FACULTY OF ENGINEERING

B.E. 4/4 (M/P) I-Semester (Main) Examination, November / December 2012

Subject : Composite Materials
(Elective-I)

Time : 3 Hours   **Max. Marks: 75**

Note: Answer all questions of Part - A and answer any five questions from Part-B.

PART – A (25 Marks)

1. Why fiber reinforcements are of thin diameter?   (3)

2. What are the drawbacks of polymer matrix composites?   (2)

3. Define prepareg. What are its limitations?   (2)

4. What is the difference B/W open mould and closed-mould process?   (3)

5. For a composite E_f=100 Gpa, E_m=10Gpa. Calculate the percentage increase in load
   carrying capacity of a uni-axial bar when the fiber increased from 70 to 80%.   (3)

6. Write Halpin-Tser equations describing the terms clearly.   (2)

7. What are the fracture modes in composites?   (2)

8. Differentiate between balanced and specially orthotropic laminates.   (3)

9. Define critical fiber length as far as fiber pull-out is concerned.   (3)

10. Define maximum strain criterion.   (2)

PART – B (5x10=50 Marks)

11. Explain with neat sketches, any two of the following :   (10)
    (a) Pultrusion
    (b) Injection moulding
    (c) Filament winding process

12.(a) Clearly define a composite material give the complete classification of
       composite materials.   (5)

   (b) What is the role of matrix and reinforcement in composite materials? Explain.   (5)

13. Determine the modulus of elasticity of FRP in the fiber direction and in
    transverse directions, with proper representative sketches. Use MOM
    approach.   (10)

14.(a) For an osthotropic UD lamina, Engineering properties along the principal
       axes: E_1=150 GPa, E_2=50GPa; γ_{12}=0.2 and G_{12} = 5 GPa. Determine the
       reduced stiffness matrix elements.   (5)

   (b) The longitudinal modulus of a glass fiber reinforced lamina is to be doubled by
       substituting the glass fibers with carbon fibers. The total volume fraction remains
       unchanged at 0.5. Calculate the volume fraction of fibers
       E_C=300 GPa ; E_G=70GPa; E_{matrix} = 5 GPa   (5)

15. For a UD lamina, with the shown state of stress, check the safety based on different failure theories with the following material properties. (10)
F_{1t}=1280 MPa ; F_{1C}=622 MPa ; F_{2t}=49 MPa; F_{2C}=245 MPa
F_{12}=69 MPa ; E_1=35 GPa ; E_2=7 GPa; G_{12}= 3 GPa
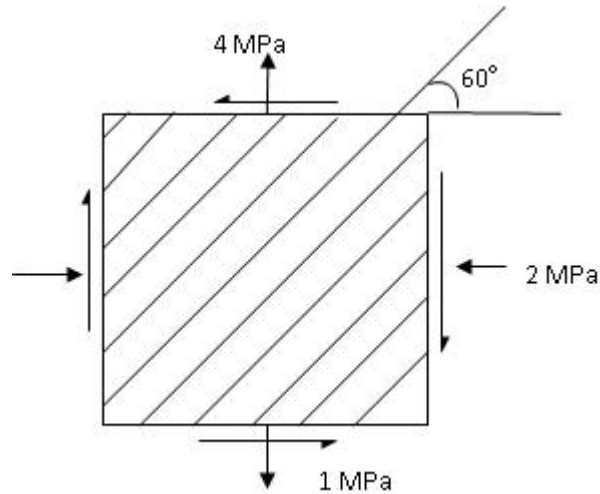
16. A Lamina is made up of four graphite epoxy plies each 1 mm thick. They are stacked and bonded to form a laminate [(0/90)_s]. Constant [A], [B] and [D] matrices for zero degree. (10)

$$[Q] = \begin{bmatrix} 150732 & 2713 & 0 \\ 2713 & 10048 & 0 \\ 0 & 0 & 6000 \end{bmatrix} \text{ N / mm}^2$$

17. (a) List the advantages and dis-advantages of composite materials. (5)
    (b) Distinguish between thermosetting and thermoplastic polymers. (5)

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FACULTY OF ENGINEERING

B.E. 4/4 (M/P) I-Semester (Main) Examination, November / December 2012

Subject : Neural Networks
(Elective-I)

Time : 3 Hours   Max. Marks: 75

Note: Answer all questions of Part - A and answer any five questions from Part-B.

PART – A (25 Marks)

1. What are the components of a knowledge based information systems?   (3)
2. What is hybrid intelligence?   (2)
3. What is a meda line?   (2)
4. What are the steps involved in building of a neural based AI systems?   (3)
5. State the limitations of Back-propagation algorithm.   (3)
6. Distinguish between auto association and Bidirectional – Associative memory.   (2)
7. What are the advantages of a sigmoid function as activation function over

   a hard-limiting functions?   (2)
8. Why competitive learning is also called Winner-take-all?   (3)
9. What are the uses of Hopfield nets?   (2)
10. What are the various ways of data representation?   (3)

PART – B (5x10=50 Marks)

11. (a) What is an ANN? Discuss about the applications of ANNS.   (6)
    (b) Distinguish between knowledge oriented and data-oriented processing.   (4)

12. What is a perceptron? Explain about perceptron convergence theorem?   (10)

13. Discuss about Back-propagation algorithm indetail.   (10)

14. (a) What is BAM? Briefly explain?   (4)
    (b) Explain the capacity of Hopfield net with a suitable example.   (6)

15. What is SOM? Discuss about Kohonet Networks.   (10)

16. Discuss about various AI learning mechanisms.   (10)

17. Write short notes on :
    (a) Boltzman machines   (5)
    (b) Multilayer perceptron   (5)

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FACULTY OF ENGINEERING

B.E. 4/4 (M/P) I-Semester (Main) Examination, November / December 2012

Subject : Computational Fluid Flows
(Elective-I)

Time : 3 Hours   **Max. Marks: 75**

Note: Answer all questions of Part - A and answer any five questions from Part-B.

PART – A (25 Marks)

1. Write three dimensional continuity equation.   (2)

2. Define compressible and incompressible flows. Is water a compressible fluid?   (3)

3. Differentiate turbulent and laminar flows.   (2)

4. Explain Prandt's mixing length model.   (3)

5. Write Euler explicit difference formulation for the following equation.   (2)

$$\frac{\partial T}{\partial t} = r \frac{\partial^2 T}{\partial x^2}$$

6. Define the terms stability and consistency and convergence.   (3)

7. Define grid generation.   (2)

8. Differentiate Jacobi and Gauss Seidel methods.   (3)

9. Write finite volume formulae for one dimensional heat conduction equation.   (3)

10. Write the merits of finite volume method.   (2)

PART – B (5x10=50 Marks)

11. Derive Euler's momentum equation applicable for inviscid flow.

12. Explain the classification of Partial Differential Equations and write short notes about the solution domain of any two types of PDE.

13. Derive second order accurate, backward difference expression for second derivate of a function using Taylor's series method.

14. Derive 2-D vorticity transport equation form N-S equations.

15. Explain SIMPLE algorithm to solve steady incompressible flow equations.

16. For the following linear equations find the solution using Point Jacobi iterations up to three steps with initial guess [3 3 3].
    $10x_1 + x_2 - x_3 = 17$
    $2x_1 + 20x_2 + x_3 = 28$
    $3x_1 - x_2 + 25x_3 = 105$

17. Formulate the solution matrix for one dimensional transient heat conduction equation using explicit method. Take four nodes and Fo=$(\alpha\Delta t)/(\Delta x^2)$
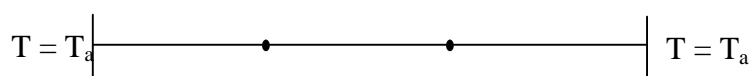
$$T = T_a \vdash\!\!\!—\!\!\bullet\!\!—\!\!\bullet\!\!—\!\!\dashv T = T_a$$

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FACULTY OF ENGINEERING

B.E. 4/4 (M/P.) I-Semester (Main) Examination, November / December 2012

Subject : Automobile Engineering
(Elective-I)

Time : 3 Hours   **Max. Marks: 75**

Note: Answer all questions of Part - A and answer any five questions from Part-B.

PART – A (25 Marks)

1. What is carburettor and carburetion?   (3)

2. State the functions of compression rings in the piston.   (2)

3. What is the function of starting motor?   (2)

4. What are the objects of lubrication? Name the engine parts of a car which

   require lubrication.   (3)

5. What is toe in and toe-out?   (2)

6. What is the aspect ratio of a tyre?   (2)

7. What is steering ratio? How is steering gear ratio determined?   (3)

8. What are the advantages of independent front end suspension ?   (3)

9. What is a torsion bar?   (2)

10. State the Euronorms and Bharat norms.   (3)

PART – B (5x10=50 Marks)

11.(a) Compare mechanical fuel injection system with electronic fuel injection
    system.   (6)
   (b) Why is carburettor needed in petrol engine? Why not is diesel engine?   (4)

12.(a) What are the primary and secondary objects of lubrication?   (4)
   (b) Differentiate between wet sump and dry sump lubrication systems.   (6)

13.(a) Differentiate between pump circulation cooling system and
    thermosyphon system.   (5)
   (b) With a neat sketch explain the working principle of radiator.   (5)

14.(a) What is battery self-discharge ? What are the slow rate and quick rate
    charging methods?   (5)
   (b) Differentiate between battery ignition system and coil ignition system.   (5)

15. Explain the following terms with neat sketches: (10)
    (a) Camber   (b) caster   (c) steering axis inclination (d) King pin inclination

16.(a) What is the difference between conventional suspension and independent
    suspension system?   (6)
   (b) What are the advantages of tubeless tyres?   (4)

17. Write a short notes on the following: (10)
    (a) Semi automatic and automatic gear boxes
    (b) Hydraulic brake system
    (c) Pollution control technologies
    (d) Catalytic converter

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FACULTY OF ENGINEERING

B.E. 4/4 (M/P) I-Semester (Main) Examination, November / December 2012

Subject : Design for Manufacture
(Elective-I)

Time : 3 Hours   **Max. Marks: 75**

Note: Answer all questions of Part - A and answer any five questions from Part-B.

PART – A (25 Marks)

1. Define manufacturability and list out its design principles.   (3)
2. Briefly explain about composites.   (2)
3. What is metal extrusion ? Also mention its salient features.   (3)
4. List out various characteristics of drilled parts.   (2)
5. What are the advantages and applications of die casting ?   (3)
6. Explain centreless grinding.   (2)
7. What are the characteristics of welded plastic articles?   (2)
8. Briefly explain about gear box assembly.   (3)
9. Differentiate between bolted and screwed connections.   (2)
10. Define Group Technology and mention its advantages.   (3)

PART – B (5x10=50 Marks)

11.(a) Discuss in detail about the concept of geometrical tolerances and
        highlight its influence in manufacturing.   (5)
   (b) Explain in detail about significance and applications of copper and brass. (5)

12.(a) Describe about metal stamping and blanking with examples.   (5)
   (b) List out different specialized forming methods and explain any one of them. (5)

13.(a) Explain about electrical discharged parts and rolled parts.   (5)
   (b) Discuss about the concept and working principle of investment casting.   (5)

14.(a) Differentiate between rotational moulded and blow moulded parts.   (5)
   (b) Discuss about salient features and applications of thermosetting plastics. (5)

15. Explain in detail about computer aided manufacturing.   (10)

16.(a) What are the advantages and applications of Aluminium?   (5)
   (b) Discuss about various characteristics and applications of spun metal parts. (5)

17. Write short notes on any three of the following: (10)
    (a) Tolerances control
    (b) Ferrous steel
    (c) Bearing assembly
    (d) Product design requirements

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FACULTY OF ENGINEERING

B.E. 4/4 (Mech./Prod.) I-Semester (Main) Examination, November / December 2012

Subject : Non Conventional Energy Sources
(Elective-I)

Time : 3 Hours   **Max. Marks: 75**

Note: Answer all questions of Part - A and answer any five questions from Part-B.

PART – A (25 Marks)

1. What do you understand by green house effect and what are its consequences?   (3)
2. What is the present annual primary energy consumption of the world? At what rate is it growing?   (2)
3. Define solar constant. What is its value?   (2)
4. What is a solar pond? What are its applications?   (2)
5. Describe the principle of solar photovoltaic energy conversion.   (3)
6. What are the most favourable sites for the installation of wind turbines? (3)
7. Comment on the environmental impacts of wind energy.   (2)
8. What are the environmental considerations while selecting geothermal energy as a source for utilization?   (3)
9. Explain the term biomass gasification.   (3)
10. What are the limitations of tidal energy?   (2)

PART – B (5x10=50 Marks)

11. List the various non conventional energy resources. Give their availability, relative merits and their classification.   (10)

12. (a) Calculate the angle made by beam radiation with the normal to a flat plate collector, tilted at 30° to the horizontal, pointing due South, located at New Delhi (28° 55'N, 77° 12'E) on 1st June at 11.00 am (IST). The standard IST is 81^o44'E.   (5)
    (b) Define the terms declination angle, hour angle, zenith angle, solar azimuth angle and angle of incidence.   (5)

13. (a) With a neat sketch, explain the construction and working of a central tower receiver power plant.   (5)
    (b) With a schematic diagram, explain the construction and working of a Stand-Alone Solar PV (Photovoltaic) system.   (5)

14. (a) Using Betz model of a wind turbine, derive the expression for the power extracted from the wind. What is the maximum theoretical power that can be extracted and under what condition?   (7)
    (b) Comment on the relative features of HAWT and VAWT.   (3)

15. Explain :
    (a) Vapour dominated system   (4)
    (b) Liquid dominated system and   (4)
    (c) Hot water system of energy extraction used with hydrothermal resources (2)

16. (a) Explain the process of gasification of solid bio-fuels. What is the general composition of the gas produced and what is its heating value?   (4+3)
    (b) Briefly explain about the different types of bio-fuels.   (3)

17. (a) Explain the working of an open cycle OTEC plant with a neat sketch. (7)
    (b) What is the source of tidal energy? What is the minimum tidal range required for a practical tidal plant? How much is the potential in tides? (3)

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FACULTY OF ENGINEERING

B.E. 4/4 (Common to All) I-Semester (Main) Examination, November / December 2012

Subject : Entrepreneurship
(Elective-I)

Time : 3 Hours   **Max. Marks: 75**

Note: Answer all questions of Part - A and answer any five questions from Part-B.

PART – A (25 Marks)

1. Define entrepreneurship.   (2)
2. What are the salient features of small scale industries?   (3)
3. Differentiate between manager and an entrepreneur.   (2)
4. Explain briefly about first generation entrepreneurs.   (2)
5. What are the various sources of project financing in India?   (2)
6. List out various factors to be considered in choosing the right technology.   (2)
7. Define a project and mention different parameters to be considered in
   project formulation.   (3)
8. Discuss about significant features of marketing analysis.   (3)
9. What is behaviour? And explain the role of motivation in behaviour of an
   entrepreneur.   (3)
10. Define personality and list out its various attributes.   (3)

PART – B (5x10=50 Marks)

11.(a) List out various opportunities and challenges of entrepreneurs in Indian
       context.   (5)
(b) Explain the role of entrepreneurs in developing the economical status of a country.   (5)

12.(a) Explain in detail about women entrepreneurs by highlighting the favourable
       conditions for them in Indian context.   (5)
   (b) Define an Idea and elaborate various methods used for Idea generation.   (5)

13. What is project formulation? Explain in detail about marketing, financial
    and technical analysis in project formulation.   (10)

14. Discuss in detail about the concept and salient features of PERT and CPM
    techniques and explain their role in helping an entrepreneur in successful completion
    of a project.   (10)

15.(a) What is leadership? How any entrepreneur develops leadership qualities
       required to be successful in his profession?   (5)
   (b) Explain in detail about Time management matrix.   (5)

16.(a) Discuss about the concept of assessment of text burden and how it will
       be helpful to an entrepreneur in planning and managing finance
       effectively.   (5)
   (b) "Entrepreneurs are made not born". Give your views with proper justification.   (5)

17. Write short notes on any three of the following :   (10)
    (a) Partnership firm
    (b) Large scale industries
    (c) Human aspects in project management
    (d) Change behaviour

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