F 9335 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2011

Fourth Semester

Branch : Mechanical Engineering

HYDRAULIC MACHINES (M)

(2002 Admissions onwards—Supplementary)

Time : Three Hours Maximum : 100 Marks

Part A

Answer **all** *questions.*
Each question carries 4 *marks.*

1. Explain Reyleigh's method of dimensional analysis.
2. Show that in case of jet striking the flat plates mounted on wheels, the efficiency will be maximum when the tangential velocity of wheel is half of that of the jet.
3. What are the unit quantities in the case of hydraulic turbines ?
4. What do you mean by the specific speed of a turbine ?
5. Give classification of pumps very briefly.
6. With a neat sketch explain the working of a centrifugal pump.
7. Draw the theoretical indicator diagram for a reciprocating pump and calculate the work input.
8. Describe a double acting reciprocating pump.
9. Explain very briefly the applications of positive displacement pumps.
10. With a neat sketch explain the working of gear pump.

(10 × 4 = 40 marks)

Part B

Answer **all** *questions.*
Each question carries 12 *marks.*

11. (a) What are the objectives of model studies ? (4 marks)

    (b) A 2.5 m ship model was tested in fresh water (ρ = 1000 kg/m^3) and measurements indicated that there was a resistance of 45 N when the model was moved 2 m/s work out the velocity of 40 m prototype. Also calculate the force required to drive the prototype at this speed through sea water (ρ = 1025 kg/m^3).

(8 marks)

Or

Turn over

12. (a) What are the dimensionless numbers in fluid mechanics and what are their significance ?

(5 marks)

(b) A nozzle of 5 cm diameter delivers a stream of water at 20 m/s perpendicular to a plate that moves away from the jet at 5 m/s. Find the force on the plate, the work done and the efficiency of jet.

(7 marks)

13. What is the main function of a Draft Tube ? With neat sketches explain the different types of Draft Tubes.

Or

14. For a Kaplan turbine with runner diameter 4 m, the discharge is 60 m^3/s and the hydraulic and mechanical efficiencies are stated to be 90% and 94% respectively. The diameter of boss is 0.3 times the runner diameter and the speed ratio is 2. Assuming the discharge is free and there is no swirl at outlet, calculate the net available head on the turbine, the power developed and specific speed.

(12 marks)

15. (a) Explain the different efficiency ratings of a centrifugal pump. (5 marks)

(b) A centrifugal pump having an overall efficiency of 72% delivers 0.03 m^3/s of water to a height of 20 m through a 10 cm diameter pipe 80 cm long. Taking friction coefficient $f = 0.01$, calculate the power required to run the pump.

(7 marks)

Or

16. A three-stage centrifugal pump has impellers 30 cm diameter and 1.5 cm width at outlet. The velocity of water at inlet is radial, the vanes are curved back at an angle of 30° to the tangent at outlet and occupy 8% of the outlet area. While running at 1000 rpm, the pump delivers 0.04 m^3/second with 85% manometric efficiency and 75% overall efficiency. Calculate the head generated by the pump and the input power.

(12 marks)

17. Explain (a) Cavitation (b) Slip and (c) Abrasive wear of pumps.

Or

18. Draw the theoretical and actual indicator diagrams for a reciprocating pump and explain the effects of acceleration.

(12 marks)

19. With a neat sketch explain the working of a s Hydraulic intensifier.

Or

20. With a neat sketch explain the working of (a) Hydraulic press and (b) Air lift pump.

(12 marks)

[5 × 12 = 60 marks]

F 9325 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2011

Fourth Semester

Branch : Mechanical Engineering

THEORY OF MACHINES—I (M)

(2002 Admissions onwards—Supplementary)

Time : Three Hours Maximum : 100 Marks

Part A

Answer **all** *questions.*
Each question carries 4 *marks.*

1. What is a quadric circle chain ?
2. Define Corioli's component of acceleration.
3. What is dimensional synthesis of mechanism ?
4. Write note on overlay method in the synthesis of mechanisms.
5. Explain the principle of pantograph.
6. What do you mean by an engine indicator mechanism ?
7. Differentiate between a brake and a dynamometer.
8. Describe a centrifugal clutch.
9. What are the classifications of gears ?
10. What is interference between two mating gears ?

(10 × 4 = 40 marks)

Part B

Each question carries 12 *marks.*

11. With sketches explain three inversions of a double slider crank chain.

Or

12. The crank of a slider crank mechanism is 15 cm and the connecting rod is 60 cm long. The crank makes 400 r.p.m. in the clockwise direction. When it has turned 45° from the inner dead centre position, determine :
    (i) Velocity of slider.
    (ii) Angular velocity of connecting rod.
    (iii) Linear velocity of the midpoint of the connecting rod.

Turn over

13. Design a slider crank mechanism so that the displacement of the slider is proportional to the crank rotation in the interval 30° < < 100°. Assume initial distance of the slider equal to 15 cm and final distance to be 10 cm.

Or

14. Explain the graphical method of synthesis of a four bar chain.

15. With sketches explain any two approximate straight line mechanisms.

Or

16. With sketch explain the Whitworth quick return motion mechanism. State the application of this mechanism.

17. A car moving along a level road is having the following data : Wheel base of the car = 2.8 m ; distance of C. G. from ground surface = 600 mm ; perpendicular distance of C.G. from rear axle = 1.2 m ; speed on level road = 50 km/h ; coefficient of friction between the tyres and road = 0.6. Determine the minimum distance in which the car may be stopped when brakes are applied to the (i) rear wheels only (ii) front wheels only (iii) all four wheels.

Or

18. With sketches explain (i) belt transmission dynamometer ; (ii) torsion dynamometer.

19. Derive the expression for the minimum number of teeth on the wheel to avoid interference in involute gears.

Or

20. Two mating spur gears with module pitch of 6.5 mm have 19 and 47 teeth of 20° pressure angle, and 6.5 mm addendum. Determine the number of pairs of teeth in contact and the angle turned through by the larger wheel for one pair of teeth in contact.

(5 × 12 = 60 marks)

F 9323 (Pages : 3) Reg. No.....12 copies.....

Name.....ME.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2011

Fourth Semester

ENGINEERING MATHEMATICS—III (CMELRPTANSUF)

(2002 admissions onwards—Supplementary)

[Common to all branches]

Time : Three Hours Maximum : 100 Marks

Answer **one** *full question from each module..*
Each full question carries 20 marks.
Use of statistical tables is permitted.

Module 1

1. (a) Solve $x^2 y dx = (x^3 - y^3)\, dy$; $y(1) = 1$. (5 marks)

(b) Solve $y' = \dfrac{2x + 2y - 1}{3x + y - 2}$. (5 marks)

(c) A tank contains 100 litres of fresh water. 2 litres of brine, each containing 1 gm of dissolved salt, run into the tank per minute, and the mixture kept uniform by stirring uniformly. Water runs out at the rate of 1 litre per minute. Find the amount of salt present when the tank contains 150 litres of brine.

(10 marks)

Or

(d) Solve $y = x + 2\tan^{-1} p$. (5 marks)

(e) Solve $e^{4x}(p-1) + e^{2y} p^2 = 0$. (5 marks)

(f) Calculate the amount of heat passing through 1 cm^2 of a refrigerator wall, if the thickness of the wall is 6 cm and the temperature inside the refrigerator is 0°C while outside it is 20°C. Assume k = 0.0002.

(10 marks)

Module 2

2. (a) Solve $q(p - \cos x) = \cos y$. (5 marks)

(b) Solve by Charpit's method : $pxy + pq + qy = yz$. (8 marks)

(c) Solve $\dfrac{\partial^2 z}{\partial x^2} - 2\dfrac{\partial^2 z}{\partial x \partial y} + \dfrac{\partial^2 z}{\partial y^2} = \sin x$. (7 marks)

Or

Turn over

(d) Find the complete solution of :

$$\frac{\partial^3 z}{\partial x^3} - 4\frac{\partial^3 z}{\partial x^2 \partial y} + 4\frac{\partial^3 z}{\partial x \partial y^2} = 4\sin(x + y).$$

(10 marks)

(e) A tightly stretched string with fixed ends points $x = 0$ and $x = l$ is initially in a position given by $y = y_0 \sin^3\left(\frac{\pi x}{l}\right)$. If it is released from rest from its position, find the displacement $y(x, t)$.

(10 marks)

Module 3

2. (a) Find the Fourier Integral representation of the function :

$$f(x) = \begin{cases} c, & x < 0 \\ 1/2, & x = 0 \\ e^{-x}, & x > 0 \end{cases}$$

(8 marks)

(b) Find the Fourier sine and cosine transforms of $2e^{-5x} + 5e^{-2x}$.

(12 marks)

Or

(c) Using Parseval's identity show that $\int_0^\infty \frac{x^2 dx}{(1+x^2)^2} = \pi/4$.

(10 marks)

(d) Solve the integral equation $\int_0^\infty f(\theta)\cos\alpha\theta\, d\theta = \begin{cases} 1-\alpha, 0 \le \alpha \le 1 \\ 0, \quad \alpha > 1 \end{cases}$ Hence evaluate $\int_0^\infty \frac{\sin^2 t}{t^2} dt = \frac{\pi}{2}$.

(10 marks)

Module 4

4. (a) The probability that a man aged 70 will live to be 75 is 0.65. What is the probability that out of ten men now 70, at least 7 would live to be 75 ?

(8 marks)

(b) An aptitude test for selecting design Engineers in an IT firm is conducted on 1000 candidates. The average score is 42 and the standard deviation of score is 24. Assuming normal distribution for the scores, find :

(i) The number of candidates whose scores exceed 60.

(ii) The number of candidates whose scores lie between 30 and 60.

(12 marks)

(c) In a certain factory turning razor blades, there is a small chance of 0.002 for any blade to be defective. The blades are supplied in packets of 10. Use Poisson distribution to calculate the approximate number of packets containing no defective, one defective and three defective blades respectively in a consignment of 10,000 packets.

(12 marks)

(d) Find the equation of the best fitting normal curve to the following distribution :

x :	0	1	2	3	4	5
y :	13	23	34	15	11	4

(8 marks)

Module 5

5. (a) In a group of 50 first cousines there were found to be 27 males and 23 females. Ascertain if the observed proportions are inconsistent with the hypothesis that the sexes should be in equal proportion ?

(10 marks)

(b) Fit a binomial distribution to the data :

x :	0	1	2	3	4	5
f :	36	144	340	282	163	25

and test for goodness of fit, at the level of significance 0.05.

(10 marks)

Or

(c) The correlation between height and weight in a sample of 200 ten year old boys is 0.7 and the correlation between height and weight in a sample of 250 ten year old girls is 0.62. Is the difference significant ?

(10 marks)

(d) A research worker wishes to estimate mean of a population by using sufficiently large sample. The probability is 95% that sample will not differ from the true mean by more than 25% of the S.D. How large a sample should be taken ?

(10 marks)

[5 × 20 = 100 marks]

F 9354 (Pages : 3) **Reg. No.....**

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2011

Fourth Semester

Branch : Mechanical Engineering

MACHINE DRAWING – II (M)

(2002 Admissions onwards–Supplementary)

Time : Four Hours Maximum : 100 Marks

1. Details of a Lathe tool post are shown in Fig 1 (on page 2). Assemble the parts and draw the following views :
   (a) Elevation, right half in section. (20 marks)
   (b) Plan. (20 marks)
2. Details of a Steam stop valve are shown in Fig 2 (on page 3). Assemble the parts and draw the following views :
   (a) Elevation, right half in section. (40 marks)
   (b) Top View. (20 marks)

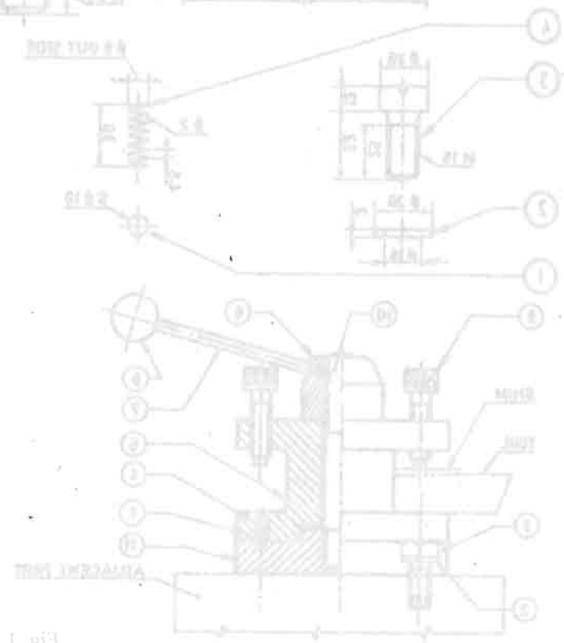

Fig. 1

Fig. 2

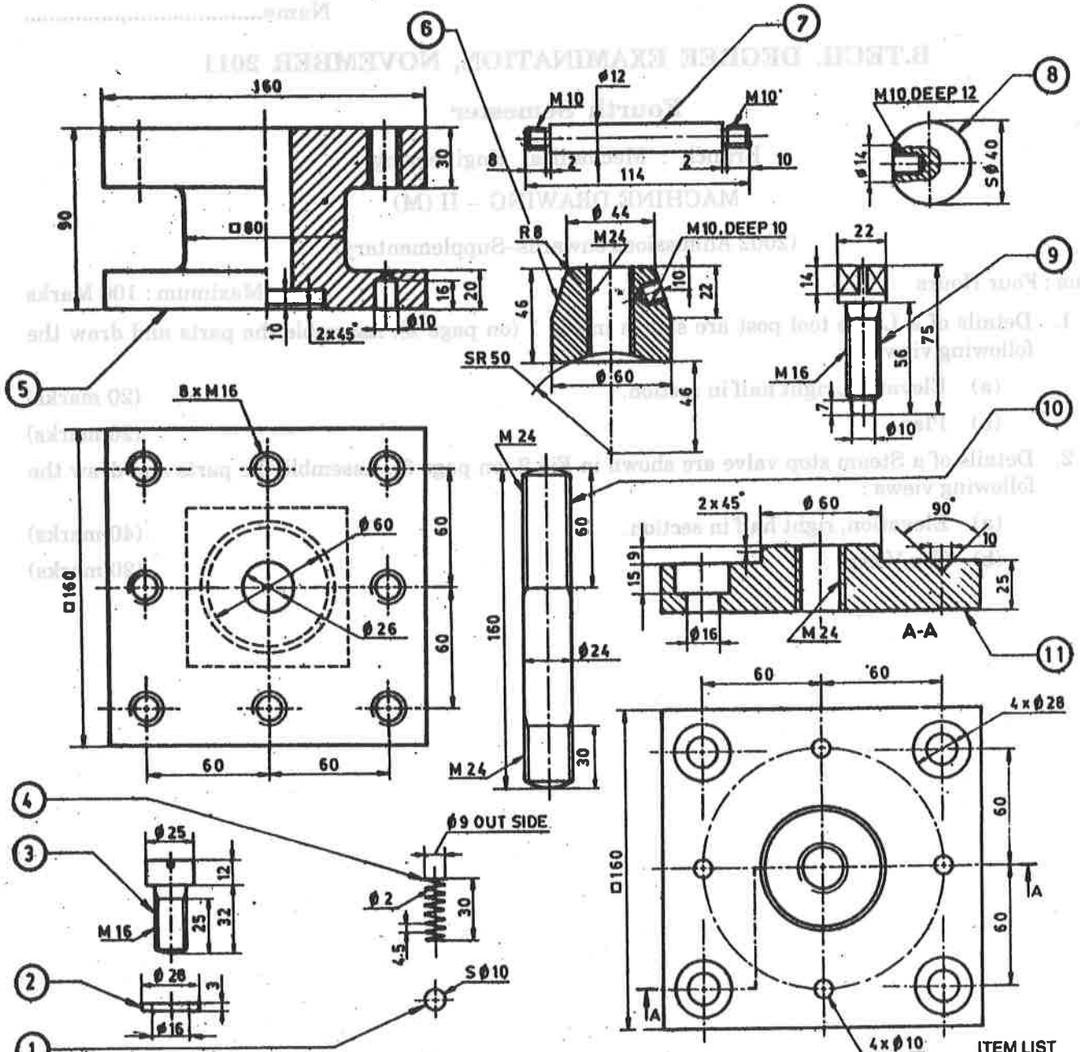

Fig. 1

ITEM LIST

Item	Description	Qty.	Material
1	Ball	1	Steel
2	Washer	4	M.S.
3	Grub screw	4	M.S.
4	Spring	1	Steel
5	Tool holder	1	Steel
6	Clamping nut	1	Steel
7	Handle	1	M.S.
8	Knob	1	Ebonite
9	Screw (Square headed)	8	M.S.
10	Stud	1	M.S
11	Base plate	1	Steel

LATHE TOOL POST

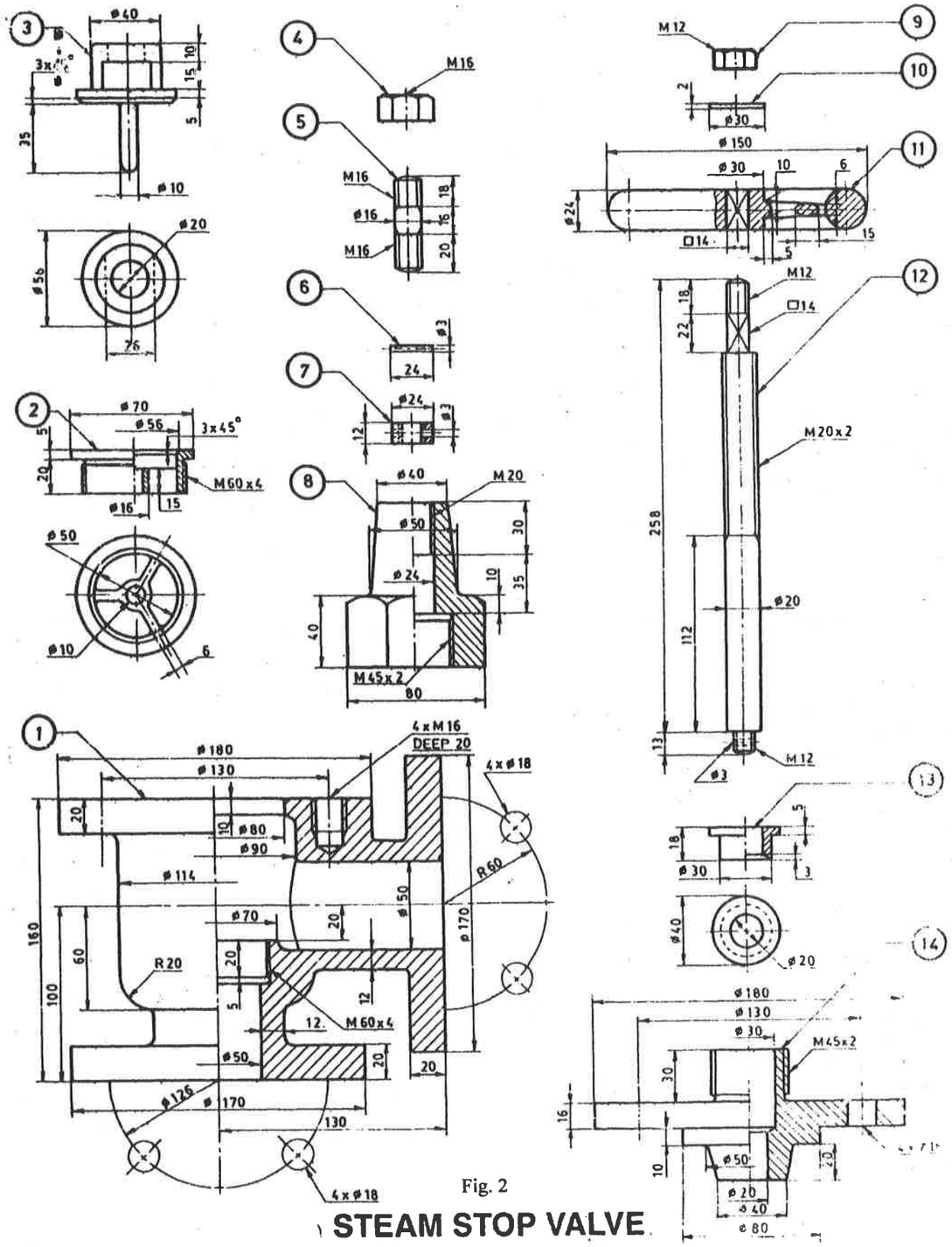

Fig. 2

STEAM STOP VALVE

F 9363 (Pages : 3) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2011

Fourth Semester

Branch : Mechanical Engineering / Automobile Engineering

ELECTRICAL TECHNOLOGY (MU)

(2002 Admissions onwards—Supplementary)

Time : Three Hours Maximum : 100 Marks

Part A

Answer **all** *questions.*
Each question carries 4 *marks.*

1. Is it possible for transformer to have a negative voltage regulation ? Explain.
2. Explain why a small change in motor speed and counter emf will produce correspondingly larger changes in armature current ?
3. Explain why alternators are designed intentionallyto have a high ratio or armature reactance to resistance ?
4. The induction motor is sometimes called a variable frequency transformer. In the light of this statement, explain the conditions under which the rotor and stator frequencies are the same.
5. In the traction drive, why the torque required during free running is lower than the torque required during starting ?
6. What are the advantages of using electric braking instead of mechanical brakes ?
7. What is feedback in amplifiers ? What are its applications ?
8. State any four applications of astable multivibrator :
9. Why 'pulse triggering' is preferred and when does it fail in SCR ?
10. Explain what is meant by (i) firing angle and ; (ii) conduction angle with reference to SCR ?

(10 × 4 = 40 marks)

Part B

Answer **either** *section (a) or (b) of each module.*
Each full question carries 12 *marks.*

Module 1

11. (a) A 25KVA transformer has 500 turns on the primary and 50 turns on the secondary winding. The primary is connected to 3000 V, 50Hz supply. Find the full-load primary and secondary currents, the secondary e.m.f. and the maximum flux in the core. Neglect leakage drops and no-load primary current.

(12 marks)

Or

Turn over

(b) A 250 V dc shunt motor has an armature circuit resistance of 0.5 Ω and a field circuit resistance of 125 Ω. It drives a load at 1000 r.p.m. and takes 30 A. The field circuit resistance is then slowly increased to 150 Ω. If the flux and field current can be assumed to be proportional and if the load torque remains constant, calculate the final speed and armature current.

Module 2

12. (a) A 3- phase, 50 Hz, star-connected 1000 KVA, 2300 volts, alternator gives a short circuit current of 400A for a certain field excitation. With the same excitation, open circuit voltage was 1328 volts (phase value) The dc resistance between the two lines is 0.412 ohms. Calculate the full load voltage regulation at 0.8 pf lagging. (12 marks)

Or

(b) (i) Explain the direct on-line starting in a 3 phase induction motor. (6 marks)

(ii) With neat diagrams explain the concept of double field revolving theory in single phase induction motor. (6 marks)

Module 3

13. (a) (i) Explain with neat diagrams, the different modes of operation of a DC drive ? (6 marks)

(ii) Explain with suitable examples, the individual drive and group drives, bringing out their merits and demerits. (6 marks)

Or

(b) (i) Why it is necessary to usually combine dynamic braking with regenerative braking ? Can you get rid of mechanical brakes when dynamic braking is used ? (8 marks)

(ii) What makes the squirrel cage induction motor the best for traction application ? (4 marks)

Module 4

14. (a) With a neat circuit diagram, explain the working of a Colpitts oscillator ? (12 marks)

Or

(b) (i) Draw the diagrams of RC differentiating and integrating circuits and describe their working. (8 marks)

(ii) What are Lissajous figures ? How they are obtained ? (4 marks)

Module 5

15. (a) With constructional details, describe the working principle of SCR. With a neat sketch explain the two-transistor model and therefrom obtain conditions for turn ON and turn OFF of the device. (12 marks)

Or

(b) With a neat sketch and equations explain the principle of dielectric heating ? Explain its advantages and applications ? (12 marks)

(5 × 12 = 60 marks)

F 9345

(Pages : 2)

Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2011

Fourth Semester

Branch : Mechanical Engineering/Automobile Engineering

MACHINE TOOLS (M, U)

(2002 Admissions onwards—Supplementary)

Time : Three Hours

Maximum : 100 Marks

Answer **all** *questions.*

Part A

Each question carries 4 *marks.*

1. How is a lathe specified ?
2. What is a countersinking process ?
3. What are the advantages and disadvantages of hydraulically driven shapers ?
4. State the advantages of down milling process.
5. What are the factors that affect the performance of grindling wheels ?
6. Explain gear shaping operation.
7. What are the classifications of NC machines ?
8. What are the elements of a program controlled machine tool ?
9. What do you mean by a part family in cellular manufacturing ?
10. What is a machining centre ?

(10 × 4 = 40 marks)

Part B

Each question carries 12 *marks.*

11. Explain the different methods of taper turning in a lathe.

Or

12. Explain the following operations :

    (i) Reaming. (ii) Boring. (iii) Manufacture of bushes.

13. Explain :

    (i) Slotting of keyways. (ii) Internal and external broaching. (iii) Work holding devices in shaper.

Or

14. What do you mean by indexing in a milling operation ? Explain the different methods of indexing.
15. Explain (i) Grinding wheel specifications and (ii) Gear form cutters.

Or

16. Explain (i) Ultrasonic impact grinding (ii) Burnishing process.

Turn over

17. (i) What is an automated chipless process ?

(ii) With sketches explain single spindle and multi spindle automatic screw machines.

(3 + 9 = 12 marks)

Or

18. Explain (i) NC tooling (ii) Semi automatic multi tool centre lathe (iii) Special purpose machine tools.

19. Describe (i) Flexible Manufacturing System (ii) Just in Time production.

Or

20. Explain (i) Computer Integrated Manufacturing (ii) Manufacture of ceramic circuit boards.

(5 × 12 = 60 marks)