Code: 9ABS401/9ABS304

B.Tech II Year II Semester (R09) Regular & Supplementary Examinations, April/May 2013

PROBABILITY & STATISTICS

(Common to CE, ME, CSS and IT)

Time: 3 hours   Max Marks: 70

Answer any FIVE questions

All questions carry equal marks

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1   Two dice are thrown. Find the probability that the sum of the numbers coming upon them is 9. If it is known that the number 5 always occurs on the first die.

2   A random variable x has the density function $F(x) = \begin{cases} 1/4, & -2 < x < 2 \\ 0, & d \text{ else where} \end{cases}$

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 (a)   The mean of certain normal population is equal to the standard error of the mean of the samples of 64 from that distribution. Find the probability that the mean of the sample size 36 will be negative?

   (b)   The probability that the sample mean will not differ from the true mean by more than 15% of the standard deviation is 0.95. How large the sample should be?

5 (a)   Prove that for a random sample of size n, $x_1, x_2,…,x_n$ taken from a finite population

$S^2 = 1/n \sum_{i=1}^{n}(x_i - \bar{x})^2$ is not unbiased estimator of the parameter σ^2 but 1/n-1

$\sum_{i=1}^{n}(x_i - \bar{x})^2$ is unbiased.

   (b)   Assuming that $\sigma = 20$, how large a random sample be taken to assert with probability 0.95 that the sample mean will not differ from the true mean by more than 3.0 points.

6 (a) In a random sample of 400 persons from a large population, 120 are females. Can it be said that males and females are in the ratio 5:3 in the population? Use 1% level of significance.

(b) An investigation of the merits of two kinds of flash light batteries showed that a random sample of 100 batteries of brand A tested on average 36.5 hrs with a S.D. of 1.8 hrs. While a random sample of 80 batteries of brand B tested on the average 36.8 hrs with a S.D. of 1.5 hrs. Test whether the observed difference between the average life times is significant or not? Use 0.05 level of significance.

7 1000 students at a college level were graded according to their I.Q and the economic conditions of their home. Use χ^2 test to find out whether there is any association between condition at home with $\alpha = 0.05$ and I.Q.

Economic condition	High	Low	Total
Rich	460	140	600
Poor	240	160	400
Total	700	300	1000

8 Cars arrive at a petrol pump with exponential inter arrival time having mean 1/2 min. The attendant takes an average of 1/5 min per car to supply petrol, the service time being exponentially distributed. Determine:
(i) The average number of cars waiting to be served
(ii) The average number of cars in the system and
(iii) The proportion of time for which the pump attendant is idle.

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B.Tech II Year II Semester (R09) Regular & Supplementary Examinations, April/May 2013
PROBABILITY & STATISTICS
(Common to CE, ME, CSS and IT)

Time: 3 hours   Max Marks: 70

Answer any FIVE questions
All questions carry equal marks
*****

1 (a) If A and B are independent events. Then prove A^c and B^c are also independent events.

(b) If A and B are independent events. Then prove A and B^c are also independent.

2   If X is a continuous random variable and Y = ax+b prove that E(1/y) = aE(x) + b and V(y) = a^2 V(x).

3   Find the mean and the variance of the uniform probability distribution given by:

$$f(x) = \frac{1}{n} \; for \; x = 1,2,.....n$$

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) Write a short note on interval estimation and Bayesian estimation.

(b) Measurements of the weights of a random sample of 200 ball bearing made by a certain machine during one week showed a mean of 0.824 and a S.D of 0.042. Find maximum error at 95% confidence interval. Find the confidence limits for the mean if x = 32.

6 (a) In a sample of 600 students of a certain college 400 are found to use ball pens. In another college from a sample of 900 students 450 were found to use ball pens. Test whether 2 colleges are significantly different with respect to the habit of using ball pens.

(b) The mean consumption of food grains among 400 sampled middle class consumers is 380 gms per day per person with a S.D. of 120 gms. A similar sample survey of 600 working class consumers gave a mean of 410 gms with a S.D. of 80 gms. Are we justified in saying that the two classes consume the same quality of food grains? Use 5% level of significance

7 (a) In a random sample of 1000 persons from town A, 400 are found to be consumers of wheat. In a sample of 800 from town B are found to be consumers of wheat. Do these data reveal a significant difference between town A and town B, so far as the proportion of wheat consumers is concerned?

(b) 5 measurements of the output of the following results. (in kgs of materials per one hour of operation) Assuming that both samples have obtained from normal populations, test at 0.01 level of significance if two populations have the same variance.

| Unit A | 14.1 | 10.1 | 14.7 | 13.7 | 14.0 |
| Unit B | 14.0 | 14.5 | 13.7 | 12.7 | 14.1 |

8 Consider a single server queuing system with Poisson input and exponential service time. Suppose the mean arrival rate is 3 calling units per hrs with the expected service time as 0.25 hrs and the maximum permissible number of calling units in the system is two. Obtain the steady state probability of the number of calling units in the system and then calculate the expected number in the system.

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B.Tech II Year II Semester (R09) Regular & Supplementary Examinations, April/May 2013
PROBABILITY & STATISTICS
(Common to CE, ME, CSS and IT)

Time: 3 hours   Max Marks: 70

Answer any FIVE questions
All questions carry equal marks
*****

1 (a) If $A \subseteq B$ then prove that $(i) P(A^c \cap B) = P(B) - P(A)$ (ii) $P(A) \leq P(B)$

  (b) If A and B are mutually exclusive events, then prove that $P(A) \leq P(B^c)$.

2   A random variable x has the density function: $f(x) = K. \dfrac{1}{1+x^2}, \ if -\infty < x < \infty = 0,$

     otherwise determine K and the distributive function.

3   In a distribution exactly normal 7% of the items are under 35 and 89% are under 63. What are the mean and standard deviation of the distribution?

4   A random sample of size is taken from a normal population with $\mu = 51.4$ and $\sigma = 6.8$. What is the probability that the mean of the sample will
  (a) Exceed 52.9
  (b) Fall between 50.5 and 52.3
  (c) Be less than 50.6.

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) Experience had shown that 20% of a manufactured product is of top quality. In one day's product of 400 articles only 50 are of top quality. Test the hypothesis at 0.05 levels?

(b) A sample of 900 members has a mean of 3.4 cm and S.D. 2.61 cm is the sample from a large population of mean 3.25 cm and S.D. 2.61 cm. If the population is normal and its mean is unknown find the 95% fiducial limits of true mean?

7 (a) A sample poll of 300 voters from district A and 200 voters from district B showed that 56% and 48% respectively, were in favour of a given candidate. At a 0.05 level of significance, test the hypothesis that the there is a difference in the districts?

(b) Two independent samples of 8 and 7 items respectively had the following values of the variables.

Sample I	9	11	13	11	16	10	12	14
Sample II	11	13	11	14	10	8	10	-

Do the estimates of the population variance differ significantly?

8 A bank plans to open a single server drive-in banking facility at a certain center. It is estimated that 20 customers will arrive each hour on average. If on average, it requires 2 min to process a customer's transaction, determine

(i) The proportion of time that the system will be idle;

(ii) On the average, how long a customer will have to wait before reaching the server;

(iii) The fraction of customers will have to wait?

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Code: 9ABS401/9ABS304

B.Tech II Year II Semester (R09) Regular & Supplementary Examinations, April/May 2013
PROBABILITY & STATISTICS
(Common to CE, ME, CSS and IT)

Time: 3 hours

Max Marks: 70

Answer any FIVE questions
All questions carry equal marks
*****

1   An integer is chosen at random from the first 200 positive integers. What is the probability that the integer chosen is divisible by 6 or 8?

2   The cumulative distribution function for a continuous random variable x

$$F(x)=\begin{cases} 1-e^{-2x} & x \geq 0 \\ 0 & x < 0 \end{cases}$$. Find the density function f(x).

3   If mean = 70, standard deviation is 16. Find
  (a) $P(38 \leq x \leq 46)$
  (b) $(82 \leq x \leq 94)$
  (c) $(62 \leq x \leq 86)$

4   When we take a sample from an infinite population what happen to the standard error of the mean if the sample size is (i) Increased from 50 to 200 (ii) Decreased from 225 to 25.

5   The mean mark in mathematics in common entrance test will vary from year to year. If this variation of the mean mark is expressed subjectively by a normal distribution with mean $\mu_0 = 72$ and variance $\sigma_0^2 = 5.76$.
    (i) What probability can we assign to the actual mean being somewhere between 71.8 and 73.4 for the next year's test?
    (ii) Construct a 95% Bayesian interval for μ if the test is conducted for a random sample of 100 students from the next incoming class yielding a mean mark of 70 with S.D. of 8.
    (iii) What posterior probability should be assigned to the event of part (i)?

6 (a) A company claims that its light bulbs are superior to those of its main competitor. If a study showed that a sample of $n_1 = 40$ of its bulbs that a mean life time of 647 hrs of continuous use with a S.D. of 27 hrs; while a sample of $n_2 = 40$ bulbs made by its main competitor had a mean life time of 638 hrs of continuous use with a S.D. of 31 hrs. Does this substantiate the claim at 0.05 level of significance?

(b) In a study designed to investigate whether certain detonators used with explosives in coal mining meet the requirement that at least 90% will ignite the explosive when charged, it is found that 174 of 200 detonators function property. Test the null hypothesis $p = 0.9$ against the alternative hypothesis $p > 0.9$ at 0.05 level of significance.

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) What is the probability distribution of time spent in the (M/M/1) : (∞/FIFO) Queuing system?

(b) What is the probability distribution density function of the waiting time distribution for (M/M/1) : (∞/FIFO) Queuing system?

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Code: 9ABS402/9ABS303

B.Tech II Year II Semester (R09) Regular & Supplementary Examinations, April/May 2013

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 (a) Define environment and environmental science.
  (b) Explain the scope of environmental science in our daily life.

2   Write a short notes on:
  (a) Hydrological cycle.
  (b) Droughts.
  (c) Soil erosion.
  (d) Bio gas.

3   What are ecological pyramids? Write about various types of ecological pyramids with examples.

4   What do you mean by consumptive use value, productive use value, social value, ethical value, aesthetic value and option value of biodiversity?

5 (a) Define pollution and various types of pollution.
  (b) Explain about the source, effects of water pollution.

6   Population, consumerism and waste production are interrelated. Explain.

7   What is the importance of environmental education? What is value based education?

8 (a) What are the environmental parameters to be taken into consideration when visiting an industry?
  (b) Write about the structural and functional components of an ecosystem.

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Code: 9ABS402/9ABS303

B.Tech II Year II Semester (R09) Regular & Supplementary Examinations, April/May 2013

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   How would environmental awareness help to protect our environment?

2 (a)   What are renewable and non-renewable sources? With examples.
   (b)   Explain in brief various renewable resources in native.

3   Explain the functional attributes of ecosystem.

4   Write a short notes on:
   (a)   Ex situ conservation.
   (b)   Hot spots.
   (c)   Poaching.
   (d)   Endemic species.

5   Explain and write notes on solid waste management.

6   What are the measures to be taken for conservation of water resources?

7   Writes notes about:
   (a)   GIS.
   (b)   Population characteristics.
   (c)   Human immune deficiency syndrome.

8   Explain the salient features of forest Eco-system.

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Code: 9ABS402/9ABS303

B.Tech II Year II Semester (R09) Regular & Supplementary Examinations, April/May 2013

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 (a) Define:
 (i) Concept of Eco-mark.
 (ii) Green marketing.
 (b) Write notes on people's contribution and awareness towards environmental protection.

2   Explain the ecological and commercial uses of forests. Discuss major causes consequences of deforestation.

3   Write about:
 (a) Grazing food chain.
 (b) Oxygen cycle.
 (c) Primary production of an ecosystem.
 (d) Ecological succession.
 (e) Homeo stasis.

4   Explain the Bio-geographical classification of India.

5   Write about soil pollution and explain the impacts of modern agriculture on soil.

6   Write short notes on:
 (a) Rain water harvesting.
 (b) Acid rain.
 (c) Green house gases.

7   Explain the role of information technology in environment.

8 (a) Which water quality parameters are to be taken into consideration while assessing a drinking water sample testing in a laboratory?
 (b) Write BIS: 10500: 1991 drinking water quality parameter charts.

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B.Tech II Year II Semester (R09) Regular & Supplementary Examinations, April/May 2013

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   Define natural resources. Explain about the mineral resources, uses of minerals, environmental impacts of mineral mining.

2   What are Bio-geochemical cycles? Explain in brief about:
     (i)   Nitrogen cycle.
     (ii)   Carbon cycle with neat diagrams.

3 (a)   Explain the types of conservation techniques taken for biodiversity.
   (b)   Major threats to biodiversity.

4   Explain the multidisciplinary nature of environmental studies with flow chart.

5   Write briefly:
   (a)   Minimata disease.
   (b)   Bio chemical oxygen demand.
   (c)   Chernobyl nuclear disaster.
   (d)   Landslides.

6   Discuss various issues and measures for women and child welfare at international and national level.

7   Explain the following:
   (a)   Environmental protection act, 1986.
   (b)   Wild life protection act 1972.

8   Write about different types, characteristics and components of aquatic eco-system.

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Code: 9A01404

B.Tech II Year II Semester (R09) Regular & Supplementary Examinations, April/May 2013

FLUID MECHANICS AND HYDRAULIC MACHINERY
(Mechanical Engineering)

Time: 3 hours   Max Marks: 70

Answer any FIVE questions
All questions carry equal marks
*****

1   A square metal plate 1.8 m side and 1.8 mm thick weighing 60 N is to be lifted through a vertical gap of 30 mm of infinite extent. The oil in the gap has a specific gravity of 0.95 and viscosity of 3 N. s/m^2 if the metal plate is to be lifted at a constant speed of 0.12 m/s, find the force and power required.

2 (a) What are the various types of flows? Explain in brief.
   (b) Write a short note on Euler's equation.

3 (a) Explain Reynolds's experiment.
   (b) Discuss and differentiate hydraulic gradient and total energy lines.

4   A set of water of diameter 50 mm moving with a velocity of 25 m/s impinges on a fixed curved plate tangentially at one end at an angle of 30^0 to the horizontal find the resultant force of the jet on the plate if the jet is deflected through an angle of 60^0. Take g = 10 m/s^2.

5 (a) What are base-load and peak load plants?
   (b) Two turbo-generators each of capacity 25000 KW have been installed at a hydel power station. During a certain period the load on the hydel plant varies from 15000 KW to 40000 KW. Find the total installed capacity, the load factor, the plant factor and the utilization factor.

6 (a) What is the role of a draft tube with respect to turbine? What are the various types of draft tubes?
   (b) Explain Keplan turbine in brief.

7 (a) What is meant by cavitation? When can it occur in a turbine?
   (b) A Francis turbine working under a head of 5 m at a speed of 210 r.p.m. develops 75 KW when the rate of flow of water is 1.8 m^3/s. The runner diameter is 1 m. If the head on this turbine is increased to 18 m, find its new-speed, discharge and power.

8   Explain the working of a centrifugal pump with neat sketch.

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Code: 9A01404

B.Tech II Year II Semester (R09) Regular & Supplementary Examinations, April/May 2013

FLUID MECHANICS AND HYDRAULIC MACHINERY
(Mechanical Engineering)

Time: 3 hours   Max Marks: 70

Answer any FIVE questions
All questions carry equal marks
*****

1   The velocity distribution of flow over a plate is parabolic with vertex 30 cm from the plate where the velocity is 180 cm/s. If the velocity of the fluid is 0.9 N.s/m^2 find the velocity gradient and shear stresses at distance of 0.15 cm and 30 cm from the plate.

2   Water flows through a 0.9 m diameter pipe at the end of which there is a reducer connecting to a 0.6 m diameter pipe. If the gage pressure of the entrance to the reducer is 412.02 KN/m^2 and the velocity is 2 m/s, determine the resultant thrust on the reducer assuming that the frictional loss of head in the reducer is 1.5 m.

3   Explain venturimeter in detail with a neat sketch.

4   A jet of water of diameter 8 cm strikes a curved plate at its centre with a velocity of 18 m/s. The curved plate is moving with a velocity of 8 m/s in the direction of the jet. The jet is deflected through an angle of 165^0. Assuming the plate smooth find. Force exerted on the plate in the direction of set, power of the jet, efficiency of the jet.

5 (a) Explain tidal plants.
   (b) Differentiate storage and pondage support your answer with a neat sketch.

6   How do you design a Francis turbine runner? Give step by step procedure.

7 (a) What is meant by governing of turbines?
   (b) A turbine develops 7460 KW under a head of 24.7 m at 135 r.p.m. What is the specific speed? What would be its normal speed and output under a head of 19.5 m.

8   A single acting reciprocating pump has a plunger of diameter 250 mm and stroke of 350 mm. If the speed of the pump is 60 r.p.m and it delivers 16.5 lps of water against a suction head of 5 m and a delivery head of 20 m, find the theoretical discharge, coefficient of discharge, the slip, the percentage slip of the pump and the power required to drive the pump.

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Code: 9A01404

B.Tech II Year II Semester (R09) Regular & Supplementary Examinations, April/May 2013

FLUID MECHANICS AND HYDRAULIC MACHINERY
(Mechanical Engineering)

Time: 3 hours
Max Marks: 70

Answer any FIVE questions
All questions carry equal marks
*****

1   A circular disc of diameter D is slowly rotated in a liquid of large viscosity (μ) at a small distance (h) from a fixed surface. Derive an expression of torque (T) necessary to maintain an angular velocity (W).

2 (a)   Derive the continuity equation for one dimensional flow.
  (b)   Explain momentum equation and give its applications.

3   A pipe 50 mm diameter is 6 m long and the velocity of flow of water in the pipe is 2.4 m/s. What loss of head and the corresponding power would be saved if the central 2 m length of pipe was replaced by 75 mm diameter pipe the change of section being sudden? Take f =0.04 for the pipes of both diameters.

4   A jet of eater from a nozzle is deflected through 60^0 from its original direction by a curved plate which it enters tangentially without shock with a velocity of 30 m/s and leaves with a mean velocity of 25 m/s. If the discharge from the nozzle is 0.9 Kg/s, find the magnitude and direction of the resultant force on the vane if the vane is stationary.

5 (a)   Explain Run-off river plants.
  (b)   What is a mass curve? Explain with sketch.

6   Design a Pelton wheel which is required to develop 1500 KW when working under a head of 160 m at a speed of 420 r.p.m. The overall efficiency may be taken as 85% and assume other data which is required.

7   Discuss unit and specific quantities in detail.

8   What is meant by specific speed of a pump? Derive the expression for specific speed.

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B.Tech II Year II Semester (R09) Regular & Supplementary Examinations, April/May 2013

FLUID MECHANICS AND HYDRAULIC MACHINERY

(Mechanical Engineering)

Time: 3 hours

Max Marks: 70

Answer any FIVE questions

All questions carry equal marks

*****

1   The space between two square flat parallel plates is filled with oil. Each side of the plate is 720 mm. The thickness of the oil film is 15 mm. The upper plate, which moves at 4 m/s, requires a force of 120 N to maintain the speed. Determine the dynamic viscosity of oil is 0.95.

2 (a) Derive the Bernoulli's equation.
  (b) Define stream line, path line and streak line.

3   A pipe 50 mm diameter is 6 m long and the velocity of flow of water in the pipe is 2.4 m/s. What loss of head and the corresponding power would be saved if the central 2 m length of pipe was replaced by 75 mm diameter pipe the change of section being sudden? Take $f = 0.04$ for the pipes of both diameters.

4 (a) Derive the expression for force exerted on a flat vertical plate moving in the direction of jet.
  (b) A nozzle of 50 mm diameter delivers a stream of water at 20 m/s perpendicular to a plate that moves away from the jet at 5m/s, find the force on the plate, the work done and the efficiency of jet.

5 (a) Explain pumped storage plants.
  (b) A run-of-river plant is installed on a river having a minimum flow of 15 m^3/s. If the plant is used as a peak load plant operating only for 6 hours a day, find the firm capacity of the plant without pondage and with pondage but allowing 10% of the water to be lost in evaporation and other losses. Head at the plant is 10 m and the plant efficiency may be assumed as 85%.

6 (a) What are the working proportions of a Pelton wheel?
  (b) Give broad classification of turbines.

7 (a) Explain constant speed characteristic curves of a turbine.
  (b) What is a surge tank?

8 (a) Define static and manometric head of a centrifugal pump. State the different types of head losses which may occur in a pump installation.
  (b) What are the different efficiencies of a centrifugal pump?

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B.Tech II Year II Semester (R09) Regular & Supplementary Examinations, April/May 2013
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 (a)   Define the term kinematic link. Explain different types of links with the help of examples.
  (b)   Explain different inversions of four bar chain with the of line diagrams.

2 (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.

3 (a)   Draw and explain Klien's construction for determining the velocity and acceleration of the piston in a slider crank mechanism.
  (b)   In a pin jointed four bar mechanism, as shown in fig. AB = 300 mm, BC = CD = 360 mm, and AD = 600 mm, the angle BAD = 60^0. The crank AB rotates uniformly at 100 r.p.m. locate ball the instantaneous centers and find the angular velocity of the link BC.
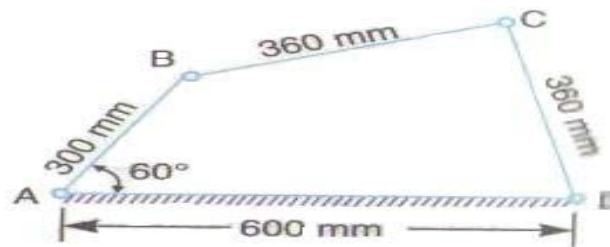
4 (a)   What is fundamental equation of steering gears? Which steering gear fulfils this condition?
  (b)   In a double universal coupling joining two shafts, the intermediate shaft is inclined at 10^0 to each. The input and the output forks on the intermediate shaft have been assembled inadvertently at 90^0 to one another. Determine the maximum and the least velocities of the output shaft if the speed of the input shaft is 500 r.p.m. Also find the coefficient of fluctuation in speed.

5 (a) Why a roller follower is preferred to that of a knife-edged follower.

   (b) From the following data draw the profile of a cam in which the follower moves with S.H.M. during ascent while it moves uniformly accelerated motion during descent:
   Lift of follower = 4 cm; Least radius of cam = 5 cm; Angle of ascent = 48^0; Angle of dwell between ascent and descent = 42^0; Angle of descent = 60^0; The diameter of roller = 3 cm; Distance between line of action of the follower and the axes of cam = 2 cm. If the cam rotates at 360 r.p.m. anticlockwise, find the maximum velocity and acceleration of the follower during descent.

6 (a) State and prove the law of gear tooth action for constant velocity ratio and show how the involute teeth profile satisfies the condition.

   (b) Derive an expression for the velocity of sliding between a pair of in volute teeth. State the advantages of in volute profile as a gear tooth profile.

7   In a flat belt drive the initial tension is 2000 N, the coefficient of friction between the belt and the pulley is 0.3 and the angle of lap on the smaller pulley is 150^0. The smaller pulley has a radius of 200 mm and rotates at 500 r.p.m. find the power in KW transmitted by the belt.

8   In an epicyclic gear train, the internal wheels A and B and the compound wheels C and D rotate independently about axis O. the wheels E and F rotate on pins fixed to the arm G.E gear with A and C and F gear with B and D. All wheels have the same module and the number of teeth are: $T_C = 28$, $T_D = 26$, $T_E = T_F = 18$
   (i) Sketch the arrangement ;
   (ii) Find the number of teeth on A and B;
   (iii) If the arm G makes 100 r.p.m clockwise and A is fixed, find the speed B;
   (iv) If the arm G makes100 r.p.m clockwise and wheel A makes 10 r.p.m counter clockwise, find the speed of wheel B.

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B.Tech II Year II Semester (R09) Regular & Supplementary Examinations, April/May 2013
KINEMATICS OF MACHINERY
(Mechanical Engineering)

Time: 3 hours   Max Marks: 70

Answer any FIVE questions
All questions carry equal marks
*****

1 (a) Differentiate between: (i) Lower pair and higher pair. (ii) Turning pair and sliding pair.
        (iii) Screw pair and spherical pair. (iv) Closed pair and unclosed pair.
   (b) With a neat sketch explain the 'Whitworth Quick Return Mechanism.

2 (a) Describe the Watt's parallel mechanism for straight line motion and derive the condition
        under which the straight line is traced.
   (b) Describe Hart's mechanism with a neat sketch and prove that the tracing point describes
        a straight line path

3   The crank of a slider crank mechanism is 15 cm and the connecting rod is 60 cm long.
        The crank makes 300 r.p.m in the clock wise direction. When it has turned 45 from the
        inner dead centre position, determine; (i) Acceleration of the mid-point of the connecting
        rod and (ii) Angular acceleration of the connecting rod.

4 (a) Describe with a neat sketch the working of Davis steering gear mechanism. Also prove
        that for Davis steering gear Tan α = w/2L.
   (b) A Hooke's joint is used to connect two shafts. The driving shaft is rotating uniformly with
        a speed of 600 r.p.m the maximum speed of the driven shaft is 630 r.p.m. Determine the
        greatest permissible angle between the two shafts. Also find   the minimum speed of the
        driven shaft.

5   Draw the profile of a cam operating a knife-edge follower when the axis of the follower
        passes through the axis of the cam shaft from the following data:
        (i) Follower to move outwards through 30 mm during 90⁰ of cam rotation,
        (i) Follower to move outwards through 30 mm during 90^0 of cam rotation,
        (ii) Follower to dwell for the next 45^0,
        (iii) Follower to return to its original position during next 60^0,
        (iv) Follower to dwell for the rest of the cam rotation.
        The displacement of the follower is to take place with simple harmonic motion during
        both the outward and the return strokes. The least radius of the cam is 50 mm. if the
        cam rotates at 600 r.p.m. Determine the maximum velocity and acceleration of the
        follower during outward stroke and return stroke.

6 (a) Prove that the velocity of sliding is proportional to the distance of the point of contact from the pitch point.

(b) Two in volute gears of 20^0 pressure angle are in mesh. The number of teeth on pinion is 20 and the gear ratio is 2. If the pitch expressed in module is 5 mm and the pitch line speed is 1.2 m/s, assuming addendum as standard and equal to one module, find: (i) The angle turned through by pinion when one pair of teeth is in mesh; and
(ii) The maximum velocity of sliding.

7 (a) Distinguish between slip and creep in a belt drive. Derive an expression for the ratio of tensions in the tight and slack sides in terms of μ and θ, when the belt is just on the point of slipping.

(b) A shaft running at 120 r.p.m is to drive a parallel shaft at 180 r.p.m the pulley on the driving shaft is 75 cm in diameter, calculate the diameter of the pulley on the driven shaft (i) neglecting belt thickness (ii) taking belt thickness into account which is 15 mm, (iii) assuming in the latter case a total slip of 4 %.

8 Two parallel shafts are connected with the help of two gears one gear on each shaft. The number of teeth on one gear is 40 and speed of the shaft is 500 r.p.m. If the speed ratio is 2.5 and circular pitch of the gears is 24 mm, and then find;
(i) Number of teeth and speed of other shaft and
(ii) Centre distance between the two shafts.

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B.Tech II Year II Semester (R09) Regular & Supplementary Examinations, April/May 2013
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 (a)   Define the term 'Inversion of a mechanism. Explain any one inversion of a double slider crank mechanism.
  (b)   In a crank and slotted lever quick return mechanism, the distance between the fixed centres is 150 mm and the driving crank is 75 mm long. Determine the ratio of the time taken on the cutting and return strokes.

2 (a)   What do you mean by straight line mechanism? Name the different mechanisms which are used for exact straight line motion
  (b)   Describe any one type of exact straight line motion mechanism with the help of a sketch.

3 (a)   What do you mean by Coriolis component of acceleration? When it will exist?
  (b)   Locate all the instantaneous centers of the slider crank mechanism as shown in figure. The lengths of cranks OB and connecting rod AB are 100 mm and 400 mm respectively. If the crank rotates clockwise with an angular velocity of 10 rad/s, find:
        (i) Velocity of the slider A, and (ii) Angular velocity of the connecting rod AB.
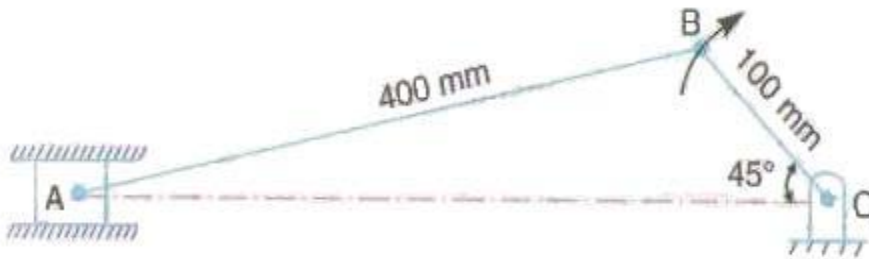
4 (a)   What is a Hooke's joint? Where is it used? Sketch a polar velocity diagram of a Hooke's joint and mark its salient features.
  (b)   Derive an expression for the ratio of angular velocities of the shafts of a Hooke's joint.

5   Differentiate between:
  (a)   Pitch point and trace point and
  (b)   Period of ascent and period of decent.
  (c)   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 valve 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 2 cm. The axis of the valve rod is offset by 1.0 cm from the axis of cam shaft.

6 (a)   Derive an expression for the centre distance of a pair of spiral gears.
  (b)   The pitch circle diameter of the smaller of the two spur wheels which mesh externally and have involute teeth is 100 mm. The numbers of teeth are 16 and 32. The pressure angle is 20^0 and the addendum is 0.32 of the circular pitch. Find the length of the path of contact of the pair of teeth.

7   The following data relate to a flat belt drive:
    Power transmitted = 18 kW.
    Pulley diameter = 180 cm.
    Angle of contact = 175^0.
    Speed of pulley = 300 r.p.m.
    Coefficient of friction between belt and pulley surface = 0.30.
    Permissible stress for belt = 300 N/cm^2.
    Thickness of belt = 8 mm.
    Density of belt material = 0.95×10^{-3} gm/cm^3.
    Determine the width of belt required taking centrifugal tension into account.

8 (a)   Explain the term, sun and planet gears. With a neat sketch explain the working of an epicyclic gear train with a sun and planet gear.
  (b)   Two parallel shafts are to be connected by spur gearing. The approximate distance between the shafts is 600 mm. If one shaft runs at 120 r.p.m and other at 360 r.p.m. Find number of teeth on each wheel if module is 8 mm. Also determine the exact distance apart of the shafts.

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B.Tech II Year II Semester (R09) Regular & Supplementary Examinations, April/May 2013
KINEMATICS OF MACHINERY
(Mechanical Engineering)

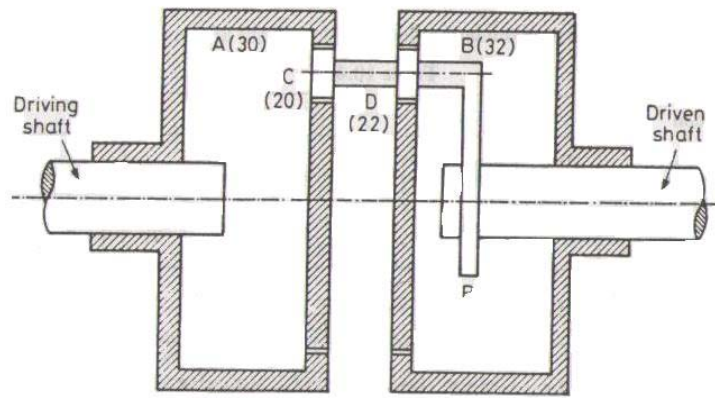Time: 3 hours   Max Marks: 70

Answer any FIVE questions
All questions carry equal marks
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1 (a) What is a machine? Giving example, differentiate between a machine and structure.
  (b) Sketch and describe the working of two different types of quick return mechanisms. Give examples of their applications. Derive an expression for the ratio of times taken in forward and return stroke for one of these mechanisms.

2 (a) Sketch and describe the Peaucellier 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.

3   In a four bar chain ABCD, AD is fixed and is 15 cm long. The crank AB is 4 cm long and rotates at 120 r.p.m clockwise, while the link CD (8 cm) oscillates about D. BC and AD are of equal length. Find:
      (i) The angular velocity and angular acceleration of link CD when angle BAD = 60°.
      (ii) The velocity and acceleration of the points B and C.

4 (a) An Ackermann steering gear does not satisfy the fundamental equation of steering gear at all positions. Yet it is widely used. Why?
  (b) The driving shaft of a double Hooke's joint rotates at 400 rpm. The angle of the driving and of the driven shaft with the intermediate shaft is 20^0. If somehow the forks of the intermediate shaft lie in planes perpendicular to each other. Determine the maximum and the minimum velocities of the driven shaft.

5   Draw the profile for the disc cam offset 20 mm to the right of the centre of the cam shaft. The base circle diameter is 75 mm and the diameter of the roller is 10 mm, the follower is to move outward a distance of 40 mm with S.H.M. in 140^0 of the cam rotation to dwell for 40^0 of cam rotation to move inward with 150^0 of cam rotation with uniform acceleration and retardation. Calculate the maximum velocity and acceleration of the follower during each stroke if the cam shaft rotates at 90 r.p.m.

6 (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.

7   A leather belt 200 mm x 10 mm 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.

8   An epicyclic train is shown in figure Internal gear A is keyed to the driving shaft and has 30 teeth. Compound wheel C and D of 20 and 22 teeth respectively are free to rotate on the pin fixed to the arm P which is rigidly connected to the driven shaft. Internal gear B which has 32 teeth is fixed. If the driving shaft runs at 60 r.p.m. clockwise, determine the speed of the driven shaft. What is the direction of rotation of driven shaft with reference to driving shaft?

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B.Tech II Year II Semester (R09) Regular & Supplementary Examinations, April/May 2013
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) Explain in detail the effect of exhaust valve opening time on blow down in case of gasoline engine.
   (b) Discuss briefly the loss due to gas exchange process in gasoline engine

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

3   Briefly explain the effect of different factors on knock in SI engines.

4   What are the factors affecting the delay period? Explain in detail.

5 (a) Define indicated mean effective pressure related to I.C engine and how it can be measured?
   (b) A two cylinder four stroke engine runs at 240 rpm developing a torque of 5 kN-m. The bore and stroke of cylinder are 30 cm and 60 cm respectively. Engine runs with gaseous fuel having calorific value of 16.8 MJ/m^3. The gas and air mixture is supplied in proportion of 1:7 by volume. The volumetric efficiency is 0.85. Determine: (i) The brake power. (ii) The mean piston speed in m/s. (iii) The brake mean effective pressure. (iv) The brake thermal efficiency.

6 (a) A single stage double acting air compressor running at 300 rpm, delivers 15 m^3 of free air per minute at 700 kPa and 200^0 C. If the clearance volume is 8% of swept volume and if the index of compression and expansion are same. Find the clearance swept volume of piston and volumetric efficiency. Initial air conditions are 10 kP and 15^0 C.
   (b) Draw the T-S diagram for the multi stage compression and show the work saving during the compression in comparison with single stage reciprocating air compression.

7 (a) With the help of neat sketch, explain the working of vane type blower. Also show the compression process in P-V diagram.
   (b) A Vaned compressor handles free air of 0.6 m^3/s at 1 bar and compresses to 2.3 bar. There occurs 30% reduction in volume before the back flow occurs. Determine the indicated power required and isentropic efficiency.

8 (a) Derive expression for polytropic efficiency in terms of entry and delivery pressures, temperature and ratio of specific heats.
   (b) An axial flow compressor is to have constant axial velocity of 250 m/s and 50% degree of reaction. The mean diameter of blade ring is 45 cm and speed is 18000 r.p.m. The exit angles of the blade are 25^0. Calculate blade angle at inlet and work done per kg of air with the help of velocity triangles.

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B.Tech II Year II Semester (R09) Regular & Supplementary Examinations, April/May 2013
THERMAL ENGINEERING - I
(Mechanical Engineering)

Time: 3 hours   Max Marks: 70

Answer any FIVE questions
All questions carry equal marks
*****

1 (a) Define volumetric efficiency of engine and discuss the effect of various factors that affect the volumetric efficiency.
   (b) Compare the actual and fuel-air cycles of IC engine

2 (a) Sketch the battery ignition system and explain its working.
   (b) Explain the various types of cooling systems employed in IC engines.

3   Explain the phenomenon of knocking in S.I engine. What are the effects of knocking?

4   Explain with neat sketch the working principle of combustion chamber used in CI engine.

5 (a) A four stroke four cylinder diesel engine running at 300 rpm produces 250 kW of brake power. The cylinder dimensions are 30 cm bore and 25 cm stroke. Fuel consumption rate is 1 kg/min while air fuel ratio is 10. The average indicated mean effective pressure is 0.8 MPa. Determine indicated power, mechanical efficiency, brake thermal efficiency and volumetric efficiency of engine. The calorific value of fuel is 43 MJ/kg. The ambient conditions are 1.013 bar, 27^{0}C.
   (b) How do you measure air consumption rate of I.C engine in the laboratory?

6 (a) A two stage air compressor compresses air from 1 bar 20^{0}C to 42 bar. If the law of compression is $pV^{1.35}$ = constant and intercooling is perfect. Find per kg of air (i) the work done in compression. (ii) the mass of cooling water necessary for abstracting the heat in the intercooler, if the temperature rise of the cooling water a 25^{0}C.
   (b) What are power producing and power absorbing machines? List few of them.

7 (a) A roots blower handles free air of 0.5 m^3/s at 1 bar and 27^{0}C and delivers air at a pressure of 2 bar. Determine the indicated power required to drive compressor and isentropic efficiency.
   (b) With the help of neat sketch, explain the working of roots blower. Also show the compression process in p-V diagram.

8   In an axial flow compressor, the overall stagnation pressure ratio achieved is 4 with overall stagnation isentropic efficiency 86%. The inlet stagnation pressure and temperature are 1 bar and 320 K. The mean blade speed is 190 m/s. The degree of reaction is 0.5 at the mean radius with relative air angles of 10^0 and 30^0 respectively. The work done factor is 0.9. Calculate: (i) Stagnation polytropic efficiency. (ii) Number of stages. (iii) Inlet temperature and pressure. (iv) Blade height in the first stage if the hub-tip ratio is 0.4, mass flow rate is 20 kg/sec

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B.Tech II Year II Semester (R09) Regular & Supplementary Examinations, April/May 2013
THERMAL ENGINEERING - I
(Mechanical Engineering)

Time: 3 hours   Max Marks: 70

Answer any FIVE questions
All questions carry equal marks
*****

1 (a) What is the use of air-standard cycle? List some air standard cycles.
  (b) Discuss the effect of exhaust valve opening time on blow down.

2 (a) What is IC engine? Classify I.C engines.
  (b) Compare external combustion and internal combustion engine.

3   What are the factors which affects the ignition lag, flame propagation in S.I engines?

4   Explain any three important phases of combustion in C.I engine.

5 (a) Define the terms: brake power, piston speed, brake mean effective pressure and brake thermal efficiency.
  (b) A two cylinder four stroke engine runs at 240 r.p.m developing a torque of 5.16 kN- m. The bore and stroke of cylinder are 30 cm and 58.5 cm respectively. Engine runs with gaseous fuel having calorific value of 16.8 MJ/m^3. The gas and air mixture is supplied in proportion of 1:7 by volume. The volumetric efficiency is 0.85. Determine (i) The brake power. (ii) The mean piston speed in m/s. (iii) The brake mean effective pressure. (iv) The brake thermal efficiency.

6 (a) With the help of neat sketch explain the working principle of single stage single acing reciprocating air compressor.
  (b) A single-stage, double acting compressor has a free air delivery of 14 m^3/min, measured at 1.013 bar and 15^{0}C. The pressure and temperature in the cylinder during induction are 0.95 bar 15^{0}C. The delivery pressure is 7 bar and index of compression and expansion is 1.3. The clearance volume is 5% of the swept volume. Calculate: (i) Indicated power required. (ii) Volumetric efficiency.

7 (a) Define and explain the terms: pressure coefficient and adiabatic coefficient of a centrifugal compressor.
  (b) A single sided centrifugal compressor is to deliver 14 kg/s of air when operating at a pressure ratio of 4:1 and a speed of 200 rev/s. The inlet stagnation conditions are 288 K and 1.0 bar. The slip factor and power input factor may be taken as 0.9 and 1.04 respectively. The overall isentropic efficiency is 0.80. Determine the overall diameter of the impeller.

8 (a) Define polytropic efficiency of an axial flow compressor and write the expression.
  (b) A multi stage axial compressor is required for compressing air at 300 K, through a pressure ratio of 4.5 to 1. Each stage is to be a 50% reaction and the mean blade speed of 300 m/s, flow coefficient 0.5, and the stage loading factor 0.3 are taken, for simplicity, as constant for all stages. Determine the flow angles and the total number of stages required if the polytropic efficiency is 85%. Take C_p = 1.005 kJ/kg K and γ = 1.4 for air.

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B.Tech II Year II Semester (R09) Regular & Supplementary Examinations, April/May 2013
THERMAL ENGINEERING - I
(Mechanical Engineering)

Time: 3 hours   Max Marks: 70

Answer any FIVE questions
All questions carry equal marks
*****

1 (a) Discuss the effect of exhaust valve opening time on blow down.
  (b) What are the factors that affect the volumetric efficiency of an engine?

2 (a) What are the various components to be lubricated in an engine and explain how it is accomplished?
  (b) What are the various characteristics of an efficient cooling system in an engine?

3 (a) What do you understand from abnormal combustion in S.I engines?
  (b) Explain different stages of combustion in S.I engine.

4 (a) What are the factors that affect the combustion process in C.I engines?
  (b) What is knocking in diesel engine? Explain in detail.

5 (a) A gas engine having a cylinder 250 mm bore and 450 mm 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?

6 (a) Derive an expression for minimum work required for two stage reciprocating air compressor with perfect inter-cooling and neglect clearance volume.
  (b) A single stage single acting air compressor delivers 14 m^3 of free air from 1 bar to 7 bar. The speed of the compressor is 300 r.p.m. Assuming the compression and expansion is $pV^{1.35}$ = constant and clearance is 5% of the swept volume, find the diameter and stroke of the compressor. Take stroke length is 1.5 times the bore diameter.

7 (a) What is power input factor and slip factor?
  (b) A centrifugal compressor running at 9000 r.p.m delivers 600 m^3/min of free air. The air is compressed from 1 bar and 20^{0}C to a pressure ratio of 4 with an isentropic efficiency of 0.82. Blades are radial at outlet of impeller and the flow velocity of 62 m/s may be assumes throughout constant. The outer radius of the impeller is twice the inner and the slip factor may be assumed as 0.9. The blade area coefficient may be assumed as 0.9 at the inlet. Calculate, (i) Final temperature of air. (ii) Theoretical power. (iii) Impeller diameters at inlet and outlet. (iv) Breadth of the impeller at inlet. (v) Impeller blade angle at inlet. (vi) Diffuse blade angle at inlet.

8 (a) Define degree of reaction and write the expression for degree of reaction.
  (b) An axial flow compressor is to have constant axial velocity of 150 m/s and 50% degree of reaction. The mean diameter of blade ring is 35 cm and speed is 15000 rpm. The exit angles of the blade are 27^0. Calculate blade angle at inlet and work done per kg of air with the help of velocity triangles.

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B.Tech II Year II Semester (R09) Regular & Supplementary Examinations, April/May 2013
MANUFACTURING TECHNOLOGY
(Mechanical Engineering)

Time: 3 hours   Max Marks: 70

Answer any FIVE questions
All questions carry equal marks
*****

1 (a)   Explain any five types of patterns with sketch giving their applications.
   (b)   Explain the parting line gate with sketch. Write the advantages?

2   Explain the following centrifugal casting methods with sketch:
   (a)   True centrifugal casting.
   (b)   Semi centrifugal casting.

3 (a)   Explain the Volt-ampere (V-I) characteristics of welding power source.
   (b)   What are the applications and advantages of explosive welding?

4 (a)   Explain the friction welding process with sketch.
   (b)   What are the advantages of friction welding process?

5 (a)   Sketch and describe the different types of rolls used in rolling.
   (b)   What is the power required in rolling?

6   Describe the following cold working process:
   (a)   Coining.
   (b)   Roll bending.

7 (a)   Why can open die forging be made larger than closed die forging?
   (b)   Why can metals such as aluminium and tin extruded cold?

8 (a)   Why is EDM widely used? Give the reasons.
   (b)   What is the difference between the chemical milling and electro chemical milling?
   (c)   What is principal cause of tool wear in ECM?

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B.Tech II Year II Semester (R09) Regular & Supplementary Examinations, April/May 2013
MANUFACTURING TECHNOLOGY
(Mechanical Engineering)

Time: 3 hours   Max Marks: 70

Answer any FIVE questions
All questions carry equal marks
*****

1   Explain the steps involved in preparing the sand mould.

2 (a)   Explain the working of a cupola furnace with a neat sketch.
   (b)   Write the advantages of a cupola furnace.

3 (a)   Explain the thermit welding process with sketch.
   (b)   What are the applications of thermit welding?

4 (a)   What are the various methods of non destructive testing of welds? List them.
   (b)   What are the advantages and limitations non destructive testing?

5 (a)   Mention the materials used for rolls
   (b)   What are the different types of rolling mills? Explain the tandem and planetary rolling mills with neat diagrams,

6 (a)   Define blanking, punching and piercing operations.
   (b)   What are different types of drawing? Explain any one.

7 (a)   What is cold forging? What for cold heading is used?
   (b)   Explain the process of rotary forging with help of neat sketch.

8 (a)   What is principle of working of electrochemical machining (ECM)?
   (b)   Describe in brief an ECM machine.
   (c)   What is the function of electrolyte in ECM? List common electrolytes used in ECM.

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B.Tech II Year II Semester (R09) Regular & Supplementary Examinations, April/May 2013
MANUFACTURING TECHNOLOGY
(Mechanical Engineering)

Time: 3 hours   Max Marks: 70

Answer any FIVE questions
All questions carry equal marks
*****

1 (a)   Define the following terms related to casting:
              (i) Casting. (ii) Sprue. (iii) Runner.   (iv) Chaplets.
   (b)   Explain the following types of gates with sketch:
              (i) Pencil gate. (ii) Branch gate.   (iii) Ring gate.

2 (a)   What is directional solidification? Explain it with the help of a diagram.
   (b)   Explain the solidification of a pure metal with sketch.

3 (a)   Explain the carbon arc welding process with sketch.
   (b)   What are the advantages and limitations of arc welding?

4 (a)   What are the various types of destructive tests conducted on welds? List them.
   (b)   Explain the procedure of tensile testing of a weld with sketch.

5 (a)   Differentiate between two high reversing mill and three high mill. Sketch them.
   (b)   Discuss the various stages of shape rolling of a component with sketches? What
         are its applications?

6 (a)   Draw a sketch of a punch and a die set used for punching operation. Indicate its
         various parts.
   (b)   Explain the following terms: (i) Coining.   (ii) Embossing. (iii) Trimming.

7 (a)   A board hammer receives its name because of what feature.
   (b)   Compare the forging press to a drop hammer press and discuss the energy
         transmitted to the work.

8 (a)   Explain why the EBM process is performed in vacuum chamber.
   (b)   List product applications of EBM.
   (c)   What is the difference between the EBM and LBM processes?

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4

MANUFACTURING TECHNOLOGY
(Mechanical Engineering)

Time: 3 hours   Max Marks: 70

Answer any FIVE questions
All questions carry equal marks
*****

1 (a) Explain the parting line gate and bottom gate with sketches and their advantages and disadvantages.
   (b) Explain the functions of runner extension in a gating system.

2 (a) What are the two basic categories of casting processes? Explain.
   (b) What are the advantages and disadvantages of sand casting over investment casting?

3 (a) What is welding? How the welding processes are classified? Explain.
   (b) Explain the various types of welded joints with sketch.

4 (a) Explain the two types of impact testing of welds with sketch.
   (b) What is the difference between Izod and Charpy impact testing of welds?

5 (a) Explain the significance of recrystallization temperature in metal working.
   (b) Why is hot working sometimes preferred to cold working in spite of some disadvantages?

6 (a) What is drawing? Sketch and explain hot drawing process.
   (b) Describe the process of cold spinning stating its advantages and specific uses.

7 (a) Explain with simple sketches, the process of forward and backward extrusion.
   (b) Explain how the various variables affect the extrusion pressure.

8 (a) What is over cutting in EDM process and how it is affected by amperage and frequency?
   (b) Describe in brief an EDM machine.
   (c) What are the special requirements of the EDM?

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