the pressure head is 7.6 m of flowing liquid and the maximum flow is 8.1 m^3 per minute. Find the least diameter of the threat to ensure that the pressure head does not become negative. Take k = 0.96.

4   A jet of water of diameter 10 cm strikes a flat plate normally with a velocity of 20 m/s. The plate is moving with a velocity of 6 m/s in the direction of the jet and away from the jet. Find the force exerted by the jet on the plate and the work done by the jet on the plate per second.

5   Explain hydro electric power station in detail.

6   Explain Francis turbine in detail.

7   Explain unit and specific quantities with respect to turbines.

8   A centrifugal pump is to discharge 0.118 m^3/s at a speed of 1450 r.p.m against a head of 25 m. The impeller diameter is 250 mm, its width at outlet is 50 mm and manometric efficiency is 75 %. Find the value angle at the outer periphery of the impeller.

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II B. Tech II Semester (R09) Supplementary Examinations, November/ December 2011
KINEMATICS OF MACHINERY
(Mechanical Engineering)

Time: 3 hours   Max Marks: 70

Answer any FIVE questions
All questions carry equal marks
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1   In an epicyclic gear train an annular wheel A having 54 teeth meshes with a planes wheel B
        which gears with a sun wheel C, the wheels A and C being coaxial. The wheel B is carried on a
        pin fixed on one end of arm P which rotates about the axis of the wheels A and C. If the wheel A
        makes 20 r.p.m. in a clockwise sense and the arm rotates at 100 r.p.m. in the anticlockwise
        direction and the wheel C has 24 teeth, determine r.p.m. And sense of rotation of C.

2 (a) Define the term 'kinematic chain'. What is the difference between mechanism and kinematic
        chain? Derive the relation between:
        (i) Number of links and number of pairs.   (ii) Number of links and number of joints.
   (b) In a crank and slotted lever quick return motion mechanism, the distance between the fixed
        centres is 240 mm and the length of the driving crank is 120 mm. Find the inclination of the
        slotted bar with the vertical in the extreme position and the time ratio of cutting stroke to the
        return stroke. If the length of the slotted bar is 450 mm, find the length of the stroke if the line of
        stroke passes through the extreme positions of the free end of the lever.

3 (a) Sketch and describe the Hart's straight line mechanism indicating clearly the conditions under
        which the point P on the corners of the rhombus of the mechanism generates a straight line.
   (b) Prove geometrically that the above mechanism is capable of producing straight line.

4   What do you mean by Coriolis component of acceleration? When it will exist? Derive an
        expression for its magnitude by drawing a line diagram of Crank and Slotted lever quick return
        motion mechanism.

5 (a) What is the condition for correct steering? Sketch and show the two main types of steering
        gears and discuss their relative advantages.
   (b) The angle between the axes of two shafts connected by Hooke's joint is 15°. Determine the
        angular turned through by the driving shaft when the velocity ratio is maximum and unity.

6   A Draw the profile of a cam which raises a value with S.H.M. through 3 cm in 1/3 of revolution,
        keep it fully raised through 1/12 revolution and it is closed in next 1/3 revolution with S.H.M. the
        value remains closed during the rest of the revolution. The diameter of the roller is 1 cm and
        minimum radius of the cam is to be 2cm. the axis of the value rod is offset by 1.0 cm from the
        axis of cam shaft.

7 (a) Explain what interference is and how it is prevented.
   (b) A spur gear has a module of 3 mm and its pitch line velocity is 942.45 mm/s. if the number of
        teeth of this spur gear is 20, find the speed of the gear. Also determine its circular pitch.

8   A leather belt 200 mm x 10mm is of density 1.1 gm /cc. its maximum permissible tension is 200
        N/ cm^2. If the ratio of tensions is 1.8, determine at what velocity should it be run so as to transmit
        maximum power? Also, determine the maximum power transmitted.

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II B. Tech II Semester (R09) Supplementary Examinations, November/ December 2011
THERMAL ENGINEERING - I
(Mechanical Engineering)

Time: 3 hours
Max Marks: 70

Answer any FIVE questions
All questions carry equal marks
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1   (a) What do you understand from degree of reaction?
    (b) An axial flow compressor with compression ratio of 1.4 draws in air at 22° C. The compression process is approximated as an isentropic process. The stagnation conditions at this stage is 300 K. the blade velocity being 200 m/s. Draw the velocity triangles for an air angle of 20° and determine vane angles. Also calculate the degree of reaction.

2   (a) What do you understand from gas exchange process in an engine and how it affects the performance of I.C engine?
    (b) What do you understand from air standard cycle? What are the assumptions made for accurate analysis of internal combustion engine process?

3   (a)   A gas engine having a cylinder 250mm bore and 450mm stroke has a volumetric efficiency of 80%. Air-gas ratio equals 9:1, calorific value of fuel 21000 kJ/m^3 at NTP. Calculate the heat supplied to the engine per working cycle. If the compression ratio is 5:1, what is the heat value of the mixture per working stroke per m^3 of total cylinder volume?
    (b) Explain the performance test of an IC engine. Why is it carried out?

4   (a) Briefly explain any two methods of fuel injection systems generally employed in C.I engines.
    (b) Compare Otto and diesel engines.

5   (a) What are the primary considerations in designing a combustion chamber for C.I engine?
    (b) State the factors on which delay period in C.I engine depends.

6   (a) Define volumetric efficiency and explain the effect of clearance volume and pressure ratio on volumetric efficiency.
    (b) Estimate the minimum work required to compress 2 kg of air from 1 bar 330 K to 18 bar in two stages if the law of compression is $pV^{1.25}$ = constant and inter cooling is perfect.

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) What are knock limited parameters in case of combustion engines?
    (b) What are homogeneous and heterogeneous mixtures? Explain in which engines these mixtures are used.

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II B. Tech II Semester (R09) Supplementary Examinations, November/December 2011
MANUFACTURING TECHNOLOGY
(Mechanical Engineering)

Time: 3 hours   Max Marks: 70

Answer any FIVE questions
All questions carry equal marks
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1   With neat sketches, explain different types of patterns.

2   (a)   Explain investment costing in detail.
     (b)   What are the basic rules to be followed for good casting design?

3   Explain the following:
         (a) Resistance welding.
         (b) Thermit welding.

4   (a)   What is soldering process? Distinguish between soldering and barging.
     (b)   Explain the following welding processes.
            (a) Explosive welding.
            (b) Laser beam welding.

5   Explain the following with neat sketches:
         1) Two-high rolling mill.
         2) Three high rolling mill.
         3) Four high rolling mill.
         4) Tandem rolling mill.

6   Write short notes on the following:
         (a) Cold spinning   (b) Blanking   (c) piercing.

7   (a)   Describe the forward extrusion process with neat diagram.
     (b)   Describe the backward extrusion process with neat diagram.

8   (a)   Explain the principle EDM with neat sketch.
     (b)   Briefly explain the working of an EDM machine showing important elements.

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II B. Tech II Semester (R09) Supplementary Examinations, November/ December 2011
PROBABILITY & STATISTICS
(Common to Civil Engineering, Mechanical Engineering, Computer Science & Systems Engineering &
Information Technology)

Time: 3 hours

Max Marks: 70

Answer any FIVE questions
All questions carry equal marks
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1   If 20% of the memory chips made in a certain plant are defective. What are the probabilities
        that in a lot of 100 randomly chosen for inspection?
        (a) At most 15 will be defective.   (b) Exactly 15 will be defective.

2   A student appears for tests I, II & III. The student is successful if he passes either in test I and II
        or tests I and III. The probability of the student passing in test I, II, III is p, q and ½ respectively.
        If the probability that the student is successful is ½ then find the relation between p and q.

3   Determine the expected number of families to have (a) 2 boys and 2 girls   (b) at least one boy
        (c) No girls (d) at most two girls, out of 800 families with 4 children each. Assume equal
        probabilities for boys and girls.

4   (a) Find the maximum difference that we can expect with probability 0.95 between the means of
        sizes 10 and 12 from a normal population if their standard deviations are found to be 2 and 3
        respectively.
    (b) If two independent random samples of sizes n_1 =9 and n_2=16 are taken from a normal
        population. What is the probability that the variance of the first sample will be at least 4 times as
        large as the variance of the second sample?

5   (a) Give the difference between the interval estimation and the Bayesian estimation.
    (b) The mean weight loss of n= 16 grinding balls after a certain length of time in mill slurry is 3.42
        grams with a S.D. 0.68 grams. Find the maximum error of estimate at 99% confidence interval.
        Also construct a 99% confidence interval for the true mean weight loss of such grinding balls
        under the stated conditions.

6   (a) What is meant by Level of Significance?
    (b) In a sample of 1000 people in Karnataka 540 are rice eaters and rest is wheat eaters. Can we
        assume that both rice and wheat are equally popular in this state at 1% level of significance.
    (c) It is claimed that a random sample of 49 tires has a mean life of 15200 kms. This sample was
        drawn from a population whose mean is 15150 kms. And a S.D. of 1200 kms. Test the
        significance at 0.05 levels.

7   A random sample of a company's very extensive files show that the orders for a certain kind of
        machinery were filled, respectively in 10, 12, 19, 14, 15, 18, 11 and 13 days. Use α = 0.01 level
        of significance to test the claim that on average such orders are filled in 10.5 days. Assume
        normality.

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

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II B.Tech II Semester (R09) Supplementary Examinations, November/December 2011
ENVIRONMENTAL SCIENCE
(Common to Civil Engineering, Mechanical Engineering, Computer Science &
Engineering, Information Technology, Aeronautical Engineering and Biotechnology)

Time: 3 hours   **Max Marks: 70**
Answer any FIVE questions
All questions carry equal marks
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1.   Discuss the multidisciplinary nature of environmental studies.

2. (a) Write about forest resources use and over exploitation.
    (b) Discuss environmental issues concerning extracting and using mineral resources.

3. (a) Discuss the concept of an ecosystem.
    (b) Discuss about a desert ecosystem.

4. (a) Explain insitu and exsitu conservation of biodiversity.
    (b) Give the biogeographical classification of India.

5. (a) Define nuclear hazard. Give cause, effects and control measures of nuclear hazards.
    (b) Discuss solid waste management of industrial waste.

6. (a) Discuss how rainwater can be harvested in rural and urban areas.
    (b) Write the salient points of 'Forest Conservation Act'.

7. (a) Write about the measures being taken by the government in controlling AIDS.
    (b) Discuss the role of IT in environment and human health.

8. (a) Write about global warming and its effects.
    (b) Discuss about the role of an individual in prevention of pollution.
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