Code: 9ABS401/9ABS304

II B. Tech II Semester (R09) Regular & Supplementary Examinations, April/May 2012
PROBABILITY & STATISTICS
(Common to CE, ME, CSS & IT)

Time: 3 hours

Max Marks: 70

Answer any FIVE questions
All questions carry equal marks
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1   Prove the following identities:
     (i) $P(A^1)=1-P(A)$
     (ii) For any two events A and B
         (a) $P(A^1 \cap B)=P(B)-P(A \cap B)$
         (b) $P(A \cap B^1) = P(A) - P(A \cap B)$
     (iii) If $B \subset A$, then $P(A \cap B^1)=P(A)-P(B)$.

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   (a)   When the mean of marks was 50% and S.D 5% then 60% of the students failed in an examination? Determine the grace marks to be awarded in order to show that 70% of the students passed. Assume that the marks are normally distributed.
    (b)   The marks X obtained in mathematics by 1000 students in normally distributed with mean 78% and s.d 11% determine:
       (a) How many students got marks above 90%?
       (b) What was the highest mark obtained by the lowest 10% of students?
       (c) Semi inters quartile range.
       (d) Within what limits did the middle 90% of students lie.

4   If the mean of breaking strength of copper wire is 575 lbs, with a standard deviation of 8.3 lbs. How large a sample must be used in order that there will be one chance in 100 that the mean breaking strength of the sample is less than 572 lbs?

5   To estimate the average time it takes to assemble a certain computer component, the industrial engineer at an electronic firm timed 40 technicians in the performance of the task, getting a mean of 12.73 min. and a S.D. of 2.06 min.
     (i) What can we say with 99% confidence about the maximum error if $\bar{x}$ = 12.73 is used as a point estimate of the actual average time required to do the job?
     (ii) Use the given data to construct 99% confidence interval.
     (iii) With what confidence we can assert that the sample mean does not differ from the true mean by more than 30 sec.

6 (a) A coin was tossed 400 times and returned heads 216 times. Test the hypothesis that the coin is unbiased. Use a 0.05 level of significance.

   (b) Producers of 'gutkha', claims that the nicotine content in his 'gutkha' on the average is 1.83 mg. Can this claim accepted if a random sample of 8 'gutkha' of this type have the nicotine contents of 2.0, 1.7, 2.1, 1.9, 2.2, 2.1, 2.0, 1.6 mg? Use a 0.05 level of significance.

7 (a) Write about (M/M/1): (∞/FIFO) queuing system.

   (b) Derive the formula for the probability distribution density function of the waiting time distribution.

8 (a) A manufacturer claims that only 4% of his products are defective. A random sample of 500 was taken among which 100 were defective. Test the hypothesis at 0.05 levels.

   (b) An oceanographer wants to check whether the depth of the ocean in a certain region if 57.4 fathoms, as had previously been recorded. What can he conclude at the 0.05 level of significance, if reading taken at 40 random locations in the given region yielded a mean of 59.1 fathoms with a S.D. 5.2 fathoms?

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PROBABILITY & STATISTICS
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1   In a bolt factory machines A, B, C manufacture 20%, 30%, 50% of the total of their output and 6%, 3% and 2% are defective. A bolt is drawn at random and found to be defective. What is the probability that is manufactured by machines A, B and C?

2   A continuous random variable x has the distribution function:
     F(x) = 0 if $x \le 1$
     $= k(x-1)^4 \; if \; -1 < x \le 3$
     = 1 if x>3
     Find k and the probability density function of x.

3   (a)   A box contains 9 cards numbered 1 to 9. If four cards are drawn with replacement. What is the probability that none is 1?
     (b)   An insurance agent accepts policies of 5 men all of identical age and good in health. The probability that a man of this age will be alive 30 years is 2/3. Find the probability that in 30 years: (i) All five men.   (ii) At least one man.   (iii) Almost three will be alive.

4   The following are the times between six calls for an ambulance in a city and the patient's arrival at the hospital: 27, 15, 20, 32, 18 and 26 minutes. Use these figures to judge the reasonableness of the ambulance services claim that it takes on the average 20 minutes between the call for an ambulance and patient's arrival at the hospital.

5   (a)   A random sample of 100 teachers in a large metropolitan area revealed a mean weekly salary of Rs. 487 with S.D. Rs. 48. With what degree of confidence can we assert that the average weekly salary of all teachers in all area is between 472 to 502.
     (b)   A population ransom variable has mean 100 and S.D.16. What are the mean and S.D. of the sample mean for the random sample of size 4 drawn with replacement?

6   (a)   In a city 'A' 20% of a random sample of 900 school boys had a certain slight physical defect. In another city 'B' 18.5% of a random sample of 1600 school boys had the same defect. Is the difference between the proportions significant at 0.05 level of significance?
     (b)   The mean yield of wheat from a district A was 210 pounds with S.D. of 10 pounds per acre from a sample of 100 plots. In another district the mean yield was 220 pounds with S.D. of 12 pounds from a sample of 150 plots. Assuming that the S.D. of yield in the entire state was 11 pounds, test whether there is any significant difference between the mean yields of crops in the two districts.

7 (a) Find the maximum difference that we can expect with probability 0.95 between the means of samples of sizes 10 and 12 from a normal population if their S.D. is found to be 2 and 3 respectively.

   (b)   A mechanist is making engine parts with axle diameters of 0.007 inch. A random sample of 10 parts shows a mean diameter of 0.742 inch with a S.D. of 0.040 inch. Compute the statistic you would use to test whether the work is meeting the specification at 0.05 level of significance.

8   Derive the following:

(i) $E(n) = L_s = \dfrac{\rho}{1-\rho}$,

(ii) Average queue length $L_q = \dfrac{\lambda^2}{\mu(\mu - \lambda)}$,

(iii) $E(m/m > 0) = \dfrac{\mu}{\mu - \lambda}$,

(iv) $V(n) = \dfrac{\lambda\mu}{(\mu - \lambda)^2}$.

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1   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?

2   (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.

3   (a)   During a country wide investigation the incidence of tuberculosis was found to be 1%. In a college of 400 strength 5 reported to be affected whereas in another 1200 strength 10 were affected. (i) Dose this indicate any significant difference. (ii) if the population proportion of the tuberculosis is not known test whether the difference is significant

     (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 0.01 level of significance, does this support the claim that the second production line does superior work?

4   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)?

5   (a)   For the given three events A,B and C, verify that:
$$P(A \cup B/C) = P(A) \subset P(B/C) - P(A \cap B/C)$$

    (b)   For three event A,B and C prove that $P(A \cap B^1/C) + P(A \cap B/C) = P(A/C)$

6   The diameter of an elective cable say X is assumed to be a continuous random variable with p.d.f of $f(x) = kx(1 - x^2) in 0 \le x \le 1 = 0$ elsewhere find the value of k and $P(0 \le x \le 1/2), P(x \ge 1/4)$.

7   A die is thrown 8 times. If getting a 2 or 4 is a success. Find the probability of:
    (i) 4 success
    (ii) $P(x \le 3)$
    (iii) $P(x \ge 2)$

8   (a)   Find the value of the finite population correction factor for n = 10 and N = 1000.
    (b)   A sample is collected from the items produced by a factory. The sample size is 81. The standard deviation of the population is 0.3. Find the standard error of the mean of sampling distribution.

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II B. Tech II Semester (R09) Regular & Supplementary Examinations, April/May 2012
PROBABILITY & STATISTICS
(Common to CE, ME, CSS & IT)

Time: 3 hours   Max Marks: 70

Answer any FIVE questions
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*****

1   (a)   One card is drawn from a regular deck of 52 cards. What is the probability of card being either red or a king?
    (b)   A bag contains 12 balls numbered from 1 to 12. If a ball is taken at random what is the probability of having a ball with a number which is a multiple of either 2 or 3.

2   A continuous random variable x has a probability density function: $f(x) = 3x^2, 0 \leq x \leq 1$. Find a and b such that: (i) $P\{x \leq a\} = P\{x > a\} and$ (ii) $P\{x \geq b\} = 0.05$

3   It has been claimed that in 60% of all solar heat installations the utility bill is reduced by at least one third. Accordingly what are the probabilities that the utility bill will be reduced by at least one – third in: (i) Form of five installations.   (ii) At least four of five installations.

4   Take 30 slips of paper and label 5 each -4 and 4, from each -3 and 3, three each -2 and 2 and each -1, 0 and 1. If each slip of paper has the same probability of being drawn find the probabilities of getting -4, -3, -2, -1, 0, 1, 2, 3, 4 and find the mean and variance of this distribution.

5   (a)   A random sample of size 100 has a S.D. of 5. What can you say about the maximum error with 95% confidence?
    (b)   The mean and S.D. of a population are 11,795 and 14,054 respectively. What can one assert with 95% confidence about the maximum error $\overline{x}$ = 11,795 and n = 50?
    (c)   Also construct the 95% confidence interval for the true mean for the above given data.

6   (a)   In a city 325 men out of 600 men were found to be smokers. Does this information support the conclusion that the majority of men in this city are smokers.
    (b)   A sample of 400 items is taken from a population whose S.D. is 10. The mean of the sample is 40. Test whether the sample has come from a population with mean 38. Also calculate 95% confidence interval for the population.

7   A random sample of 10 boys had the following I.Q.'s: 70, 120, 110, 101, 88, 83, 95, 98, 107, and 100. (i) Do these data support the assumption of a population mean I.Q of 100? (ii) Find a reasonable range in which most of the mean I.Q. values of the samples of 10 boys lie?

8   A machine repairing shop gets on average 16 machines per day (of eight hours) for repair and the arrival pattern is Poisson. At the moment there is no repair man available in the shop. The shop owner has two applicants A and B for the job of repairman. Both A and B claim the service times are exponentially distributed with mean 20 and 15 min. respectively. They demand salaries Rs. 500 and Rs. 600 per day respectively. The lost time costs Rs. 50/- per hour per machine. Assuming that the claims of the applicants are true, which one should be employed.
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1

FLUID MECHANICS AND HYDRAULIC MACHINERY

(Mechanical Engineering)

Time: 3 hours   Max Marks: 70

Answer any FIVE questions

All questions carry equal marks

*****

1   Two large fixed parallel planes are 12 mm apart. The space between the surfaces is filled with oil of viscosity 0.972 N.s/m^2. A flat thin plate 0.25 m^2 area moves through the oil at a velocity of 0.3 m/s. Find the drag force when the plate is equidistant from both the planes and when the thin plate is at a distance of 4 mm from one of the plane surfaces.

2 (a) Explain Bernoulli's theorem. Also list the assumptions.
   (b) A pipe 200 m long slopes down at 1 in 100 and tapers from 600 mm diameter at the higher end to 300 mm at the lower end and carrier 100 lps of oil (G = 0.8). It the pressure gauge at the higher end reads 60 KN/m^2. Find velocities at the two ends and pressure at the lower end.

3   The following data is related to an orifice meter.
        Diameter of the pipe = 240 mm
        Diameter of the orifice = 120 mm G of oil = 0.88.
        Reading of differential manometer = 400 mm of mercury, C_d = 0.65.
        Find the rate of flow of oil.

4   A jet of water moving at 20 m/s impinges on a symmetrical curved vane shaped to deflect the jet through 120^0 (i.e. the vane angles θ and $\emptyset$ are each equal to 30^0). If the vane is moving at 5 m/s, find the angle of the jet so that there is no shock at inlet. Also determine the absolute velocity of exit in magnitude and direction, and the work done.

5   Explain hydro electric power station with a neat sketch.

6 (a) What is meant by geometric similarity?
   (b) Explain the term 'cavitation' with respect to turbines.

7   A Pelton wheel has to be designed for the following data: Power to be developed = 6000 kw. Net head available = 300 m, speed = 550 r.p.m. Ratio of jet diameter to wheel diameter = 1/10, and overall efficiency = 85%. Find the number of jets, diameter of the jet, diameter of the wheel and the quantity of water required.

8 (a) Explain the term "NPSH".
   (b) Explain indicator diagram.

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B.Tech II Year II Semester (R09) Regular & Supplementary Examinations, April / MAY 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 metal plate 1.25 m x 1.25 m x 6 mm thick and weighing 90 N is placed midway in the 24 mm gap between the two vertical plane surfaces. The gap is filled with an oil of specific gravity 0.85 and dynamic viscosity 3 N s/m^2. Find the force required to lift the plate with a constant velocity of 0.15 m/s.

2 (a) Explain Euler's theorem.
   (b) In a pipe of 90 mm diameter water is flowing with a mean velocity of 2 m/s and at a gauge pressure of 350 kN/m^2. Determine the total head, if the pipe is 8 m above the datum line. Neglect friction.

3   Determine the rate of flow of water through a pipe 300 mm diameter placed in an inclined position where a venturimeter is inserted having a throat. of 150 mm. The difference of pressure between the main and throat is measured by a liquid of G = 0.7 in an inverted U – tube which gives a reading of 260 mm. The loss of head between the main and throat is 0.3 times the kinetic head of the pipe.

4   Show that the efficiency of a free jet striking normally a series of flat plates mounted on the periphery of a wheel never exceeds 50%.

5   Explain the various types of hydro electric power stations.

6 (a) Explain specific quantities of hydraulic turbines.
   (b) What is water hammer? Explain with respect to a turbine.

7   Give the classification of turbines in detail.

8   Find the power required to drive a centrifugal pump which delivers 40 lps to a height of 20 m. through a 150 mm dia. and 100 m long pipeline. The overall efficiency of pump is 70% and Darcy's f = 0.06 for the pipeline. Assume inlet losses in suction pipe equal to 0. 33m.

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B.Tech II Year II Semester (R09) Regular & Supplementary Examinations, April / MAY 2012

FLUID MECHANICS AND HYDRAULIC MACHINERY

(Mechanical Engineering)

Time: 3 hours   Max Marks: 70

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*****

1 (a)   Give a complete classification of different types of manometers (do not give sketches) mentioning the conditions for which each type of manometer is suitable.
   (b)   Derive the expressions for the pressure intensity inside a droplet, a soap bubble and a liquid jet.

2   A pipe line carrying oil (G = 0.8) changes in diameter from 300 mm at position 1 to 600 mm diameter at position 2, which is 5 m. at a higher level. If the pressures at positions 1 and 2 are 100 kN/m^2 and 60 kN/m^2 respectively and the discharge is 300 lps, find loss of head and direction of flow.

3 (a)   What is the significance of upper and lower critical Reynolds's numbers.
   (b)   A differential manometer is connected between the inlet and throat sections of a venture meter. Show that the manometer reading is unaltered whatever be the inclination of the venturimeter.

4   A jet of water 50 mm in diameter having a velocity of 20 m/s, strikes normally a flat smooth plate. Determine the thrust on the plate if the plate is at rest and if the plate if the plate is moving in the same direction as the jet with a velocity of 8 m/s. Also find the work done per second on the plate and the efficiency of the jet when the plate is moving.

5   Explain the various elements of hydro electric power station with sketches.

6   What are the various characteristic curves of a turbine? What is the necessity of characteristic curves?

7   An inward flow reaction turbine discharges radially and the velocity of flow is constant and equal to the velocity of discharge from the turbine. Show that the hydraulic efficiency can be expressed by

$$\eta_h = \cfrac{1}{1 + \cfrac{\frac{1}{2}(Tan^2 \propto)}{\left(1 - \frac{Tan \propto}{Tan \theta}\right)}}$$

Where $\propto$ and θ are respectively the guide vane angle and wheel vane angle at inlet.

8   Explain the classification of centrifugal pumps. Explain the working of a centrifugal pump.

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FLUID MECHANICS AND HYDRAULIC MACHINERY

(Mechanical Engineering)

Time: 3 hours   Max Marks: 70

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*****

1 (a) Explain U-Tube manometers.
   (b) A fluid has an absolute viscosity of 0.048 Pa- s and a specific gravity of 0.913. For flow of such a fluid over a solid flat surface, the velocity at a point 75 mm away from the surface is 1.125 m/s. calculate the shear stresses at the solid boundary and also at the points 25 mm, 50 mm and 75 mm away from the surface in normal direction, if the velocity distribution across the surface is linear, parabolic with vertex at the point 75 mm away from the surface.

2 Gasoline (G = 0.8) is flowing upwards through a vertical pipeline which tapers from 300 mm to 150 mm dia. A gas line mercury differential manometer is connected between 300 mm and 150 mm pipe section to measure the rate of flow. The distance between the manometer tappings is 1 m and gauge reading is 500 mm of mercury. Find differential gauge reading in terms of gasoline head. Also find the rate of flow. Neglect friction and other losses.

3 (a) Derive Darcy Weisbach equation and give its significance.
   (b) What is flow nozzle? Explain.

4 The rotor of an inward flow hydraulic turbine has a diameter over the tips of the blades of 1 m. The diameter at the bottom of the blade is 0.6 m. The speed is 300 r.p.m. the water is supplied through fixed values at 10^0 to the tangent to the outer circumference of the rotor, the velocity of water being 10 m/s. Find the blade angle at entry and exit, so that the water may enter and leave the moving blades without shock, the water leaves the blades with the velocity entirely radial and equal to 3.5 m/s. Also find the velocity of water relative to the blades at the inlet.

5 Explain the various types of hydroelectric power stations.

6 (a) What are unit quantities?
   (b) Explain any two characteristic curves of a turbine.

7 The following data were obtained from a test on a pelton wheel. Head at the base of the nozzle = 32 m discharge of the nozzle = 0.18 m^3/s. Area of the jet = 7500 sq. mm. Power available at the shaft = 44 KW mechanical efficiency = 94 % Calculate the power lost in the nozzle, in the runner and in mechanical friction.

8 Explain the working of a reciprocating pump in detail.

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II B. Tech II Semester (R09) Regular & Supplementary Examinations, April/May 2012
KINEMATICS OF MACHINERY
(Mechanical Engineering)

Time: 3 hours   Max Marks: 70

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

1   (a)   Define and explain the terms: mechanism, machine, link and kinematic pair.
     (b)   Show that the locus of the midpoint of the link connecting the two sliders in an elliptical
            trammel is a circle.

2   What are straight line mechanisms? Describe one type of exact straight line motion
            mechanism with the help of a sketch.

3   In the steam engine mechanism, shown in fig the crank AB rotates at 200 r.p.m. Find the
            velocities of C, D, E, F, and P. Also find the acceleration of the slider at C. the dimension
            of the various links is: AB = 12 cm, BC = 48 cm, CD = 18 cm, DE =36 cm and EF =12 cm
            and FP= 36 cm.
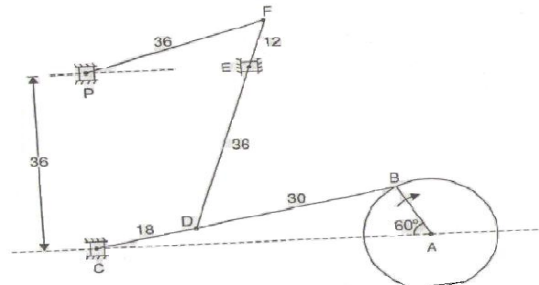
4   (a)   Describe with a neat sketch the working of Davis steering gear mechanism. Also prove
            that for Davis steering gear Tan α = w/2 L.
     (b)   Two shafts with an inclined angle of 160˚ are connected by a Hooke's joint. The driving
            shaft runs at a uniform speed of 1500 r.p.m. The driven shaft carries a flywheel of mass
            of 12 kg and 100 mm radius of gyration, find the maximum angular acceleration of the
            driven shaft and the maximum torque required.

5   A flat ended valve tappet is operated by a symmetrical cam with circular arcs for flank
            and nose profiles. The total angle of action is 150º, base circle diameter 125 mm and the
            lift 25 mm. During the lift, the period of acceleration is half that of the retardation .Speed
            of cam shaft is 1250 r. p. m. The straight line path of the tappet passes through the cam
            axis .Find: (i) Radii of the nose and flank, and
                          (ii) Maximum acceleration and retardation during the lift.

6 (a) Define the term: 'Length of arc of contact' and prove that it is equal to length of path of contact divided by cosine of the pressure angle.

(b) The number of teeth on each of the two equal spur gears in mesh is 40. The teeth have $20°$ involutes profile and the module is 6 mm. If the arc of contact is 1.75 times the circular pitch, find the addendum.

7 A flat belt 8 mm thick and 100 mm wide transmits power between two pulleys running at 25 m/ s. the mass of the belt is 0.9 kg/m length. The angle of lap for the smaller pulley is $165°$ and coefficient of friction is 0.30 the maximum permissible stress for the belt material is 2×10^6 N/ m^2. Calculate the maximum power that can be transmitted.

8 (a) What do you mean by gear train? Mention the different types of the gear train.

(b) In an epicyclic train an annular wheel A having 54 teeth meshes with a planet wheel B which gears with a sun wheel C, the wheels A and C being co-axial. 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 P 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 the wheel c.

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KINEMATICS OF MACHINERY
(Mechanical Engineering)

Time: 3 hours

Max Marks: 70

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1 (a) Define and explain the term kinematic chain. For a kinematic chain, what is the relation between number of pairs and number of links? Also write the equation, showing the relation between number of links and numbers of joints.

(b) What do you mean by constrained motion? What are the different types of constrained motions? Explain each type with examples neat sketches.

2 Give a neat sketch of the straight line motion Hart mechanism. Prove that it produces an exact straight line motion.

3 (a) Prove that the ratio of the angular velocities of the driven and driving shafts for a Hooke's joint is given by $\omega_2/\omega_1 = \cos\alpha/ 1-\cos^2\theta \ \sin^2\alpha$.

(b) What is the condition for correct steering? Sketch and show the two main types of steering gears and discuss their relative advantages.

4 A tangent cam with a base circle diameter of 50 mm operates a roller follower 20 mm in diameter. The line of stroke of the roller passes through the axis of cam. The angle between the tangential faces of the cam is 60°, speed of the cam shaft 250 r.p.m and the lift of the follower 15 mm. calculate:
(a) The main dimension of the cam
(b) The accelerations of the follower at
    (i) The beginning of the lift.
    (ii) Where the roller just touches the nose.
    (iii) The apex of the circular nose.

5 A reciprocating engine mechanism is shown in figure the crank CB = 10 cm and connecting T rod BA = 30 cm with the center of gravity G, 10 cm from B. In the position shown, the crank has a velocity of 75 rad/s and an angular acceleration of 1200 rad/s2. Find: (a) The velocity and acceleration of G and (b) the angular velocity and angular acceleration of AB.
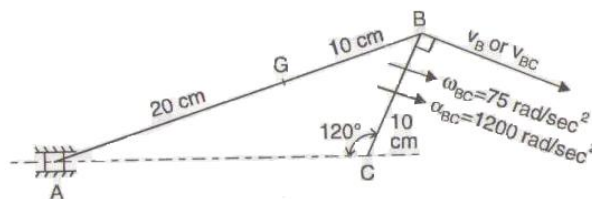
6 (a) What do you mean by pitch point; circular pitch; module, addendum and dedendum of a gear?

(b) Calculate: (i) length of path of contact, (ii) arc of contact and (iii) contact ratio when a pinion having 17 teeth drives a gear having 49 teeth. The profile of the gear is in volute with pressure angle 20º, module =6 mm and addenda on pinion and gear wheel =1 module.

7 (a) What are the relative advantages and disadvantages of chain and belt drives?

(b) Derive the expression for optimum speed of flat belt for the transmission of maximum power considering the effect of centrifugal tension.

8 (a) What are the advantages of epicyclic gearing?

(b) An internal wheel B has 80 teeth and is keyed to a shaft F. A fixed internal wheel C with 82 teeth is concentric with B.A compound wheel DE gears with two internal wheels, D having 28 teeth and gears with C, while E gears with B. the compound wheel revolves freely on a pin which projects from a disc keyed to a shaft A, co- axial with F. if all the wheels have the same pitch and the shaft A makes 800 r.p.m., what is the speed of F?

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II B. Tech II Semester (R09) Regular & Supplementary Examinations, April/May 2012
KINEMATICS OF MACHINERY
(Mechanical Engineering)

Time: 3 hours

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Answer any FIVE questions
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*****

1   What do you mean by inversion of a mechanism? Explain with sketches any three inversions of single slider crank mechanism. Where these inversions are used?

2   Draw the sketch of a mechanism in which a point traces an exact straight line. The mechanism must be made of only revolute pairs. Prove that the point traces an exact straight line motion.

3   Derive an expression for the ratio of shafts velocities for Hooke's joint and draw the polar diagram depicting the salient features of driven shaft speed.

4   In a steam engine mechanism, shown in fig, the crank AB rotates at 200 r.p.m. the dimension of the various links are : AB = 12 cm, BC = 48 cm, CD =18 cm DE= 36 cm and EF = 12 cm and FP = 36 cm, Find the velocities of C, D, E, F and P.

5   (a)   Define and explain the terms:
            (i) cam profile   (ii) base circle (iii) prime circle (iv) pitch curve (v) lift and period of dwell.
     (b)   The following particulars refer to a cam with concave flank, circular nose and roller follower. Base circle diameters =80 mm, distance between nose circle and cam axis = 58 mm nose radius = 26 mm, concave flank radius =60 mm. Follower roller radius =10 mm, speed =10 rad/s semi angle of action =60°. Determine the velocity and acceleration for the follower when the cam has rotated by 25° from the initial position of the rise of the follower.

6   (a)   Prove that for two involutes gear wheels in mesh, the angular velocity ration does not change if the centre distance is increased within limits, but the pressure angle increases.

         (b)   The numbers of teeth on each of the two equal spur gears in mesh are 40. The teeth have 20° involutes profile and the module is 6 mm. If they are of contact is 1.75 times the circular pitch, find the addendum.

7   (a)   Distinguish between initial tension and centrifugal tension in a belt.

         (b)   The power is transmitted from a pulley 1 m diameter running at 200 r.p.m. to a pulley 2.25 m diameter by means of a belt. Find the speed lost by the driven pulley as a result of the creep, if the stress on the tight and slack side of the belt is 1.4 N/mm2 and 0.5 N/mm respectively. The young's modulus for the material of the belt is 100 N/mm.

8   An arm A carries 4 gear wheels B, C, D and E. Gear wheel B meshes with gear wheel C and gear wheel D meshes with gear wheel E. Gear wheels C and D form a compound gear. The number of teeth on gear wheel B = 20, that on gear wheel C = 15, that of gear wheel D = 35 and gear wheel E has 20 teeth. If the speed of arm is 100 r. p. m. clockwise and gear wheel E is fixed, calculate the speed of gear wheel B. Draw the sketch of the gear train.

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Code: 9A03401

II B. Tech II Semester (R09) Regular & Supplementary Examinations, April/May 2012
**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)   Sketch a pantograph, explain its working and show that it can be used to reproduce to an enlarged scale a given figure.
    (b)   A circle has OR as its diameter and a point Q lines on its circumference. Another point P lies on the line OQ produced. If OQ turns about O as centre and the product OQ × OP remains constant, show that the point P moves along a straight line perpendicular to the diameter OR.

2   (a)   What do you mean by inversion of a mechanism? Explain.
    (b)   Explain the following:
          (i) Scotch Yoke mechanism,   (ii) Elliptical Trammel, and   (iii) Oldham's coupling.

3   The oscillating link OAB of a mechanism shown in figure is pivoted at O and is moving at 90 r.p.m anti-clockwise. If OA= 15 cm, AB= 7.5 cm and AC= 25 cm, then calculate:
          (i) the velocity of the block C, (ii) angular velocity of the link AC and (iii) the rubbing velocities of the pins at O, A and C assuming that these pins are of equal diameter of 2 cm. the oscillating link OAB makes an angle of 15 with the vertical as shown in fig.
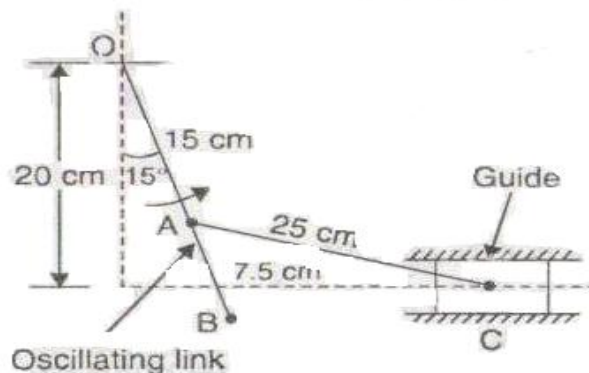

4   (a)   What is fundamental equation of steering gears? Which steering gear fulfils this condition?
    (b)   A Hooke's joint connects two shafts whose axes intersect at 18°. The driving shaft rotates at a uniform speed of 210 r.p.m. the driven shaft with attached masses has a mass of 60 kg and radius of gyration of 120mm. Determine (i) the torque required at the driving shaft if a steady torque of 180 N.m resists rotation of the driven shaft and the angle of rotation is 45°. (ii) The angle between the shafts at which the total fluctuation of speed of the driven shaft is limited to 18 rpm.

5   (a)   What do you understand by the terms cam and follower? Name the essential members of a cam mechanism.
    (b)   Draw full size profile of a cam which will lift a 2.5 cm diameter follower through 4 cm. the centre line of the follower passes through the centre of rotation of the cam. Ascent of follower takes place with S.H .M. in 0.1 second, followed by a period of rest of 0.025 sec. the follower then descends with uniform acceleration and retardation in 0.075 second. The cam rotates at a uniform speed of 120 r.p.m. And the least radius of the cam is 10 cm. Also plot velocity and acceleration diagrams of the follower during one revolution of the cam and mark important values thereon.

6   A pair of gears, having 40 and 30 teeth respectively is of 25° involute form. The addendum length is 5 mm and the module pitch is 2.5 mm. If the smaller wheel is the driver and rotates at 1500 r.p.m. find the velocity of sliding at the point of engagement and at the point of disengagement.

7   (a)   Derive an expression for the ratio of tensions for a flat belt passing over a pulley, when it is just on the point of slipping.
    (b)   Two parallel shafts 12 meters apart are to be connected by a belt running over pulleys of diameters 480 cm and 80 cm respectively. Determine the length of the belt required if the belt is open.

8   (a)   Describe the procedure of calculating the fixing torque in case of fixed wheel in case of an epicyclic gear train.
    (b)   An epicyclic gear train is shown in figure. Find out the r. p. m of pinion D if the arm A rotates at 60 r.p.m in anticlockwise direction. Number of teeth on wheels are given below :

$T_B = 12$; $T_C = 60$; $T_D = 40$
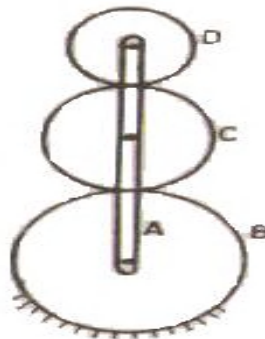
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II B. Tech II Semester (R09) Regular & Supplementary Examinations, April/May 2012
THERMAL ENGINEERING - I
(Mechanical Engineering)

Time: 3 hours

Max Marks: 70

Answer any FIVE questions
All questions carry equal marks
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1 (a) Why actual cycle is different from air standard cycle for I.C engine? Give few reasons.
   (b) 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.

2 (a) Explain the working of a two-stroke engine with neat sketch. Also draw the P-V diagram.
   (b) What is ignition system in I.C engines and explain battery ignition system used in petrol engines?

3 (a) What is knocking and what are the factors affecting knock?
   (b) Differentiate pre-ignition, auto ignition and detonation.

4 What do you understand from fuel requirements and fuel rating of C.I engine? Explain in detail.

5 (a) Define indicated power and how it can be determined experimentally for multi cylinder engine.
   (b) A four cylinder, four stroke diesel engines has brake mean effective pressure of 5.5 bar at full load speed of 600 rpm and specific fuel consumption of 0.25 kg/kWh. The cylinder has bore of 25 cm and stroke length of 35 cm. The air fuel ratio is measured as 26 from the exhaust gas analysis. The ambient conditions are 1 bar, 27ºC. Assuming the calorific value of fuel as 44 MJ/kg. Determine the brake thermal efficiency and the volumetric efficiency. Also find out brake power.

6 (a) Estimate the minimum work required to compress 1 kg of air from 1 bar 300 K to 16 bar in two stages if the law of compression is $pV^{1.3}$ = constant and inter cooling is perfect.
   (b) Explain the working of blower and compressor.

7 (a) How does the pressure rise in a centrifugal compressor? Where the compressed air is used?
   (b) A centrifugal compressor delivers free air of 20 kg/min. Air is sucked at static states of 1 bar, 27º C with inlet velocity of 100 m/s. The total head pressure ratio is 6 and isentropic efficiency of compressor is 82%. The mechanical efficiency of motor attached is 90%. Determine total temperature of air at exit o compressor and power required to drive compressor.

8 (a) Explain the working of an axial flow compressor with the help of neat sketch.
   (b) Derive expression for polytropic efficiency in terms of entry and delivery pressures, temperature and ratio of specific heats.

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II B. Tech II Semester (R09) Regular & Supplementary Examinations, April/May 2012
THERMAL ENGINEERING - I
(Mechanical Engineering)

Time: 3 hours

Max Marks: 70

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

1 (a) List out few actual and air standard cycles.
 (b) List the major losses in actual cycles and air standard cycles.

2 (a) What is I.C engine and briefly explain how they are classified?
 (b) Explain with neat sketch the construction and working of fuel pump.

3 (a) Briefly explain the importance of flame speed on combustion.
 (b) What are the requirements of combustion chamber?

4 (a) What is delay period in C.I engine? What is the difference between physical delay and chemical delay?
 (b) Enlist the various methods of controlling diesel knock.

5 (a) A diesel engine has a bore of 0.1 m, stroke of 0.11 m and a compression ratio of 19 running at 2000 rpm. Each cycle takes two revolutions and had a mean effective pressure of 1400 kPa. With total of six cylinders, find the indicated power.
 (b) What are the methods to measure the fuel consumption of I.C engine? Explain any one method with the help of diagram.

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) A gas turbine utilizes a two-stage centrifugal compressor. The pressure ratios for the first and second stages are 2.5:1 and 2.1:1 respectively. The flow of air is 1.5 kg/s, and is being at 1.013 bar and 283 K. If the temperature drop in the intercooler is $50^{o}C$ and isentropic efficiency is 0.85 for each stage. Calculate: (i) the actual temperature at end of each stage, (ii) the total compressor power. Take γ =1.4 and C_p = 1.005 kJ/kg k.
 (b) What are the different shapes of impeller blades used in the centrifugal compressor?

8 (a) Compare the axial flow compressor with centrifugal compressors
 (b) An axial flow compressor stage has a mean diameter of 600 mm and runs at 12000 rpm. mass flow rate through the compressor is 60 kg/s. Determine the power required to drive the compressor and degree of reaction if the air angle is 15°. The vane angle at inlet and exit are equal to 45° and 25° respectively.

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II B. Tech II Semester (R09) Regular & Supplementary Examinations, April/May 2012
THERMAL ENGINEERING - I
(Mechanical Engineering)

Time: 3 hours

Max Marks: 70

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

1 (a) What are the components of four-stroke IC engine and explain its functions?
  (b) What is the necessity of carburetor in S.I engine and explain its working principle?

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) What do you understand from normal combustion and what are the factors affecting normal combustion in S.I engines?
  (b) Explain the difference between pre-ignition, auto ignition and detonation.

4 (a) What do you mean by Octane number and Cetane number of fuels?
  (b) What is supercharging of IC engine? Write few applications.

5 (a) A petrol engine develops 20 kW of brake power. If the brake thermal efficiency and mechanical efficiencies of the engine are 25% and 80% respectively, calculate the indicated thermal efficiency.
  (b) Define indicated mean effective pressure related to I.C engine and how it can be measured?

6 (a) Derive the expression for the reversible work of compression with and without clearance, when the compression process is polytropic.
  (b) Differentiate positive displacement and non-positive displacement compressor.

7 (a) What is vane type compressor? Briefly explain its operating principle.
  (b) Estimate the efficiency of the vane compressor when it handles 0.15 m^3 of air per second from 1 bar to 3 bar. The pressure rise due to compression in the compressor is limited to 1.9 bar. Also calculate the power required to run the compressor if mechanical efficiency is 85%.

8 (a) Explain the mechanical details and working principle of an axial flow compressor.
  (b) An axial flow compressor draws air at 1 bar and 20° C. Assuming 50% degree of reaction, find the velocity of flow if the blade velocity is 100 m/s. Take air angle, vane angle at inlet are 10° and 40° respectively. Estimate the work done per kg of air and power developed if the flow area is 0.2 m^2.

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II B. Tech II Semester (R09) Regular & Supplementary Examinations, April/May 2012
THERMAL ENGINEERING - I
(Mechanical Engineering)

Time: 3 hours

Max Marks: 70

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

1   (a)   What is volumetric efficiency? Explain different factors which affect the volumetric efficiency
            of any engine.
     (b)   Explain the optimum opening position of exhaust valve to reduce the exhaust blow down
            loss in gasoline engine.

2   (a)   Draw the valve-timing diagram of four-stroke engine and mark the various processes on it
     (b)   What is fuel supply system and explain methods of fuel system generally employed in
            spark ignition engines.

3   (a)   Write short notes on pre-ignition and knocking.
     (b)   What are homogeneous and heterogeneous mixtures? Explain in which engines these
            mixtures are used.

4   What are the different methods used in C.I engines to create turbulence in the mixture?
            Explain its effect on power output and thermal efficiency of the engine.

5   (a)   Briefly explain the measurement of brake power of IC engine by using prony brake
            dynamometer.
     (b)   A two stroke two cylinder engine runs with speed of 2000 rpm and fuel consumption of 3
            liters/hr. The fuel has specific gravity of 0.8 and air-fuel ratio is 18. The piston speed is 500
            m/min and indicated mean effective pressure is 5 bar. The ambient conditions are 1.013
            bar, 15°C. The volumetric efficiency is 0.7 and mechanical efficiency is 0.8. Determine
            brake power output considering R for gas = 0.287 kJ/kg K.

6   (a)   What is the function of a compressor and what are the different types of compressors?
     (b)   Derive the expression for work of compression without clearance, when the compression
            process is reversible adiabatic and reversible isothermal.

7   (a)   Derive expression for roots blower efficiency.
     (b)   A centrifugal compressor running at 3000 rpm has internal and external diameters of
            impeller as 425 mm and 625 mm respectively. The vane angles at inlet and outlet are 25°
            and 45° respectively. The air enters the impeller radially. Determine work done by the
            compressor per kg of air and degree of reaction.

8   (a)   An axial flow compressor stage has a mean diameter of 600 mm and runs at 250 rps.
            Mass flow rate through the compressor is 50 kg/s. Determine the power required to drive
            the compressor and degree of reaction if the air angle is 12°. The vane angle at inlet and
            exit are equal to 35° and 27° respectively.
     (b)   What do you understand by 50% reaction balding?
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II B. Tech II Semester (R09) Regular & Supplementary Examinations, April/May 2012
MANUFACTURING TECHNOLOGY
(Mechanical Engineering)

Time: 3 hours

Max Marks: 70

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

1   What is a pattern? Explain the various pattern allowances provided on the pattern.

2   What are the various types of risers? Explain with sketches.

3   (a)   What is the fuel gases used in cutting? Write the advantages of them.
       (b)   Describe the seam welding process with neat sketch. Write the applications of seam welding process.

4   (a)   Explain the procedure of compression testing of a weld with sketch.
       (b)   What does a destructive tensile and compression tests reveal about a metal?

5   (a)   What are the common hot working processes?
       (b)   What are the main advantages and limitations of injection moulding for thermoplastic parts?

6   (a)   Discuss the various factors and variables, which affect the wire drawing process.
       (b)   Compare and contrast among various methods available for tube drawing.

7   (a)   What are the common lubricants used in extrusion?
       (b)   Describe in detail with nest sketch the working of drop hammers.

8   (a)   Explain the principle of ultrasonic machining with help of a neat diagram.
       (b)   What are the main advantages, disadvantages and applications of the USM process?

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Code: 9A03403

II B. Tech II Semester (R09) Regular & Supplementary Examinations, April/May 2012
MANUFACTURING TECHNOLOGY
(Mechanical Engineering)

Time: 3 hours

Max Marks: 70

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

1   What are the materials used for pattern making? Explain the relative advantages and disadvantages of them.

2   What are the various design considerations for designing the sand mould castings? Explain with sketches.

3   (a)   Describe the oxy acetylene equipment with sketch.
     (b)   What are the applications of oxy acetylene gas welding?

4   Explain the following two types of bend testing of welds with sketch:
     a) Free bend test.
     b) Guided bend test.

5   (a)   What is rolling? Sketch and explain simple rolling process.
     (b)   Is the pressure of the roll over the metal surface in contact uniform throughout. If not, how does it vary.

6   (a)   Explain the difference between blanking and punching and mansion the useful products in blanking and punching.
     (b)   Why does a metal usually become thinner in the region of a bend?

7   (a)   Differentiate between forward and backward extrusion process.
     (b)   What are the different forging hammers used in forging?

8   (a)   Explain the principle ECM with help of a suitable diagram.
     (b)   What is the laser beam machining? Explain its principle of operation with suitable diagram.

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II B. Tech II Semester (R09) Regular & Supplementary Examinations, April/May 2012
MANUFACTURING TECHNOLOGY
(Mechanical Engineering)

Time: 3 hours   Max Marks: 70

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

1   What are the various types of patterns? Explain with sketch.

2   Why is the shrinkage cavities formed in castings? Explain the methods used for eliminating them.

3   (a)   Explain the plasma arc welding process with sketch.
     (b)   What are the differences between plasma arc welding and gas tungsten arc welding?

4   Explain the following types of hardness testing of welds with sketch:
           a) Rockwell hardness test.
           b) Brinell hardness test.

5   (a)   What is re-crystallization temperature? What is the effect of re-crystallization temperature in mechanical working of metals?
     (b)   Write the dimensions of the billets, blooms and slabs.

6   (a)   Explain the terms:
           (i) blanking
           (ii) punching and
           (iii) piercing.
     (b)   With help of neat sketch explain forming process.

7   (a)   Why is flash is objectionable on a forging?
     (b)   What is swaging? What type of parts is rotary swaging capable of producing?

8   (a)   What is electron beam machining? Sketch its set up and indicate its main elements on it.
     (b)   List the main advantages and disadvantages of EBM and state few of its industrial applications.

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II B. Tech II Semester (R09) Regular & Supplementary Examinations, April/May 2012
MANUFACTURING TECHNOLOGY
(Mechanical Engineering)

Time: 3 hours

Max Marks: 70

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

1 (a) Explain about various methods available for trapping slag in the pouring basin.
   (b) Explain the parameters which effect the pouring time of a given casting to vary.

2   Explain the investment casting method (or) lost wax method with sketch.

3   What are the design considerations in designing welded joints? Explain.

4 (a) Differentiate between TID welding and MIG welding.
   (b) What are the gases commonly used in inert gas shielded arc welding process? Write their
        applications.

5 (a) How are the residual stress removed from cold worked metals?
   (b) Why pure metals are more easily cold worked than alloys?

6 (a) Briefly describe the spinning processes. What are its applications?
   (b) What are the various die stamping operations? Explain with neat diagrams.

7 (a) What is impact extrusion? Explain the process with neat sketch and state its specific
        applications.
   (b) What are the common forging defects? How they can reduced?

8 (a) What dose LASER stands for? How does the metal removal takes place by LASER beam
        machining?
   (b) List advantages, disadvantages and applications of LBM.

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Code: 9ABS402/9ABS303

II B.Tech II Semester (R09) Regular & Supplementary April/May 2012 Examinations
ENVIRONMENTAL SCIENCE
(Common to Civil Engineering,Mechanical Engineering,Information Technology,Computer Science & Engineering, Aeronautical Engineering and Bio Technology)

Time: 3 hours   Max Marks: 70

Answer any FIVE Questions
All Questions carry equal marks

*****

1. (a) Define environmental studies. Give the scope and importance of studying environmental science.
    (b) Discuss the need for public awareness on environmental hazards.

2. (a) Define energy. Discuss the different types of energy.
    (b) What is sustainable agriculture? Write short notes on integrated crop management.

3. (a) Write about concept of an ecosystem.
    (b) What is a grassland ecosystem? Write about the different types of grasslands in India.

4. (a) Give the biogeographic classification of India.
    (b) Write about in-situ and ex-situ conservation of biodiversity.

5. (a) Discuss the effects of air pollution on the following
            I.   Human beings
            II.   Plants
    (b) Give concepts that help individuals contribute towards a better quality of our environment and human life.

6   (a) Give the classification of wastelands. Write about the need for wasteland development.
    (b) Write notes on global warming and its effects on temperature and rainfall.

7. (a) Discuss how environmental issues are closely linked to human rights.
    (b) What is the nature of population growth? Discuss its variation among nations.

8. (a) Prepare a proforma for fieldwork on documenting environmental assets of river ecosystem.
    (b) Write the general guidelines for study of common plants, insects and birds.

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II B.Tech II Semester (R09) Regular & Supplementary April/May 2012 Examinations
ENVIRONMENTAL SCIENCE
(Common to Civil Engineering,Mechanical Engineering,Information Technology,Computer Science & Engineering, Aeronautical Engineering and Bio Technology)

Time: 3 hours   Max Marks: 70

Answer any FIVE Questions
All Questions carry equal marks

*****

1. (a) Define environmental studies. Give the scope and importance of studying environmental science.
    (b) Discuss the need for public awareness on environmental hazards.

     Write about the following earth's resources:
2. (a) Atmosphere
    (b) Biosphere

3. (a) Write about concept of an ecosystem.
    (b) What is a desert ecosystem? Write about the structure and functions of the desert ecosystem.

4. (a) What is a biodiversity hot spot? Explain giving examples.
    (b) Discuss the different threats to biodiversity.

5. (a) What is marine pollution? Give the different pathways of marine pollution.
    (b) Discuss disaster management. What are different phases and professional activities associated to disaster management?

6. (a) Discuss the different functions of watershed management
    (b) What is climate change? What are the causes for climate change?

7. (a) Discuss how environmental issues are closely linked to human rights.
    (b) What is value education? Discuss its importance in the present day context.

8. (a) Prepare a proforma for fieldwork on documenting environmental assets of forest ecosystem.
    (b) Write the general guidelines for study of common plants, insects and birds.

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II B.Tech II Semester (R09) Regular & Supplementary April/May 2012 Examinations
ENVIRONMENTAL SCIENCE
(Common to Civil Engineering,Mechanical Engineering,Information Technology,Computer Science & Engineering, Aeronautical Engineering and Bio Technology)

Time: 3 hours   Max Marks: 70

Answer any FIVE Questions
All Questions carry equal marks

*****

1. (a) Discuss the multidisciplinary nature of environmental studies.
   (b) Discuss the need for public awareness on environmental hazards.

2. (a) List the available energy sources for the world today and 40 years from now in order of decreasing importance in accordance to your perception.
   (b) Discuss the environmental consequences of mining industry.

3. (a) Define an ecosystem. Discuss about energy flow in ecosystems.
   (b) Cite three examples of large diversified ecosystems and note the factors threatening their existence.

4. (a) Define biodiversity. Discuss the human benefits of biodiversity.
   (b) What is a biodiversity hot spot? Explain with examples.

5. (a) Discuss the effects of presence of the following contaminants in water
      I. pathogens
      II. organic matter
      III. Inorganic nutrients
      IV. Toxic and hazardous substances.
   (b) Describe an integrated urban and industrial waste management strategy.

6. (a) What is an acid rain? What are the effects of acid rain on aquatic and terrestrial ecosystems?
   (b) Define sustainable development. How can one ensure sustainable development?

7. (a) Write about family welfare programs taken up by our country in response to phenomenal population growth.
   (b) What are values? Discuss the role of value education in the context of environment.

8. (a) Prepare a proforma for fieldwork to study the cause and effects of pollution at a local polluted site.
   (b) Write the general guidelines on aspects that can be observed and documented during ecosystem field studies.

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II B.Tech II Semester (R09) Regular & Supplementary April/May 2012 Examinations
ENVIRONMENTAL SCIENCE
(Common to Civil Engineering,Mechanical Engineering,Information Technology,Computer Science & Engineering, Aeronautical Engineering and Bio Technology)

Time: 3 hours   Max Marks: 70

Answer any FIVE Questions
All Questions carry equal marks

*****

1. (a) Define environmental studies. Give the scope and importance of studying environmental science.
    (b) Discuss the need for public awareness on environmental hazards.

2.   What is sustainable lifestyle? Discuss the equitable use of resources for sustainable lifestyle.

3. (a) Write about concept of an ecosystem.
    (b) What is an aquatic ecosystem? Write about the structure and functions of the desert ecosystem.

4. (a) Write short notes on conservation of biodiversity.
    (b) What are the human benefits of biodiversity.

5. (a) Discuss the effects of soil pollution on the following
          I.   Health
          II. Ecosystem
    (b) Give concepts that help individuals contribute towards a better quality of our environment and human life.

6. (a) Give the classification of wastelands. Write about the need for wasteland development.
    (b) Write notes on consumerism and its effect on society and environment.

7. (a) Discuss how environmental issues are closely linked to human rights.
    (b) What is population explosion? Discuss its effect on environment and human health.

8. (a) Prepare a proforma for fieldwork on documenting environmental assets of grassland ecosystem.
    (b) Write the general guidelines for study of common plants, insects and birds.

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